Anthropomorphism and OTA chatbot adoption: A mixed methods study

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Abstract: Anthropomorphizing chatbots can facilitate effective customer interaction. Based on a mixed method, this study explores perceived chatbot anthropomorphism cues and their effects on customers' chatbot usage intentions in the online travel agency (OTA) context. Findings suggest that (1) social presence cues and emotional message cues are major anthropomorphic cues of interest for customers and enterprises; (2) social presence cues by simply using a human avatar or mentioning the customer's name might not be sufficient; (3) anthropomorphic emotional message cues are essential in shaping customers' usage intentions; and (4) perceived trustworthiness, intelligence, and enjoyment mediate the above effect.

Keywords: Chatbot anthropomorphism, social presence cues, emotional message cues, perceived trustworthiness, perceived intelligence, perceived enjoyment, usage intention, OTA, tourism marketing, mixed method

1. INTRODUCTION

Technological advances are transforming service delivery in the hospitality and tourism field (Pillai and Sivathanu 2020). The integration of artificial intelligence (AI) into customer service represents an emerging technology in tourism, through which enterprises can effectively promote products and offer services online (Huang and Rust 2018; McLean et al. 2020; Pillai and Sivathanu 2020). Chatbots, with their ability to enhance service productivity, improve the user experience, and reduce operating costs, are considered a promising way to tackle customers' growing care demands (de Kervenoael et al. 2020; Lu, Cai, and Gursoy 2019)—especially as demand for digitalized travel services surges in the post-pandemic era. In a report, Ward (2021) noted that people have expressed enthusiasm for using robots to communicate during the pandemic; use of chatbot services rose from 49% in 2019 to 67% in 2020. Further, de Kervenoael and colleagues (2020) called for more empirical studies on tourists' and hospitality businesses' perceptions of and attitudes towards chatbots to ensure that the infiltration of chatbots in these contexts is sustainable.

Online travel sales are expanding worldwide and will continue to climb (McLean et al. 2020; Statista 2020). Increased online booking demand enables online travel providers to seek more advanced customer support solutions. AI-enabled technology has provided a convenient means of enhancing customer service (Lalicic and Weismayer 2021): chatbots represent an efficient yet inexpensive way for online travel agencies (OTA) to interact with customers as they book tourism-related products (Melián-González, Gutiérrez-Taño, and Bulchand-Gidumal 2021). Meanwhile, Roy and Naidoo (2021) indicated that more effective interaction is required to shape digital service experiences as chatbot services become more popular. Although greater empirical attention has recently been given to human–chatbot interaction, associated tourism and hospitality research is generally limited (Melián-González, Gutiérrez-Taño, and Bulchand-Gidumal 2021; Pillai and Sivathanu 2020; Tussyadiah 2020).

Chatbots are gaining popularity and attention as a service innovation in the travel and hospitality industry, especially in terms of anthropomorphism (Lu, Cai, and Gursoy 2019; Yang et al. 2021). However, the limited studies on this topic have provided inconsistent evidence concerning the influence of anthropomorphism on customers' willingness to use chatbots. Some scholars have indicated that chatbot anthropomorphism can enhance the customer experience (Choi, Mehraliyev, and Kim 2020; McLean et al. 2020; Tussyadiah 2020). Other researchers have argued that chatbot anthropomorphism can elevate customers' expectations, which may lead customers to feel disappointed and disinterested in these devices (Christou, Simillidou, and Stylianou 2020; Tung and Au 2018; Yang et al. 2021). As an emerging technology in tourism and hospitality, further research is needed to explore customers' concerns about chatbots' anthropomorphism. In addition, the mechanisms that transmit the impact of various chatbots' anthropomorphic cues have not been rigorously investigated.

Considering the aforementioned research gaps, based on semi-structured interviews, this paper first seeks to identify anthropomorphism cues about which customers and enterprises are concerned when using chatbots in the online travel services context. Based on preliminary findings from a qualitative study, three experiments were designed to examine the effects of two cues (i.e., social presence and emotional messages) and the associated mechanisms on consumers' intentions to use chatbots via OTAs. Through a sequential mixed method approach, this study represents an initial attempt to establish a holistic understanding of multiple anthropomorphic design cues of OTA chatbots on consumers' usage intentions. It also enriches the literature on chatbot anthropomorphism in tourism and hospitality by showing that well-designed emotional message cues can influence consumers' perceptions and usage intentions, whereas social presence cues are insufficient. In addition, this research

elucidates how perceived anthropomorphism influences customers' intentions to use OTA chatbots.

2. LITERATURE REVIEW

2.1 Chatbot anthropomorphism

Given AI's potential to continually refine customer service delivery and promote product sales, the use of chatbots to provide human-centered services has attracted growing interest from academics and business practitioners (Elsholz, Chamberlain, and Kruschwitz 2019; Luo et al. 2019). Scholars have pointed out that chatbots imbued with diverse anthropomorphic cues have valuable implications for research and practice (Araujo 2018; Choi, Mehraliyev, and Kim 2020; McLean et al. 2020; Tussyadiah 2020). Anthropomorphism refers to ascribing human characteristics (i.e., appearance or language style) to a machine to convince users that the machine is a person (Landwehr, Mcgill, and Herrmann 2011; Lu, Cai, and Gursoy 2019; Nass and Moon 2000). Research has shown that psychological and emotional connections can be better established when anthropomorphizing objects (Wan and Chen 2021). Indeed, in line with the computers are social actors (CASA) paradigm (Nass, Steuer, and Tauber 1994), human beings prefer to treat technical items (e.g., chatbots) like real people. This assertion is supported by person construal theory, which indicates how people cognitively process humanized objects as human beings (Freeman and Ambady 2011; Han et al. 2019).

Scholars have contended that anthropomorphic design is a prime means of boosting customers' satisfaction during conversational human–AI interaction (e.g., Rietz, Benke, and Maedche 2019). As described by CASA, people tend to treat computers displaying social reactions on the basis of robots' anthropomorphism (Reeves and Clifford 1996; Złotowski et al. 2018). Based on realism maximization theory (Groom et al. 2009; Moriuchi 2021), researchers often seek to determine how robots can be made to appear and behave more human-like by minimizing comparisons with people. Examples include manipulating a chatbot's visual cues through its anthropomorphic avatar to test users' perceptions (Kuligowska 2015; Rietz et al. 2019); assigning the chatbot a human name as an identity cue;

and manipulating conversational cues with which the chatbot does or does not acknowledge a user's responses to increase its social presence (Go and Sundar 2019; Qiu and Benbasat 2009). Several anthropomorphic message design cues—including human dialogical cues (e.g., "Hello"), message interactivity (e.g., the level of contingency in message exchanges), warmth, competence, temporal frames, communication quality (e.g., information accuracy), self-disclosure, excusing, and thanking—allow chatbots to appear more human, promoting social and emotional connectedness (Araujo 2018; Chung et al. 2020; Feine et al. 2019; Go and Sundar 2019; Roy and Naidoo 2021). However, customers' and enterprises' concerns about chatbots' anthropomorphism have yet to be investigated comprehensively, particularly in the tourism domain. According to Kervenoael et al. (2020), more empirical research is needed to understand tourists' perceptions of and attitudes towards chatbots in order to ensure these agents' sustainability in tourism settings.

In addition, the literature has revealed an inconsistent relationship between AI anthropomorphism and behavioral intention. For example, Kuligowska (2015) reported that consumers are more amenable to humanized versus neutral chatbots. Yet anthropomorphism might not necessarily be conducive to AI adoption due to users' overly optimistic expectations (Fernandes and Oliveira 2021; Wirtz et al. 2018). Mende and colleagues (2019) found that anthropomorphic service robots can elicit greater consumer discomfort because of the "uncanny valley" (i.e., when service robots appear eerily similar to human staff), which can evoke adverse customer reactions. Further, Yang et al. (2021) recently identified inconsistent impacts of AI anthropomorphism on users' experiences. Studies have indicated that disappointing experiences can occur due to the lower ability of anthropomorphic AI versus human counterparts (Christou, Simillidou, and Stylianou 2020; Tung and Au 2018).

2.2 Chatbot adoption in tourism

Chatbots have recently become an appealing solution to meet tourists' growing demand for travel services. Many global hotel chains, such as Marriott International and Hyatt Hotel Group, have introduced chatbot service functions to enhance the customer experience (Choi, Mehraliyev, and Kim 2020). Major platforms such as Facebook and WeChat have widely supported chatbots' provision of customer service (Luo et al. 2019). Introducing AI robot service into the tourism and hospitality domain seems beneficial; however, concerns about adopting chatbots in this area, which is of paramount importance for firms, remain unclear (Christou, Simillidou, and Stylianou 2020; Kuo, Chen, and Tseng 2017; McLean et al. 2020; Tuomi, Tussyadiah, and Stienmetz 2021).

In tourism, most work involving human–chatbot interaction has focused on identifying key attributes that affect consumers' acceptance. For example, Melián-González and colleagues (2020) found that expected performance, habits of interacting with chatbots, hedonic motivations, and human-like behavior directly affect customers' intentions to use chatbots. By incorporating context-specific variables into the technology adoption model (TAM), Pillai and Sivathanu (2020) suggested that perceived ease of use, perceived usefulness, perceived trust, perceived intelligence, and anthropomorphism all contribute to chatbot adoption intention. Later, Jiménez-Barreto, Rubio, and Molinillo (2021) constructed a framework depicting the direct effects of self-determined interaction (e.g., competence) and customers' experiences with chatbots (e.g., sensory experiences) on customers' attitudes towards and satisfaction with chatbots. Lei, Shen, and Ye (2021) found that compared with chatbot users, human service users rated their communication experience, attractiveness, and trust more highly. According to Lv et al. (2021), chatbots' cuteness positively affects customers' tolerance for service failure. Although chatbot design can be beneficial, the most useful

chatbot anthropomorphism cues and how these characteristics influence tourists' perceptions and usage intentions in the online travel context remain unclear.

3. METHODOLOGY

To achieve the research objective, a sequential exploratory mixed methods approach was adopted by conducting semi-structured interviews first (i.e., Phase 1) followed by three web-based experiments (i.e., Phase 2). Mixed methods can better verify the reliability and consistency of findings (Creswell and Clark 2017). As customers' and enterprises' concerns about chatbots' anthropomorphism in OTAs remain ambiguous, qualitative interviews were held in Phase 1 to identify customers' and enterprises' major concerns about chatbots' anthropomorphic cues for OTA chatbot usage and why these cues affected usage intention. A conceptual framework was developed based on the analysis of interviews in Phase 1. In Phase 2, three quantitative experimental studies were carried out to verify the framework proposed in the prior phase by empirically testing the effects of anthropomorphic cues (i.e., social presence cues and emotional message cues) on customers' chatbot usage intentions and the mechanisms underlying these effects. Experiments were conducted due to their internal validity and ability to uncover cause-and-effect relationships by manipulating an independent variable while controlling for the spurious effects of extraneous variables (Viglia and Dolnicar 2020). Appendix A presents a visual diagram of our mixed methods design.

3.1 Phase 1: Semi-structured interviews

3.1.1 Design and participants

Qualitative research is especially useful for in-depth exploration of tourists' perceptions and experiences (Zhao and Timothy 2017). As such, a qualitative interview was designed to delve into customers' and enterprises' concerns about chatbots' anthropomorphism at OTAs. Purposeful criterion sampling, in which participants are chosen in accordance with a key criterion (Palinkas et al. 2015), was initially used to select interviewees. This sampling approach was followed by convenience and snowball sampling to obtain specific participants

to ensure that our sample included diverse views, thus guaranteeing rigor (Heckathorn 2011). Sixty participants (i.e., 20 travel enterprise employees; 40 customers with chatbot use experience) were ultimately recruited; see Appendix B for details. Interviewees were from various industries, occupations, and backgrounds to promote triangulation as well as effectiveness and reliability (Willis, Jost, and Nilakanta 2007). Interviews lasted approximately 20–30 minutes and were conducted either face-to-face or via video or audio. All interviews were held in Chinese, recorded with participants' consent, and transcribed verbatim.

The semi-structured interview protocol was designed to prompt participants to discuss their concerns and experiences related to OTA chatbots' anthropomorphism. This approach afforded the researchers flexibility in exploring new possibilities (Harrell and Bradley 2009). Interview questions were designed and adjusted after a pilot interview process. Questions were intended to gain insight about interviewees' concerns and usage experiences involving OTA chatbots' anthropomorphism (e.g., "What are your concerns about OTA chatbots' anthropomorphism?"; "What will impress customers during their interactions with anthropomorphic chatbots offered by OTAs / What impressed you most when interacting with anthropomorphized OTA chatbots?"). Additionally, interviewees were asked questions about why these anthropomorphic factors influenced their experiences and usage intentions (e.g., "Why did these anthropomorphic factors affect customers' / your experience / satisfaction / intentions to use OTA chatbots?"). Beyond these questions, interviewees were encouraged to explain their answers and were asked follow-up questions (Kallio et al. 2016).

Thematic analysis was used to examine qualitative interview data (Braun and Clarke 2006). Transcripts were first reviewed several times and then analyzed via a three-stage coding process recommended by Glaser and Strauss (2017)—open coding, axial coding, and

selective coding—after which thematic patterns were identified and a hierarchy of themes was determined.

3.1.2 Interview findings and discussion

Two main interviewee concerned chatbot anthropomorphic cues were identified and concluded via thematic analysis from customers' and enterprises' perspectives. interviewees frequently mentioned chatbots' anthropomorphism (Figure 1), which has recently drawn close attention in human–AI interaction (Araujo 2018; Bartneck, Kulić, et al. 2009; de Visser et al. 2016; Go and Sundar 2019). Further, when discussing chatbots' anthropomorphism, interviewees often mentioned a chatbot's sense of humor, speaking like a human, having a human avatar, calling users by name, offering a self-introduction, and being able to respond to customers' feelings. These attributes were collapsed into two themes, namely emotional message cues (i.e., sense of humor, speaking like a human, and responding to customers' feelings) and social presence cues (i.e., having a human avatar, calling users by name, self-introduction), which indicated to users that "I'm a human".

"*Nowadays, many human customer service [agents] answer with set templates… standardized and polite…like robots.… I am getting used to it.… I may treat the chatbot as a human being when they answer my question politely.…By the way, they also use emoticons, making me think that the conversation is with a human customer service [agent].…I enjoy using this kind of chatbot, it is fun.*" (Interviewee #57)

"*In the past few years, smart customer service has been everywhere. Some of [the chatbots] are like people, [they have] personality, they can introduce themselves, and they will call me by name in the conversation. Oh, by the way, [the chatbot] also has a human name, which is interesting*." (Interviewee #20)

"*Many intelligent customer services now use human avatars instead of a robot, which make me unable to tell whether I am communicating with a robot or a human… it makes me confused.*" (Interviewee #35)

"*… when the chatbot calls me by name, I feel [the chatbot] is very friendly. It also makes me feel like I'm talking with a human. It's a new and interesting experience for me.*" (Interviewee #30)

Xu and Lombard (2017) defined social presence as a means of leading consumers to overlook (or fail to notice) the role of technology and instead perceive themselves to be engaging in social interaction. Studies have suggested that manipulating chatbots' anthropomorphic elements through an avatar, giving the chatbot a human name, applying politeness norms, and increasing self-disclosure during a self-introduction could strengthen chatbots' social presence (Go and Sundar 2019; Kuligowska 2015; Moon 2000; Qiu and Benbasat 2009; Schuetzler et al. 2018). A human avatar can invoke a sense of social presence through online context (Edwards et al. 2015; Sundar 2008). These attributes (i.e., a human avatar, human name, and self-introduction) could enhance the sense of closeness in human–chatbot interaction (Schuetzler et al. 2018; Wiener and Mehrabian 1968) and were thus identified as social presence cues in this study.

"*… the chatbot often cannot correctly understand my request. Even if I am impatient or angry, it still cannot give a correct response, unlike a human customer service [agent]. …The experience will be better if it can be a little more humane. … I think I would be more willing to use it if it could be emotionally responsive to my questions.*" (Interviewee #16)

"*I don't like chatbot service very much. … I think it's just an emotionless machine that answers questions coldly.*" (Interviewee #23)

"Some chatbots use very human-like humorous language, and sometimes their responses surprise me. I suspect it is a human but actually it is not…Every time a chatbot uses emojis, I

always suspect for a while that it is a human customer service [representative], which is quite funny." (Interviewee #30)

"*...allowing chatbots to use expressions, be appropriately mischievous and make little jokes can effectively enhance the user experience. Even if some questions cannot be answered or are answered incorrectly, consumers can still accept [the answer]. ... Emotions affect each other.*" (Interviewee #33, customer service employee #2)

"Customers do not like customer service with mechanized, rigid, ambiguous or irrelevant answers. ... We have received a lot of complaints about these... When a consumer has a problem, like a flight cancellation, hotel room change, etc., they will quickly transfer to human service, because we can empathize with them to solve the problem." (Interviewee #41, customer service employee #5)

A chatbot's communication ability is enhanced when emotional cues are incorporated into the message. Based on emotions as social information theory (Van Kleef 2009), researchers have pointed out that machines expressing emotion (e.g., sympathy, empathy) can convey humanness, thereby fostering effective interaction (Liu and Sundar 2018). Yet few scholars have tested chatbots' anthropomorphic emotional message cues, such as humor, empathy, and emotional expression using emoticons, in tourism and hospitality (Li, Chan, and Kim 2019; Niculescu et al. 2013). Interviewees mentioned these emotional message factors as important in shaping the user experience during online travel service delivery. We thus focused on two cues to manipulate chatbots' anthropomorphism in an online travel service context: (1) social presence–related cues (i.e., avatar, name, self-introduction) and (2) emotional message cues (i.e., humor, empathy, emoticons).

Interviewees also cited multiple concerns regarding chatbot anthropomorphism, specifically trustworthiness, intelligence, and enjoyment. These factors greatly influence bonding in

customer relationships and have begun to receive attention from researchers and enterprises (Bartneck, Kulić, et al. 2009; de Visser et al. 2016; Diederich, Brendel, and Kolbe 2020; Qiu and Benbasat 2009). Pennington, Wilcox, and Grover (2003) stated that trust is important in establishing relationships or completing a transaction. Rese, Ganster, and Baier (2020) reinforced the key role of AI entities' intelligence level in customers' usage intentions. Van der Heijden (2004) identified enjoyment as an intrinsic motivation for people to use online services.

"*Our current concerns are how to better retain customers, how to build trust and how to [create] better bonds [in] customer relationships through chatbots [anthropomorphism]. In addition to the capability of handling problems properly, a pleasant interaction experience could also help improve user satisfaction, which requires technicians to improve the algorithm design of more anthropomorphic chatbots.*" (Interviewee #24, travel enterprise manager #3)

"*Once a chatbot is anthropomorphized, it matters how smart it is… If the chatbot is not intelligent enough, it will definitely affect user satisfaction and willingness to use. Intelligent customer service is the trend of the future, which will partially replace or support human customer service. Especially when booking travel products, responding to commonly asked questions effectively... the development of technology will affect the future of intelligent customer service and the effect is positive.*" (Interviewee #14, travel enterprise manager #1)

"*The anthropomorphic chatbot should be interesting… I think as long as the chatbot could solve my problem properly, I would trust its ability and might use it next time.*" (Interviewee #26)

"*When our questions cannot be understood properly… [giving the] wrong answer… [or] providing a lot of irrelevant information or repeating a mechanical response, all of these really affect our experience. What's more, I do not like blunt answers…truly no human*

touch.… The intelligence level of chatbots, the words used, etc. can enhance a pleasant user experience." (Interviewee #53)

"*Timeliness and accuracy are very important. Regarding building customer relationships, I think if a [anthropomorphized] chatbot can show empathy when a problem occurs or when users suffer problems…customers might think the service is professional, their feelings are being addressed, their needs are being met. … Then they will trust [the chatbot's] ability and will probably enjoy the interaction with the chatbot and continue to use it.*" (Interviewee #54, customer service employee #8)

<Insert Figure 1>

3.2 Research hypothesis development

3.2.1 Effects of anthropomorphic cues on consumers' usage intentions

Prior work has shown that people will establish relationships with machines possessing human-like characteristics (de Visser et al. 2016). Giving computer entities anthropomorphic elements is hence integral to successful design (Lee, Baek, and Ju 2018). Scholars have also argued that anthropomorphism cues can evoke human perceptions (Araujo 2018; Epley, Waytz, and Cacioppo 2007; Rietz, Benke, and Maedche 2019), which affect users' perceptions and behavioral intentions related to humanized entities (Puzakova, Kwak, and Rocereto 2013; Qiu and Benbasat 2009). This finding is supported by the uncertainty reduction theory (Berger and Bradac 1982), wherein anthropomorphic objects can intensify users' perceived familiarity and lead to better relationships (Lee, Baek, and Ju 2018).

Based on the previous interviews, chatbot anthropomorphism can manifest through two types of cues: social presence cues and emotional message cues. Short, Williams, and Christie (1976) defined social presence as the "degree of salience the other person has in the

interaction" (p. 65). Studies of information systems have described social presence as "the efficacy of communication media to facilitate a sense of connection with another individual through the medium" (Schuetzler et al. 2020, p. 881). Nowak and Rauh (2005) posited that image representation (i.e., a chatbot's avatar) can make chatbots appear more "real" to consumers. Researchers have also suggested that presenting a human avatar can intensify the naturalness of interaction (Bente et al. 2008; Schuetzler et al. 2018). An avatar can thus serve as a means of recognition to promote chatbots' social presence (Biocca, Harms, and Burgoon 2003; Sundar et al. 2016). Moreover, politeness norms (i.e., personalized response, use of name) and self-disclosure (i.e., self-introduction) can reinforce objects' social presence according to the CASA paradigm (Gefen and Straub 2003; Hassanein and Head 2007).

Aside from social presence cues, chatbots' conversational cues (i.e., emotional message cues) can also highlight their humanness. Araujo (2018) stressed that using human-like language could increase chatbots' perceived anthropomorphism. The literature on human–computer interaction has shown that emotional message cues encompasses changes in agents' language use, colloquial expression, emotional expression, emoticons, and personalized and empathic statements (Elsholz, Chamberlain, and Kruschwitz 2019; Li, Chan, and Kim 2019; Rietz, Benke, and Maedche 2019). Although the importance of emotional expression in interpersonal interactions has been recognized since ancient times (Van Kleef 2009), it remains unclear whether anthropomorphic emotional messages can positively influence consumers' usage intentions in an OTA setting. The following hypotheses are thus proposed:

Hypothesis 1

H1a. High anthropomorphic social presence cues will lead to higher usage intentions as compared to lower social presence cues.

H1b. High anthropomorphic emotional message cues will lead to higher usage intentions as

compared to low emotional message cues.

3.2.2 Mediating roles of perceived trustworthiness, perceived intelligence, and perceived enjoyment

Perceived trustworthiness (PT). Per Mayer, Davis, and Schoorman (1995), PT refers to a belief-based conceptualization of trust, which covers three dimensions: Ability (competence), benevolence (kindness), and integrity (Büttner and Göritz 2008; Mayer, Davis, and Schoorman 1995; Schoorman, Mayer, and Davis 2007). Specifically, "Ability refers to the trustee's competence to fulfill stated promises. Benevolence denotes that the trustee is interested in the trustor's well-being. Integrity means that the trustee follows a set of desirable principles" (Büttner and Göritz 2008, p. 37). Trust is often interpreted as a state in which one party has positive expectations of another party's intentions or actions (Rousseau et al. 1998). Put simply, trust is a basic requirement for any business relationship or transaction (Pennington, Wilcox, and Grover 2003). Owing to the nuances of online shopping environments, customers rarely possess detailed perceptions of the products they are purchasing, and they have few actual interactions with customer service representatives (Corbitt, Thanasankit, and Yi 2003; Hoffman, Novak, and Peralta 1999). In tourism, customer service plays a particularly important role in enterprise–consumer relationships and in shaping customers' purchase decisions given travel products' inherent intangibility (i.e., customers cannot experience a product/service prior to purchase) (Bernardo, Marimon, and Alonso-Almeida 2012). The use of intelligent robots has partially replaced manual customer service. Therefore, users' trust in chatbots is vital to customers' online shopping behavior (Jin, Park, and Kim 2008). Trustworthiness has been documented as a prerequisite for relationship building and customer purchases (Pennington, Wilcox, and Grover 2003).

Humanoid robots are designed to inspire trust, be friendly, and encourage humans to bond with them (Rau, Li, and Li 2010; Van Doorn et al. 2017). Seeger, Pfeiffer, and Heinzl (2017) examined the relationship between trustworthiness and anthropomorphism and discovered that chatbots' anthropomorphic design can evoke strong trust beliefs among consumers. Qiu and Benbasat (2009) found that the warmth and empathy expressed by anthropomorphic chatbots can boost customers' trust, satisfaction, and ultimately usage intentions. Several studies have substantiated this relationship, revealing that trust can directly enhance the buyer–seller relationship as well as heighten customers' purchase intentions in online shopping contexts (Gefen 2000; Gefen, Karahanna, and Straub 2003; Gefen and Straub 2004). In addition, the literature suggests that perceived trustworthiness mediates the influence of chatbot anthropomorphism on customers' decision making in the financial and online shopping sectors (Morana et al. 2020; Yen and Chiang 2021). However, a successful chatbot service experience is contextually dependent (Belanche et al. 2021); the generalizability of existing research might be limited when examining new technologies in different fields (Fernandes and Oliveira 2021). Research is thus needed to examine how anthropomorphic cues can be used to increase consumers' trust in OTA chatbots and influence customers' usage intentions. Drawing upon psychological theory and research on human–computer interaction, we presume that anthropomorphism will be positively related to users' perceptions of trustworthiness, which can in turn guide users' usage intentions. We therefore hypothesize the following:

Hypothesis 2

H2a. Perceived trustworthiness mediates the relationship between OTA chatbots' perceived anthropomorphism (social presence cues) and customers' usage intentions.

H2b. Perceived trustworthiness mediates the relationship between OTA chatbots' perceived anthropomorphism (emotional message cues) and customers' usage intentions.

Perceived intelligence (PI). PI reflects robots' ability, knowledge, sensitivity, and appropriate responses (Bartneck, Kulić, et al. 2009; Pillai and Sivathanu 2020). In human–chatbot interaction, PI indicates robots' capabilities to understand and respond effectively through natural language processing (Pillai and Sivathanu 2020). Robots' perceived intelligence depends on their capabilities (Bartneck, Kulić, et al. 2009) and anthropomorphic design (Bartneck, Kanda, et al. 2009). Intelligence is a criterion by which to evaluate conversational AI (Ukpabi, Aslam, and Karjaluoto 2019) and is often the most intuitive appraisal dimension of AI (Bartneck, Kanda, et al. 2009), even though current intelligence cannot yet 20ulfil customers' growing needs. The level of intelligence demonstrated by AI products plays a key role in users' attitudes and behavioral intentions; for instance, customers expressing negative views regarding the intelligence of AI devices (Rese, Ganster, and Baier 2020) tend to demonstrate lower usage intentions. Radziwill and Benton (2017) found that the higher chatbots' anthropomorphism, the better consumers perceived chatbots' intelligence and service quality and, by extension, the greater consumers' usage intention. However, the mediating effect of perceived intelligence between perceived anthropomorphism and customers' usage intentions has not yet attracted sufficient scholarly attention, especially in tourism and hospitality. On this premise, we suppose the following:

Hypothesis 3

H3a. Perceived intelligence mediates the relationship between OTA chatbots' perceived anthropomorphism (social presence cues) and customers' usage intentions.

H3b. Perceived intelligence mediates the relationship between OTA chatbots' perceived anthropomorphism (emotional message cues) and customers' usage intentions.

Perceived enjoyment (PE). PE, referring to users' preferences for and willingness to use technology, is another important variable influencing users' technology acceptance (Davis,

Bagozzi, and Warshaw 1992; Lu, Cai, and Gursoy 2019; Tung and Law 2017; Venkatesh 2000). PE has been identified as an intrinsic motivation for using an internet-based system (Lee, Cheung, and Chen 2005; Van der Heijden 2004). Scholars have pointed out that chatbot with high anthropomorphism are perceived as more entertaining, thus eliciting greater enjoyment and user acceptance (Qiu and Benbasat 2009). Yi and Hwang (2003) similarly discovered that consumers' enjoyment when using web-based information systems depends on the degree of perceived anthropomorphism: higher anthropomorphism evokes greater pleasure and a more satisfactory user experience, which affects consumers' likelihood of using the service again. Additionally, Childers et al. (2001) proposed that in online retail settings, perceived enjoyment can partially determine customers' intentions and behavior. Other studies have reported direct and positive effects of perceived enjoyment on consumer acceptance and behavioral intention (Davis, Bagozzi, and Warshaw 1992; Lu, Cai, and Gursoy 2019; Tung and Law 2017). Research in the electronic retail sector highlighted the virtual role of enjoyment in online purchases (Koufaris 2002). Studies regarding enjoyment in human–chatbot interaction remains limited, particularly in tourism. Thus, we propose the following:

Hypothesis 4

H4a. Perceived enjoyment mediates the relationship between OTA chatbots' perceived anthropomorphism (social presence cues) and customers' usage intentions.

H4b. Perceived enjoyment mediates the relationship between OTA chatbots' perceived anthropomorphism (emotional message cues) and customers' usage intentions.

3.2.3 Moderating role of anthropomorphic social presence cues

As mentioned earlier, a chatbot's avatar, politeness norms, and self-disclosure can promote social presence (Biocca, Harms, and Burgoon 2003; Gefen and Straub 2003; Hassanein and

Head 2007; Nowak and Rauh 2005; Sundar et al. 2016). According to the modality-agency-interactivity-navigability model (Sundar 2008), "if agency cues are present in an interface, they influence users' perceptions by prompting their cognitive heuristics about the nature and content of the interaction" (Miao et al. 2022, p. 70). In detail, when users learn that they are interacting with a chatbot avatar or a human avatar, their perceptions and behavior differ based on the heuristics evoked by human versus machine interactions (Go and Sundar 2019; Miao et al. 2022). People generally display simplistic social scripts (e.g., politeness, reciprocity) in response to anthropomorphic appearances (Wang et al. 2007). Furthermore, chatbots with different identity cues (i.e., a human name vs. a bot name) indicate whether a user is communicating with a human or a machine, which triggers distinct heuristics in users' perceptions and in turn affects how users assess interactions (Go and Sundar 2019). Social presence cues have been shown to evoke feelings of warmth and sociability in social commerce (Liu et al. 2019; Lu et al. 2016). Thus, in high social presence conditions, the positive impacts of emotional messages on consumers' perceptions (i.e., perceived trustworthiness, intelligence, and enjoyment) might be reinforced. Furthermore, per cue congruence theory (Nass and Moon 2000), consumers mentally construct how cues fit together. The presence of high anthropomorphism social presence cues along with high emotional message cues may collectively work to enhance customers' perceptions. We therefore hypothesize the following:

H5a. Anthropomorphic social presence cues positively moderate the mediating effect of perceived trustworthiness for the impacts of anthropomorphic emotional message cues on customers' usage intentions.

H5b. Anthropomorphic social presence cues positively moderate the mediating effect of perceived intelligence for the impacts of anthropomorphic emotional message cues on customers' usage intentions.

H5c. Anthropomorphic social presence cues positively moderate the mediating effect of perceived enjoyment for the impacts of anthropomorphic emotional message cues on customers' usage intentions.

Based on the preceding discussion and research hypotheses, our research framework is illustrated in Figure 2.

<Insert Figure 2>

3.3 Phase 2: Quantitative experimental design

Tourists often ask customer service representatives for help when booking travel products and in case of problems. This study focused on effective chatbot interaction while customers were booking tickets and encountered a problem. Chatbot design is often multidimensional rather than reliant on a single anthropomorphic cue; thus, we combined different emotional message cues and social presence cues when designing chatbots to further examine customers' responses to the types and degrees of chatbots' anthropomorphism.

This phase involved three experiments: Experiment 1 was designed to examine the impacts of OTA chatbots' social presence cues on customers' usage intentions; Experiment 2 was designed to test the influence of chatbots' emotional message cues on customers' usage intentions. The mediating effects of perceived trustworthiness, perceived intelligence, and perceived enjoyment were examined in both experiments. Furthermore, Experiment 3 was developed to test the interaction effects of chatbots' social presence cues and chatbots' emotional message cues on consumers' usage intentions. Chinese residents were recruited via a China-based market research company (https://www.wjx.cn/); all participants were offered a monetary incentive in exchange for their time. Each experiment lasted 10–15 min.

3.3.1 Experiment 1

Design and participants

Experiment 1 employed a 2-group (perceived anthropomorphism on social presence cues: high vs. low) between-subjects design. In total, 214 valid responses were gathered. Participants were randomly assigned to one of the above two groups. Samples in the high- and low-anthropomorphism groups were equally divided and had an even gender distribution (50% women). Most participants were between 18 and 40 years old (89%) and had previously used chatbots (89%). In terms of education, most participants held a bachelor's degree (72%). More than three-quarters (77%) of respondents reported a higher OTA usage frequency (either occasionally or somewhat frequently).

Stimuli and procedures

The experimental stimuli were designed to look and feel like an interaction with a chatbot on Ctrip, the largest online travel provider in mainland China (Ye, Law, and Gu 2009). The inaction interface screenshot was set in an iPhone image to enhance realism. Except for the experimental manipulations, the two groups' stimuli were consistent in all other aspects. The chatbot was given a female human avatar, a human name ("Kate"), a detailed self-introduction, and used the customer's name throughout the interaction in the high anthropomorphic social presence cues condition. According to stereotype theory and previous studies, the use of female avatars can effectively increase consumers' willingness to interact due to perceived closeness (Choi, Mehraliyev, and Kim 2020; Nowak and Rauh 2005). The low-anthropomorphism chatbot was designed with a cartoon robot avatar, a non-human name ("OTA chatbot"), a brief introduction, and did not call the customer by name during the interaction; see Appendix C for English-translated stimuli.

To start, participants were given the following directions: "*Assume it is the first time you are going to use a chatbot service to book a flight through an OTA. Your name is Janet, registered on the OTA website. Imagine you plan to fly from Hong Kong to Beijing on 25 September 2020. You tell the chatbot your request so she will help you book a flight.*" Participants were then randomly assigned to the high- or low-anthropomorphism condition (with different screenshots of an OTA chatbot interaction); see Appendix C. Next, manipulation questions were asked. Participants then answered questions regarding their usage intentions and perceived trustworthiness, perceived intelligence, and perceived enjoyment when using the OTA chatbot. Lastly, they responded to a set of demographic questions.

Measures

Perceived trustworthiness (PT). The trusting beliefs scale (McKnight, Choudhury, and Kacmar 2002) was used to measure participants' perceptions of the trustworthiness of their OTA chatbot service. Several studies (Komiak and Benbasat 2006; Seeger, Pfeiffer, and Heinzl 2017; Wang and Benbasat 2007) have documented this scale's effectiveness in measuring the trustworthiness of conversational agents on e-commerce sites. The scale consists of items related to benevolence, integrity, and competence (McKnight, Choudhury, and Kacmar 2002; Qiu and Benbasat 2009); see Appendix D. Items were scored on a 7-point Likert scale with satisfactory reliability (Cronbach's $\alpha = 0.870$).

Perceived intelligence (PI). Items related to the OTA chatbot's perceived intelligence were adopted from Warner and Sugarman (1986) and scored on 7-point semantic differential scales. Three items (Foolish/Sensible, Ignorant/Knowledgeable, and Unintelligent/Intelligent) were used in this study, and the reliability of the questionnaire (Cronbach's $\alpha = 0.727$)

exceeded the suggested threshold of 0.7 (Bartneck, Kanda, et al. 2009; Bartneck, Kulić, et al. 2009).

Perceived enjoyment (PE). Perceived enjoyment was measured using five items drawn from Koufaris (2002), whose measurement has frequently been adopted to evaluate chatbot-based services (Diederich, Brendel, and Kolbe 2020; Qiu and Benbasat 2009). These items (i.e., "I think the interaction with the agent was enjoyable/exciting/pleasant/interesting/fun") were rated on a 7-point Likert scale (Cronbach's $\alpha = 0.860$).

Usage intention (UI). Customers' OTA chatbot usage intentions were evaluated with a 3-item scale (Cronbach's $\alpha = 0.782$) adapted from TAM and related studies (Davis 1989; Kwon, Park, and Kim 2014; Qiu and Benbasat 2009): "I intend to book travel products through an OTA chatbot service," "I intend to use an OTA chatbot for my travel product booking as much as possible," and "I will continue to use an OTA chatbot service to book travel products."

Experiment 1 Results

Preliminary analysis. To ensure consistency of the sample characteristics across two conditions, an independent *t*-test was performed for all demographic variables. Results indicated that all *p*-values exceeded 0.05; thus, the two groups did not differ significantly in their demographics (i.e., high vs. low anthropomorphism), such as gender [$F(2, 212) = 0.124$, $p = 0.725$] and age [$F(2, 212) = 1.384$, $p = 0.241$]. We also tested all variables' normality and collinearity, each of which were acceptable: skewness and kurtosis were each between -2 and 2, and variance inflation factors (VIFs) ranged from 1.625 to 2.785 (all lower than 3).

Manipulation check. Three questions were taken from the literature to evaluate users' perceptions of social presence cues: "The chatbot's avatar did not look human/looked very human," "did not look realistic/looked very realistic," and "looked very cartoon-like/did not

look like a cartoon" (Go and Sundar 2019; Nowak and Rauh 2005). Then, participants responded to the items "The chatbot does not have/has a human-like name" and "The chatbot does not use/uses username." Lastly, they answered the question "The chatbot's self-introduction is brief/detailed." These social presence cues manipulations have appeared in previous research (Feine, Morana, and Gnewuch 2019; Go and Sundar 2019; Verhagen et al. 2014). The Cronbach's alpha value for these six items was 0.823. An independent *t*-test indicated that respondents' perceived anthropomorphism of the OTA chatbot with respect to social presence cues differed significantly between the high-anthropomorphism group (M = 5.21) and low-anthropomorphism group (M = 3.89), with a *t*-value of 8.882, significant at the 95% level ($p < 0.000$). Thus, the manipulation operated as intended.

Usage intention. An independent samples *t*-test revealed an insignificant difference in customers' OTA chatbots usage intentions (t = -1.957, p = 0.052) between the high-anthropomorphism condition (M = 5.26) and low-anthropomorphism condition (M = 5.51). That is, participants did not demonstrate stronger usage intentions when they perceived chatbots as having higher social presence cues. H1a was thus not supported.

Mediation analysis. Hayes's (2017) PROCESS Model 4 with bootstrapping (5,000 samples) was performed to examine whether perceived trustworthiness, perceived intelligence, and perceived enjoyment mediated the relationship between perceived anthropomorphism and customers' usage intentions. Participants' gender, age, education level, prior experience using chatbots, degree to which they liked OTA platforms, and frequency with which they used OTA chatbots were covariates (for the mediators and the dependent variable). Two facets of OTA chatbots' perceived anthropomorphism (i.e., social presence cues) were set as predictors (coded as a binary variable: high anthropomorphism = 1, low anthropomorphism = 0).

Perceived trustworthiness, perceived intelligence, and perceived enjoyment were taken as parallel mediators, and usage intention was the dependent variable.

Estimation results appear in Figure 3. Bootstrapping results indicated that the influences of OTA chatbots' social presence cues on perceived trustworthiness (β = 0.063, t = 0.635, p = 0.526), perceived intelligence (β = -0.214, t = -1.572, p = 0.118), and perceived enjoyment (β = -0.004, t = -0.031, p = 0.976) were insignificant. Further, the mediating effects of perceived trustworthiness, perceived intelligence, and perceived enjoyment on participants' OTA chatbots usage intentions were insignificant (perceived trustworthiness: indirect effect = 0.024, 95% confidence interval [CI]: [-0.0540, 0.0972]; perceived intelligence: indirect effect = -0.055, 95% CI: [-0.1327, 0.0116]; perceived enjoyment: indirect effect = -0.002, 95% CI: [-0.0858, 0.0961]). In addition, to avoid the measurement order effect, we conducted three reverse mediation analyses with OTA chatbot usage intention as the mediator; no significant results were found. H2a, H3a, and H4a were therefore not supported.

<Insert Figure 3>

Experiment 1 Discussion

The results of Experiment 1 demonstrated that, different from earlier investigations (Choi, Mehraliyev, and Kim 2020; Diederich, Brendel, and Kolbe 2020), the association between OTA chatbots' anthropomorphic design features on social presence cues did not exert a significant effect on participants' usage intentions. For instance, Diederich, Brendel, and Kolbe (2020) suggested that using avatars and a name can increase the utility, enjoyability, and social presence in users' interactions with chatbots. Kim and Sundar (2012) revealed that a human-like agent could affect users' judgments on the credibility of website information.

By contrast, our study indicates that simply changing a chatbot's avatar or adding social presence cues (i.e., a humanized name, addressing users by name, and providing a self-introduction) does not inform customers' usage intentions. This result could be explained through the consistency theory, which argues that people are more willing to interact with an agent who exhibits consistent behavior (Nass and Moon 2000). Because consistent behavior is simpler to predict, it can reduce inconsistency-related confusion and alleviate users' cognitive burden. This relationship has been verified through the consistency-attraction principle (Groom et al. 2009; Thomas, Johnston, and Thomas 1995): compared to mismatched verbal and nonverbal cues, people tend to enjoy interacting with chatbots that are consistent in their different anthropomorphic cues. Research in human–computer interaction has implied that when a robot's appearance and behavior align, the interaction may be more engaging and effective (Minato et al. 2004); when a robot's appearance is too human-like, the uncanny valley might occur. Assigning a robot human-like behavior at this time can reduce the uncanny response caused by a humanized appearance. We therefore suggest that practitioners consider the consistency of multiple anthropomorphic cues when designing chatbots to enhance users' usage intention.

3.3.2 Experiment 2

Design and participants

Experiment 2 tested anthropomorphic emotional message cues and employed a 2-group (perceived anthropomorphism on emotional message cues: high vs. low) between-subjects design. The direct effects of perceived anthropomorphism on customers' usage intentions were tested along with the indirect effects through perceived trustworthiness, perceived intelligence, and perceived enjoyment. The degrees of chatbots' humor, empathetic expression, and emotional expression with emoticons were used to manipulate emotional

message cues. Participants were randomly assigned to either the high- or low-anthropomorphism condition.

In total, 208 native Chinese respondents were recruited for this experiment. The gender distribution was nearly equal (51% women, 49% men). About one-third (32%) of respondents were between 18 and 25 years old, 30% were between 26 and 30, and 27% were between 31 and 40. Most respondents had used a chatbot before (92%). Regarding education, more than half of the sample had a bachelor's degree (65%). Approximately the same proportion (73%) of respondents as in Experiment 1 reported that they frequently used OTAs.

Stimuli and procedures

In Experiment 2, the following conditions applied: (a) high anthropomorphic emotional message cues, in which the OTA chatbot used humorous, empathic, emotional expressions with emoticons (i.e., "*Perfect! I'm on it.* 😉"); and (b) low emotional message cues, in which the chatbot used formal expressions (i.e., "*OK*"). The stimuli are displayed in Appendix C. In the high-anthropomorphism condition, the chatbot used human-like expressions with emoticons (i.e., "👋*Hiiii, how can I help you today?* 😊 "), responding to customers' feelings with empathy (i.e., "*Oh! That can be quite disturbing!*"), and telling jokes (i.e., "*Breaking into the TSA servers. Let's put you on the 'no-fly list'… Ha! Kidding.*"). Conversely, in the low-anthropomorphism condition, the agent spoke in a simple, machine-like way (i.e., "*Hello, what can I do for you?*"; "*Sorry to hear that*.").

Participants were first presented with the same hypothetical scenario: "*Assume your name is Janet, registered on the OTA website. Imagine that you have used the chatbot service to book a flight through an OTA. Before check-in, you found that the flight was delayed so you asked the chatbot for help.*" and were then randomly shown a screenshot of an OTA chatbot service dialogue (high-/low-anthropomorphism emotional message cues). Following the

above scenario, participants responded to manipulation checks related to anthropomorphic emotional message cues. They then answered a series of questions regarding their perceived usage intentions (Cronbach's $\alpha = 0.869$), perceived trustworthiness (Cronbach's $\alpha = 0.918$), perceived intelligence (Cronbach's $\alpha = 0.787$), and perceived enjoyment (Cronbach's $\alpha = 0.923$) based on the chatbot interactions they observed.

Experiment 2 Results

Preliminary analysis. Gender, age, and education were tested through an independent *t*-test to identify the consistency of sample characteristics between both experimental conditions (i.e., high vs. low anthropomorphism). No significant differences emerged between the groups in terms of gender [$F(2, 206) = 0.664$, $p = 0.416$], age [$F(2, 206) = 2.583$, $p = 0.110$], and education [$F(2, 206) = 1.563$, $p = 0.213$]. Skewness and kurtosis ranged from -0.994 to 0.914 and the highest VIF was around 3; as such, no normality or multicollinearity issues were reported.

Manipulation check. Four emotional message cues manipulation items were designed based on prior research (Araujo 2018; Go and Sundar 2019; Niculescu et al. 2013; Sundar et al. 2016; Verhagen et al. 2014): "The way the chatbot talked was not human-like / very human-like; not humorous / humorous; not empathic / empathic; and not emotionally expressive / emotionally expressive" (Cronbach's $\alpha = 0.895$). An independent *t*-test revealed that participants exposed to highly anthropomorphic emotional message cues rated perceived anthropomorphism ($M = 5.53$) higher than those in the low-anthropomorphism condition ($M = 3.03$). Thus, participants perceived the stimuli as intended, and our manipulations of OTA chatbots' anthropomorphic emotional message cues were effective.

Usage intention. An independent samples *t*-test indicated a significant difference in participants' usage intentions ($t = 14.960$, $p = 0.000$) between the high-anthropomorphism

condition (M = 5.60) and low-anthropomorphism condition (M = 3.82). Participants displayed stronger usage intentions when they perceived the chatbot as having higher anthropomorphism on emotional message cues; accordingly, H1b was supported.

Mediation analysis. Model 4 in Hayes's (2017) PROCESS procedure with bootstrapping (5,000 samples) was used to examine the mediation model, consistent with the method in Experiment 1. Results are depicted in Figure 4. Participants' perceived anthropomorphism based on OTA chatbots' emotional message cues positively influenced perceived trustworthiness (β = 1.253, t = 13.554, $p < 0.001$), perceived intelligence (β = 1.170, t = 9.0002, $p < 0.001$), and perceived enjoyment (β = 1.664, t = 12.989, $p < 0.001$), leading to positive changes in participants' usage intentions (perceived trustworthiness: $\beta = 0.410$, t = 4.975, $p < 0.001$; perceived intelligence: $\beta = 0.201$, $t = 3.323$, $p < 0.001$; perceived enjoyment: $\beta = 0.376$, $t = 6.574$, $p < 0.001$). Bootstrapping results also revealed significant mediating effects of perceived trustworthiness, perceived intelligence, and perceived enjoyment on the influences of OTA chatbots' perceived anthropomorphism (i.e., emotional message cues) relative to users' usage intentions (perceived trustworthiness: indirect effect = 0.5139, 95% CI: [0.2810, 0.8021]; perceived intelligence: indirect effect = 0.2352, 95% CI: [0.1059, 0.3951]; perceived enjoyment: indirect effect = 0.6254, 95% CI: [0.4204, 0.8400]). The direct effect was significant as well. Overall, OTA chatbots' anthropomorphic emotional message cues influenced participants' usage intentions via perceived trustworthiness, perceived intelligence, and perceived enjoyment, supporting H2b, H3b, and H4b.

<Insert Figure 4>

Experiment 2 Discussion

The results of Experiment 2 indicate that participants' feelings about the anthropomorphic design of OTA chatbots' emotional message cues can influence users' usage intentions. Specifically, when users encountered a chatbot with higher anthropomorphic emotional message cues, individuals' usage intentions increased. This finding confirms Araujo's (2018) study suggesting that chatbots' anthropomorphic language style can effectively influence customers' satisfaction, attitudes, and emotional connection. This result is also consistent with findings from Niculescu et al.'s (2013) study, who discovered that a sense of humor can enhance users' perceptions of enjoyment and a robot's personality, whereas empathy positively affected users' robot acceptance.

Further, Experiment 2 provides empirical evidence of the mechanism behind the association between OTA chatbots' perceived anthropomorphism and customers' usage intentions. When chatbots' emotional message cues was more anthropomorphic, customers demonstrated greater trustworthiness, intelligence, and enjoyment and were thus more interested in using these agents. In other words, perceived trustworthiness, perceived intelligence, and perceived enjoyment each played a mediating role in the above relationship. These patterns reinforce the importance of the anthropomorphic design of emotional message cues.

3.3.3 Experiment 3

Design and participants

Experiment 3 tested the interaction effects between different anthropomorphic cues by employing a 2 (perceived anthropomorphism on social presence cues: high vs. low) × 2 (perceived anthropomorphism on emotional message cues: high vs. low) between-subjects design. Participants who failed to answer the attention check questions correctly were excluded from the experiment. A total of 447 native Chinese respondents were recruited and

had a relatively balanced gender distribution (220 women and 227 men). Approximately 17% of respondents were aged between 18 and 25, 33% were between 26 and 30, and 39% were between 31 and 40. Most (94%) had used chatbots in the past. The majority (83.9%) of the sample held a bachelor's degree or higher. About 50% reported using OTAs frequently.

Stimuli and procedures

Participants were first required to read a hypothetical scenario as in Experiment 2. They were then randomly assigned to one of the following conditions: (1) high social presence cues with high emotional message cues (n = 111); (2) high social presence cues with low emotional message cues (n = 111); (3) low social presence cues with high emotional message cues (n = 114); and (4) low social presence cues with low emotional message cues (n = 111). The chatbot's anthropomorphic social presence cues and emotional message cues were manipulated in the same way as in Experiments 1 and 2, respectively. Stimuli for Experiment 3 are provided in Appendix C.

Similar to Experiments 1 and 2, based on screenshots of interactions with a chatbot, participants answered a series of questions regarding their perceived usage intentions (Cronbach's α = 0.804), perceived trustworthiness (Cronbach's α = 0.902), perceived intelligence (Cronbach's α = 0.832), and perceived enjoyment (Cronbach's α = 0.879).

Experiment 3 Results

Manipulation check. Similar to Experiments 1 and 2, we conducted manipulation checks for social presence cues (Cronbach's α = 0.883) and emotional message cues (Cronbach's α = 0.790). An independent samples t-test revealed that we successfully manipulated the chatbot's anthropomorphic social presence cues (M_{high} = 5.49, M_{low} = 3.25; t = 20.263, p < 0.000) and emotional message cues (M_{high} = 5.39, M_{low} = 4.32, t = 10.307, p < 0.000).

Moderated mediation analysis. Model 7 in Hayes's (2017) PROCESS procedure with bootstrapping (5,000 samples) was used to examine the moderated mediating effect. Anthropomorphic emotional message cues represented the independent variable; perceived trustworthiness, perceived intelligence, and perceived enjoyment were mediators; anthropomorphic social presence cues served as the moderating variable; and usage intention was the dependent variable. The moderated mediation indices were insignificant for the indirect effect of anthropomorphic emotional message cues on usage intention through perceived trustworthiness (β = 0.0530, BootSE = 0.0503, 95% CI: [-0.0344, 0.1652]), perceived intelligence (β = 0.0431, BootSE = 0.0421, 95% CI: [-0.0187, 0.1440]), and perceived enjoyment (β = -0.0404, BootSE = 0.0843, 95% CI: [-0.2163, 0.1158]). Detailed estimation results are summarized in Table 1. Hypotheses 5a, 5b, and 5c were rejected because the CIs of these moderated mediation indices included zero.

<Insert Table 1>

Experiment 3 Discussion

The results of Experiment 3 indicate that no interaction effect was found between anthropomorphic social presence cues and emotional message cues. In contrast with studies showing that social presence–related cues (e.g., name, avatar) could increase customers' trust, usability, and enjoyment when interacting with chatbots (Diederich, Brendel, and Kolbe 2020; Liu et al. 2019; Lu et al. 2016), this effect did not occur whether social presence cues were presented alone or in conjunction with emotional message cues in this study. According to CASA (Nass, Steuer, and Tauber 1994), users may unconsciously apply social rules to anthropomorphic objects when evaluating interactions. Trust is easier to establish when customers feel emotionally connected with a robot (Wirtz et al. 2018). Thus, when consumers are exposed to multiple anthropomorphic cues, their behavior and perceptions may be more

easily influenced by emotional cues (e.g., emoticons) while they unconsciously overlook social presence cues (e.g., names, avatars). This phenomenon may explain why anthropomorphic social presence cues did not strengthen the effects of emotional message cues on customers' perceptions.

4. FINDINGS AND IMPLICATIONS

4.1 Findings

This study first qualitatively interviewed online travel practitioners and users with experience making online travel reservations to better understand the status of human–chatbot interaction. Thematic analysis revealed key attributes of chatbot anthropomorphism and how various anthropomorphic cues influence customers' perceptions (i.e., perceived trustworthiness, perceived intelligence, and perceived enjoyment) and intentions to use OTA chatbots. Qualitative analysis indicated that the degree of perceived anthropomorphism manifested through two aspects: (1) social presence cues, including the chatbot's avatar, chatbot's name, use of customer's name, and information disclosure in its self-introduction; and (2) emotional message cues, including humor, empathy, and emotional expression using emoticons. Three experimental designs were subsequently employed to validate and examine the effects of different anthropomorphic design cues in shaping customers' intentions to use chatbot services when booking tourism products/services via OTAs as well as the internal mechanism. The results of these experiments showed that the design of anthropomorphic emotional message cues could increase customers' intentions to use OTA chatbots, whereas simply adding anthropomorphic social presence cues to these chatbots was insufficient in enhancing customers' usage intentions. Further, the interaction effect between these two anthropomorphic cues was found to be insignificant. Chatbots that use emotional message cues thus appear to be a worthy design option for OTAs. In addition, perceived trustworthiness, intelligence, and enjoyment were each found to significantly mediate the effects of anthropomorphic emotional message cues on customers' intentions to use OTA chatbots. Table 2 summarizes the overall study findings.

<Insert Table 2>

4.2 Implications

Our results make several theoretical contributions to the literature. First, to the best of our knowledge, this study represents an initial attempt to examine the effects of multiple anthropomorphic design cues on customers' behavioral intentions to use OTA chatbots by adopting a sequential mixed method. Pillai and Sivathanu (2020) addressed the importance of chatbot anthropomorphism in the tourism domain; in particular, imbuing chatbots with human-like characteristics through diverse cues to improve customers' experiences can offer valuable information for academics and industry practitioners (Elsholz, Chamberlain, and Kruschwitz 2019; Feine, Morana, and Gnewuch 2019; Go and Sundar 2019). Based on a mixed method combining qualitative interviews and quantitative experiments, this study enriches the understanding of customers' and online travel providers' concerns about chatbot anthropomorphism in the online travel services context.

Second, this work offers much-needed empirical evidence regarding how chatbots' anthropomorphism can facilitate consumers' usage intentions. This study also advances the emerging literature on interactive marketing using chatbots. Different anthropomorphic chatbot design cues were conceptualized by integrating social presence theory (i.e., social presence cues) and emotions as social information (i.e., emotional message cues). Our effort further expands chatbot anthropomorphism research in tourism and hospitality by showing that although OTA chatbots' humanized social presence cues do not seem to affect customers' usage intentions (whether presented alone or together with anthropomorphic emotional cues), well-designed anthropomorphic emotional message cues can effectively enhance users' behavioral intentions.

Third, our research investigated the mechanisms behind the effects of various anthropomorphic design cues in influencing customers' intentions to use OTA chatbots.

Research has uncovered varied internal mechanisms behind the effects of chatbots' anthropomorphism on consumers' mentality and behavior under different contexts, such as investment or online shopping (Morana et al. 2020; Yen and Chiang 2021). Our work enriches the tourism literature on OTA chatbots' anthropomorphism and the associated mechanism explaining how it informs customers' usage intentions, namely via the mediating effects of perceived trustworthiness, perceived intelligence, and perceived enjoyment.

Besides, our results have important practical implications for the use and design of OTA chatbots. Findings revealed that users' perceived anthropomorphism, especially in terms of chatbots' emotional message cues, can influence customers' intentions to use OTA chatbots. Rather than simply integrating social presence cues (i.e., human avatar/name/self-disclosure) in chatbot dialogue programming, OTAs should pay more attention to chatbots' anthropomorphic emotional message cues to enrich the customers' intentions to use OTA chatbots, foster productive relationships, and bolster usage intentions. Assigning chatbots distinct but consistent anthropomorphic characteristics (e.g., in appearance, language, or voice) can increase users' interaction intentions while reducing the uncanny effects caused by a single anthropomorphic feature (e.g., an overly humanized appearance). Therefore, we recommend that designers consider the consistency of multiple anthropomorphic cues when designing chatbots to enhance users' interactive experiences. Further, incorporating humor or emotional expression with emoticons into chatbots' communication can please customers and give users the impression that they are conversing with a human rather than a robot. Being able to identify users' emotions and respond with empathy will improve customers' trust and confidence when using chatbots. Furthermore, chatbots' use of human-like language, instead of formal language, could boost users' evaluations of chatbots' intelligence along with users' attachment and loyalty to OTA, which are key OTA priorities.

4.3 Discussion related to COVID-19

Due to COVID-19, the need to digitize tourism services has intensified in response to social distancing requirements (Jiang and Wen 2020; Sigala 2020). For example, during the pandemic, online travel providers fielded a large volume of pandemic-related inquiries, such as for ticket refunds and ticket changes. Chatbots can provide services at any time to address customers' needs. Meanwhile, declining travel demand during the pandemic has amplified industry competition (Zeng, Chen, and Lew 2020). Companies have attempted to control labor costs to ensure survival. Therefore, chatbot services have garnered careful attention.

Travelers' psychology, communication methods, and purchase behavior have inevitably changed and will continue to do so during and after the pandemic (Cheung et al. 2021). For instance, the need for interaction between tourists and online travel service providers has increased due to unstable travel policies (Wen et al. 2020). The ongoing popularity of pre-online-reservation travel intended to avoid crowds adds to the workload of online customer service as well. These post-pandemic phenomena have accelerated the adoption of chatbot services on websites, applications, and social platforms to enhance tourists' experiences. Enterprises could maintain high service standards by using chatbots to answer questions effectively and in a timely manner to expedite customers' decision making and ultimately increase booking rates. It is therefore vital to understand the factors about which consumers and enterprises are most concerned in terms of chatbot usage, chatbot design, and the internal mechanism.

4.4 Limitations and future research

As with any research, this study is not without limitations. First, we used screenshots of OTA chatbot interactions as stimuli instead of actual user–chatbot conversations. This static environment may not reflect consumers' interactions with chatbots in actual online environments and might have influenced participants' perceptions and evaluations. Future studies can design an actual OTA chatbot to allow participants to interact with a chatbot in real time and then report on their experiences to gather more realistic data. Second, because the designed scenarios depicted successful service cases, service failure could be another factor influencing consumers' behavioral intentions (Kau and Loh 2006; Weun, Beatty, and Jones 2004). Normally, customers are disappointed when chatbots cannot answer a question appropriately or solve a problem efficiently. OTA chatbots' service outcomes could hence be investigated in greater depth in follow-up research.

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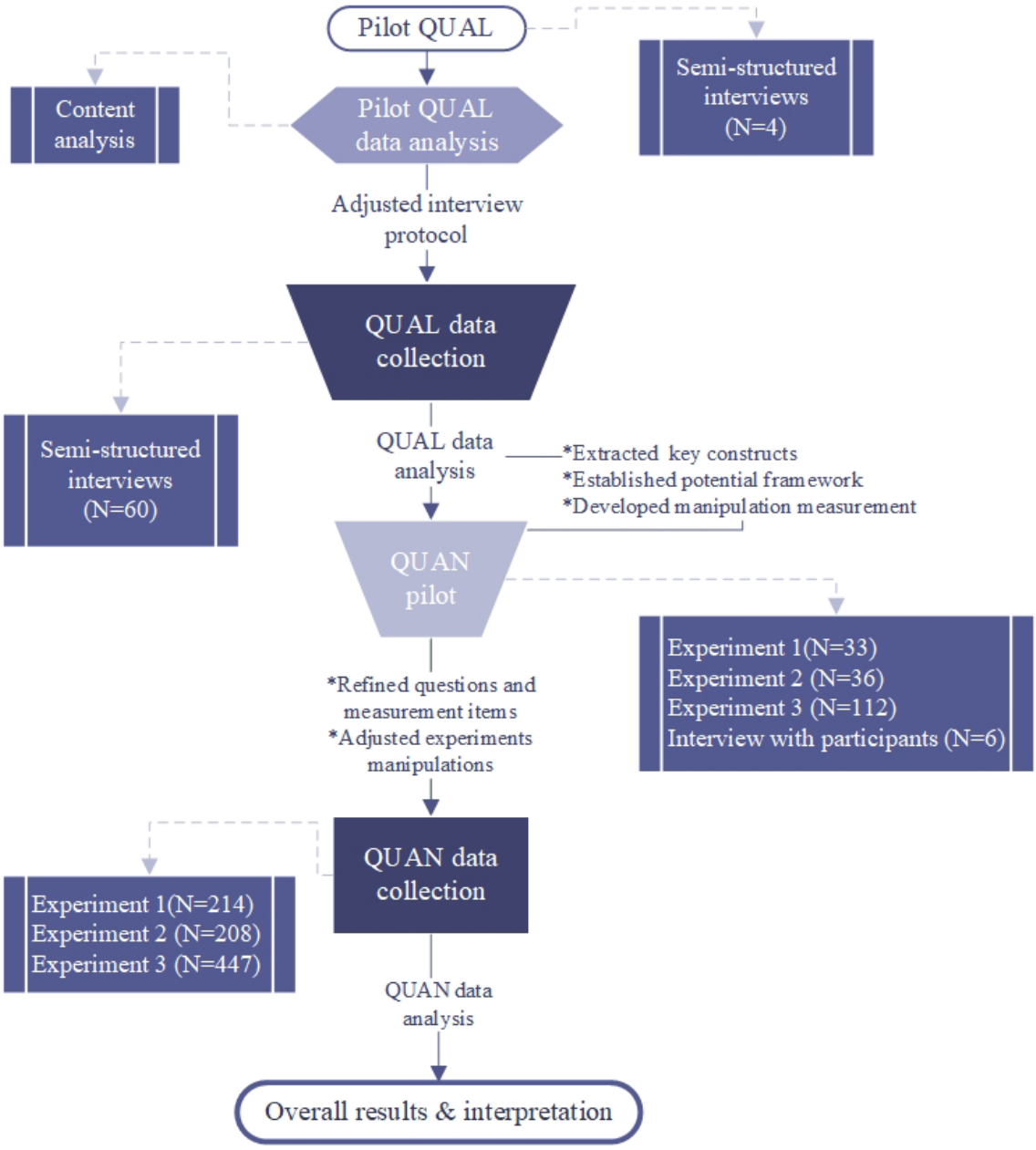
APPENDIX A. RESEARCH DESIGN



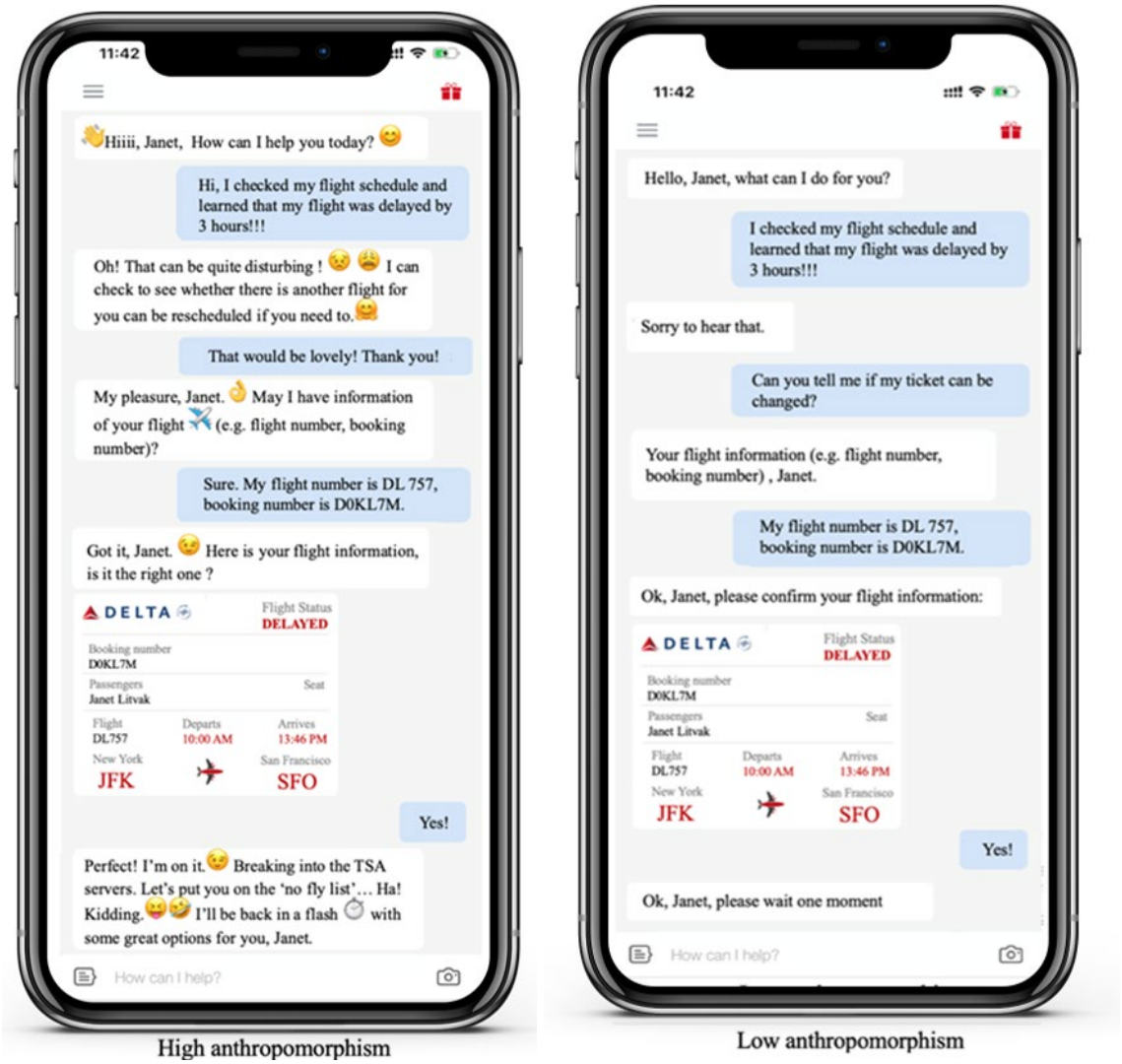
APPENDIX B. INTERVIEWEE PROFILE

Interviewee No.	Age	Gender	Current occupation:	Notes
Interviewee #1	41~50	Female	Teacher	
Interviewee #2	26~30	Male	Teacher	
Interviewee #3	51~60	Male	Financial analyst/Accountant/Auditor	
Interviewee #4	31~40	Female	Technician/R&D staff	
Interviewee #5	26~30	Male	Marketer	
Interviewee #6	18~25	Female	Student	
Interviewee #7	18~25	Male	Technician/R&D staff	Computer engineer #1
Interviewee #8	18~25	Female	Financial analyst/Accountant/Auditor	
Interviewee #9	26~30	Female	Teacher	
Interviewee #10	18~25	Female	Financial analyst/Accountant/Auditor	
Interviewee #11	26~30	Male	Office/clerical staff	
Interviewee #12	31~40	Male	Producer	
Interviewee #13	41~50	Female	Technician/R&D staff	Computer engineer #2
Interviewee #14	26~30	Male	Administrative Service Manager	Travel enterprise manager #1
Interviewee #15	26~30	Female	Administrative Service Manager	Travel enterprise manager #2
Interviewee #16	31~40	Female	Administrative/support staff	
Interviewee #17	41~50	Male	Medical staff	
Interviewee #18	31~40	Female	Producer	
Interviewee #19	41~50	Male	Customer service manager	Customer service employee #1
Interviewee #20	51~60	Female	Teacher	
Interviewee #21	26~30	Female	Technician/R&D staff	
Interviewee #22	31~40	Female	Technician/R&D staff	
Interviewee #23	18~25	Male	Student	
Interviewee #24	41~50	Male	Administrative Service Manager	Travel enterprise manager #3
Interviewee #25	31~40	Female	Technician/R&D staff	
Interviewee #26	18~25	Female	Financial analyst/Accountant/Auditor	
Interviewee #27	26~30	Female	Lawyers	
Interviewee #28	18~25	Male	Student	
Interviewee #29	18~25	Male	Technician/R&D staff	Computer engineer #3
Interviewee #30	18~25	Female	Student	
Interviewee #31	18~25	Female	Student	
Interviewee #32	26~30	Male	Office/clerical staff	
Interviewee #33	18~25	Male	Sales staff	Customer service employee #2
Interviewee #34	31~40	Female	Producer	
Interviewee #35	31~40	Male	Producer	
Interviewee #36	31~40	Female	Customer service staff	Customer service employee #3
Interviewee #37	18~25	Female	Student	
Interviewee #38	31~40	Male	Human resources staff	Customer service employee #4
Interviewee #39	31~40	Male	Administrative Service Manager	Travel enterprise manager #4
Interviewee #40	41~50	Male	Teacher	Computer engineer #4
Interviewee #41	18~25	Female	Customer service staff	Customer service employee #5
Interviewee #42	26~30	Male	Technician/R&D staff	Computer engineer #5
Interviewee #43	18~25	Female	Human resources staff	
Interviewee #44	18~25	Female	Marketer	Customer service employee #6
Interviewee #45	26~30	Female	Administrative/support staff	
Interviewee #46	18~25	Male	Student	
Interviewee #47	18~25	Female	Administrative/support staff	
Interviewee #48	18~25	Female	Technician/R&D staff	
Interviewee #49	31~40	Female	Journalists	
Interviewee #50	26~30	Male	Technician/R&D staff	Computer engineer #6
Interviewee #51	18~25	Female	Marketer	Customer service employee #7
Interviewee #52	26~30	Male	Teacher	
Interviewee #53	51~60	Female	Administrative/support staff	
Interviewee #54	41~50	Male	Marketer	Customer service employee #8
Interviewee #55	31~40	Male	Office/clerical staff	

Interviewee #56	31~40	Male	Producer	
Interviewee #57	18~25	Female	Sales staff	
Interviewee #58	26~30	Female	Customer service manager	Customer service employee #9
Interviewee #59	26~30	Male	Producer	
Interviewee #60	31~40	Female	Customer service manager	Customer service employee #10

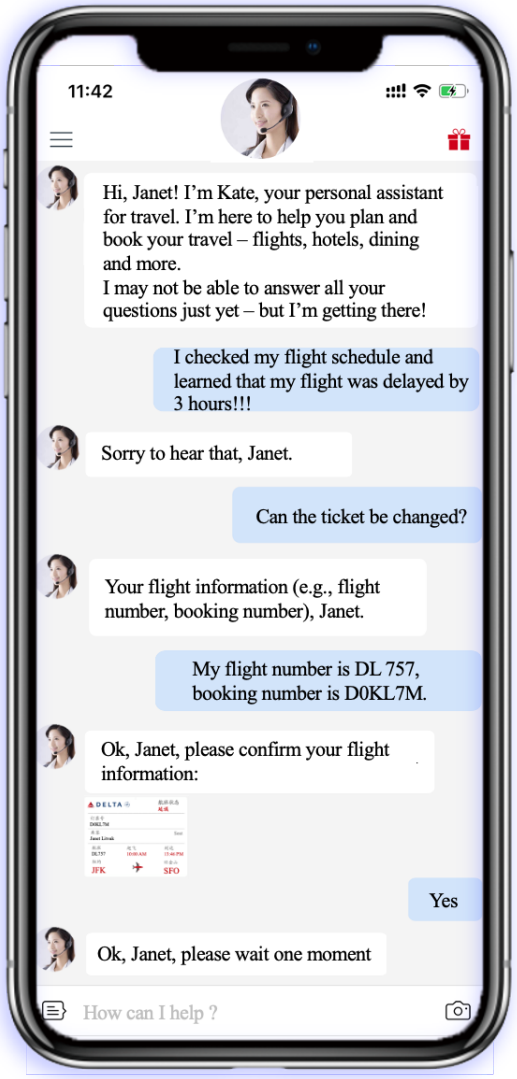
APPENDIX C. EXPERIMENTS STIMULI

Experiment 1 stimuli for anthropomorphic social presence cues

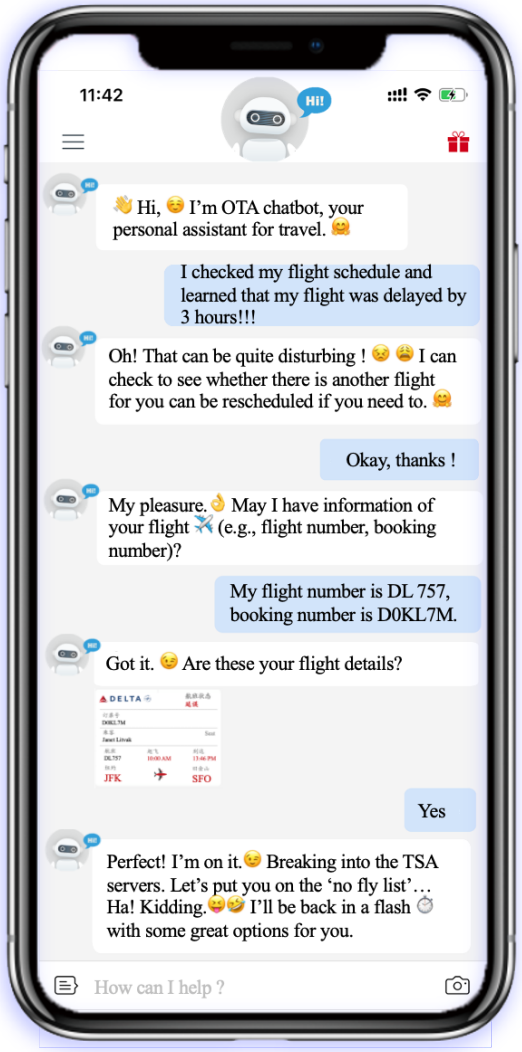


Experiment 2 stimuli for anthropomorphic emotional message cues

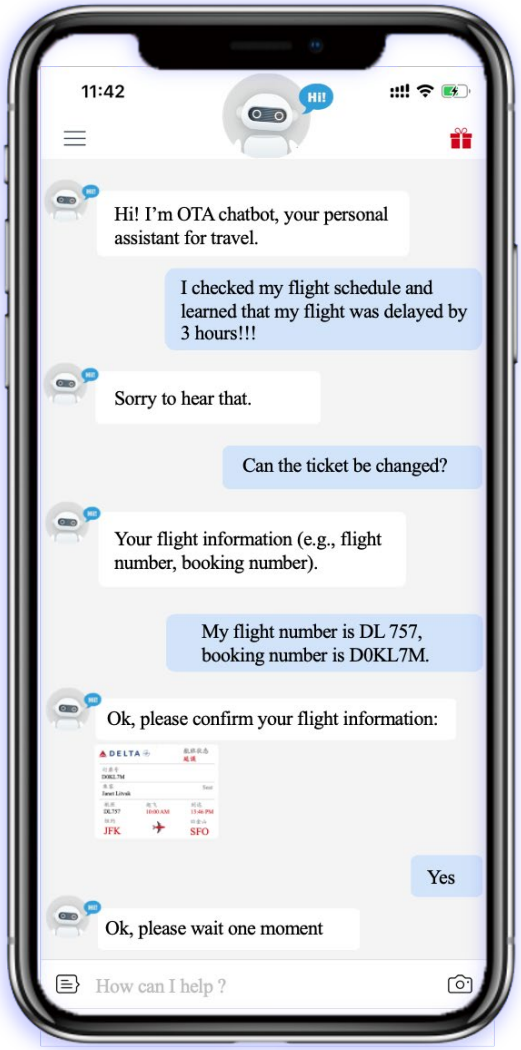
High social presence cues
High emotional message cues



High social presence cues
Low emotional message cues



Low social presence cues
High emotional message cues



Low social presence cues
Low emotional message cues

Experiment 3 stimuli for anthropomorphic social presence cues and emotional message cues

APPENDIX D. MEASUREMENT ITEMS FOR PERCEIVED TRUSTWORTHINESS

Perceived trustworthiness		
PT1:	*Competence*	The agent was competent in its service
PT2:		The agent performed its customer service role very effectively
PT3:		Overall, the agent was capable of providing suitable service
PT4:		In general, the agent was very knowledgeable about travel products
PT5:	*Benevolence*	I believe that the agent provided service that was in my best interest
PT6:		In the agent's dealings with me, I felt like the agent would do its best to help me
PT7:		In the agent's dealings with me, I felt like the agent was interested in my well-being, not someone else's
PT8:	*Integrity*	I believe the agent was truthful in its dealings with me
PT9:		I would characterize the agent's dealings with me as honest
PT10:		The agent seemed sincere and genuine
PT11:		Overall, the agent seemed trustworthy

Table 1. Experiment 3 moderated-mediation analysis results

	Perceived trustworthiness				**Perceived intelligence**				**Perceived enjoyment**				**Usage intention**			
	β	**SE**	**LLCI**	**ULCI**	**β**	**SE**	**LLCI**	**ULCI**	**β**	**SE**	**LLCI**	**ULCI**	**β**	**SE**	**LLCI**	**ULCI**
Constant	2.9466	.4693	2.0243	3.8689	3.6131	0.5156	2.5997	4.6264	1.7936	0.5982	0.618	2.9693	0.054	0.4601	-0.8503	0.9582
Emotional message cues	0.1962	0.1084	-0.0169	0.4093	0.2995	0.1191	0.0654	0.5336	0.7116	0.1382	0.44	0.9832	0.2016	0.0744	0.0553	0.3478
Perceived trustworthiness													0.2873	0.0644	0.1607	0.4139
Perceived intelligence													0.2001	0.0553	0.0915	0.3088
Perceived enjoyment													0.4182	0.0517	0.3165	0.5199
Social presence cues	-0.1009	0.11	-0.3171	0.1153	-0.1848	0.1209	-0.4223	0.0527	0.111	0.1402	-0.1646	0.3866				
Emotional message cues × Social presence cues	0.1844	0.1543	-0.1188	0.4876	0.2152	0.1695	-0.1179	0.5483	-0.0966	0.1966	-0.483	0.2899				
Control variables	YES				YES				YES				YES			
R	0.4088				0.3271				0.4415				0.7622			
R^2	0.1671				0.107				0.1949				0.5810			
F	9.7399				5.8175				11.7541				60.4635			
P	<0.000				<0.000				<0.000				<0.000			

Conditional indirect effects of X on Y				
Mediator perceived trustworthiness	**Effects**	**SE**	**LLCI**	**ULCI**
High anthropomorphic social presence cues	0.1093	0.0526	0.0281	0.2325
Low anthropomorphic social presence cues	0.0564	0.0363	0.0007	0.1424
Index of moderated mediation	**Index**	**SE**	**LLCI**	**ULCI**
High/low social presence cues	0.053	0.0514	-0.0327	0.1689

Conditional indirect effects of X on Y				
Mediator perceived intelligence	**Effects**	**SE**	**LLCI**	**ULCI**
High anthropomorphic social presence cues	0.103	0.0507	0.0227	0.2183
Low anthropomorphic social presence cues	0.0599	0.0316	0.009	0.1309
Index of moderated mediation	**Index**	**SE**	**LLCI**	**ULCI**
High/low social presence cues	0.0431	0.0429	-0.0216	0.1452

Conditional indirect effects of X on Y				
Mediator perceived enjoyment	**Effects**	**SE**	**LLCI**	**ULCI**
High anthropomorphic social presence cues	0.2572	0.0716	0.1273	0.406
Low anthropomorphic social presence cues	0.2976	0.0805	0.1529	0.469
Index of moderated mediation	**Index**	**SE**	**LLCI**	**ULCI**
High/low social presence cues	-0.0404	0.0844	-0.2279	0.1125

Table 2. Summary of test of hypotheses

Hypotheses		Results
Hypothesis 1	**H1a.** High anthropomorphic social presence cues will lead to higher usage intentions as compared to lower social presence cues.	Not Supported
	H1b. High anthropomorphic emotional message cues will lead to higher usage intentions as compared to low emotional message cues.	Supported
Hypothesis 2	**H2a**. Perceived trustworthiness mediates the relationship between OTA chatbots' perceived anthropomorphism (social presence cues) and customers' usage intentions.	Not Supported
	H2b. Perceived trustworthiness mediates the relationship between OTA chatbots' perceived anthropomorphism (emotional message cues) and customers' usage intentions.	Supported
Hypothesis 3	**H3a.** Perceived intelligence mediates the relationship between OTA chatbots' perceived anthropomorphism (social presence cues) and customers' usage intentions.	Not Supported
	H3b. Perceived intelligence mediates the relationship between OTA chatbots' perceived anthropomorphism (emotional message cues) and customers' usage intentions.	Supported
Hypothesis 4	**H4a.** Perceived enjoyment mediates the relationship between OTA chatbots' perceived anthropomorphism (social presence cues) and customers' usage intentions.	Not Supported
	H4b. Perceived enjoyment mediates the relationship between OTA chatbots' perceived anthropomorphism (emotional message cues) and customers' usage intentions.	Supported
Hypothesis 5	**H5a.** Anthropomorphic social presence cues positively moderate the mediating effect of perceived trustworthiness for the impacts of anthropomorphic emotional message cues on customers' usage intentions.	Not Supported
	H5b. Anthropomorphic social presence cues positively moderate the mediating effect of perceived intelligence for the impacts of anthropomorphic emotional message cues on customers' usage intentions.	Not Supported
	H5c. Anthropomorphic social presence cues positively moderate the mediating effect of perceived enjoyment for the impacts of anthropomorphic emotional message cues on customers' usage intentions.	Not Supported

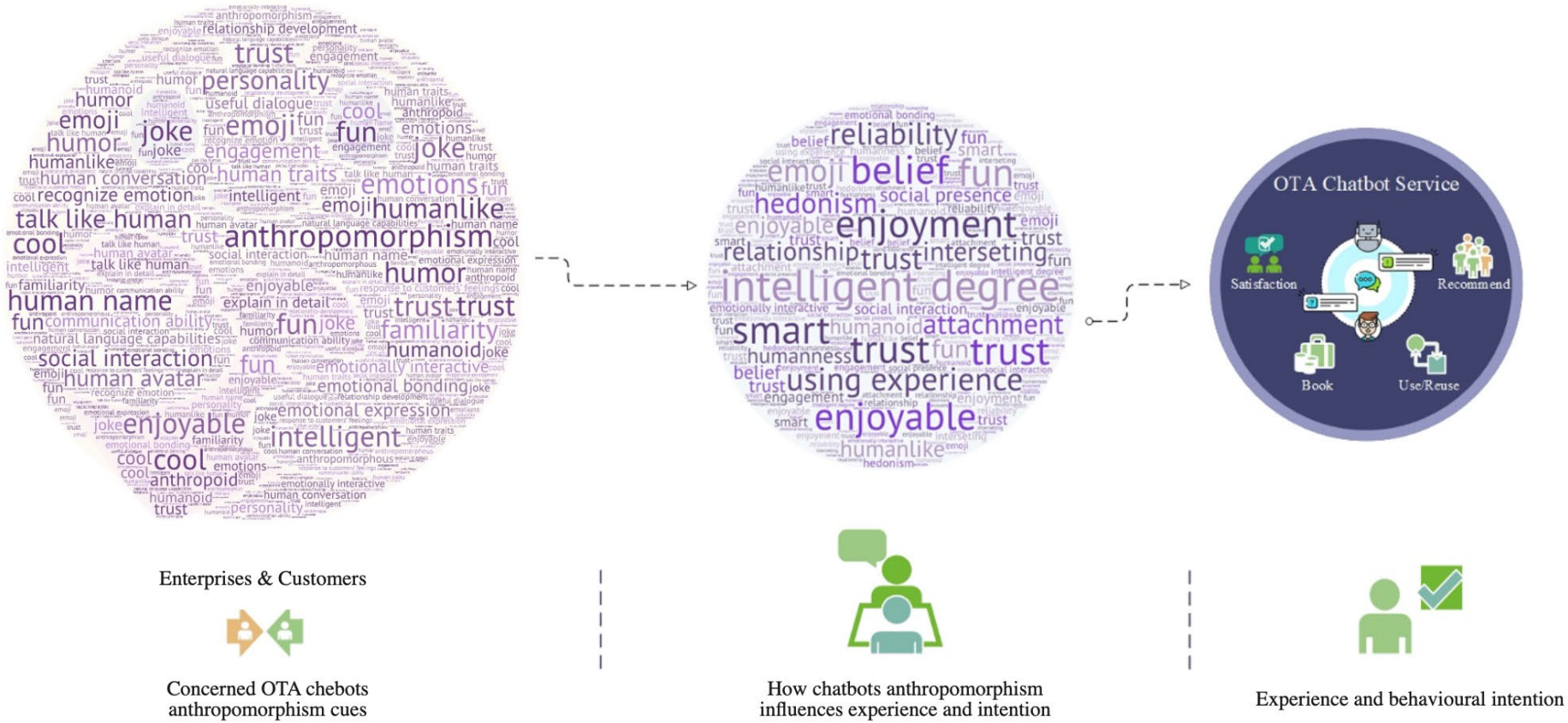


Figure 1. Main qualitative findings

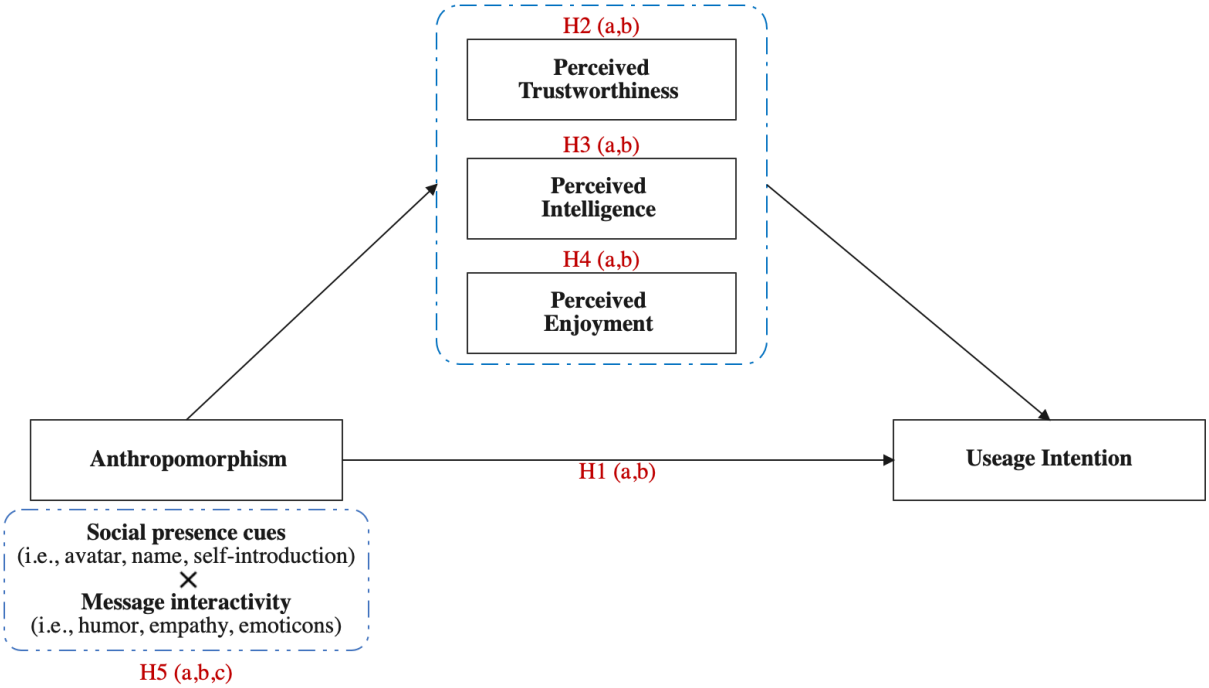


Figure 2. Conceptual framework

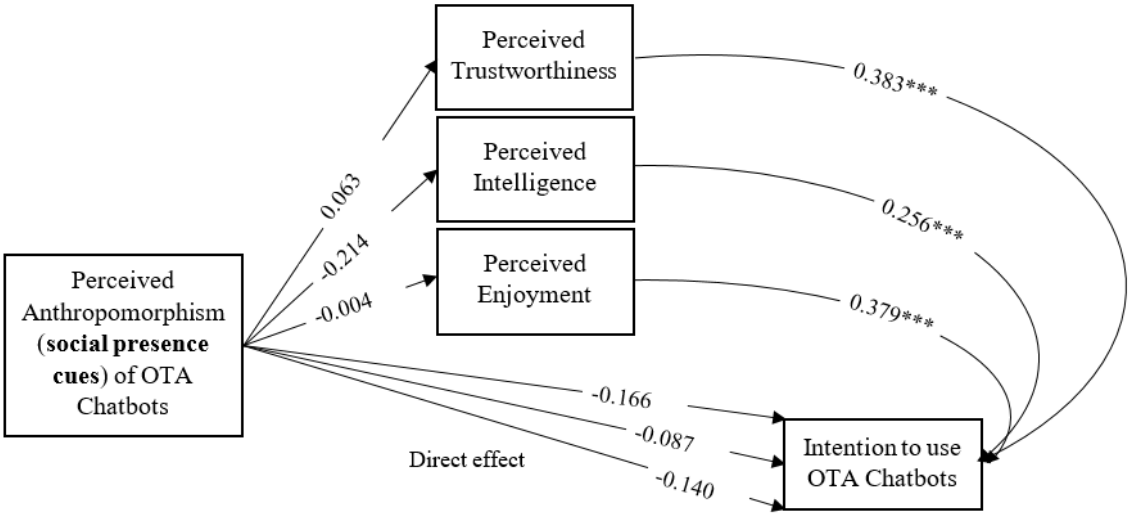


Figure 3. Mediation model results (Anthropomorphic social presence cues)

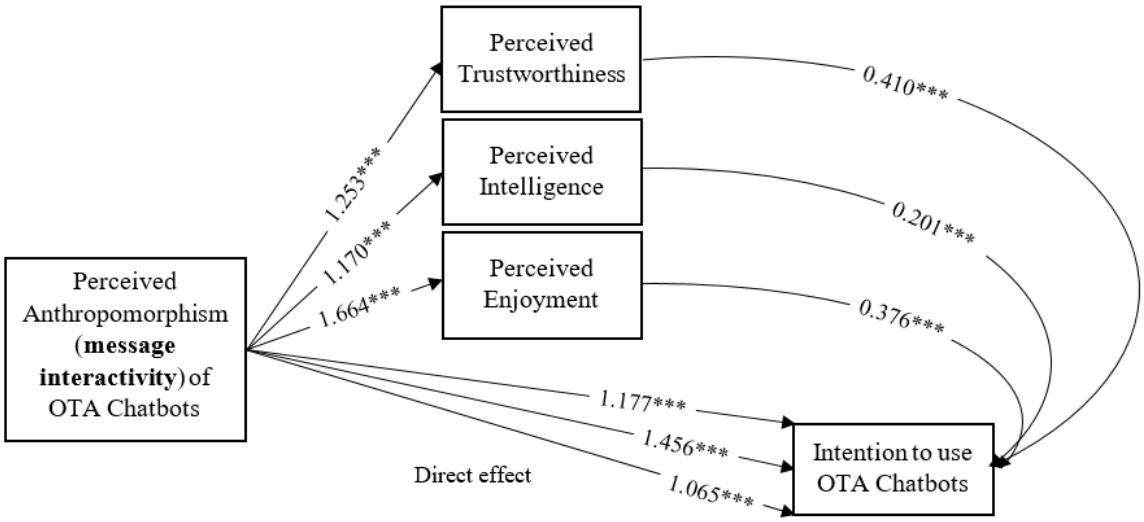


Figure 4. Mediation model results (Anthropomorphic emotional message cues)