The impact of social distancing on tourists' preferences for anthropomorphism

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ABSTRACT

Social distancing is an effective way to reduce infection risk during pandemics, such as COVID-19. It is important for the tourism industry to understand the effect of social distancing on tourist behavior to better adapt to this emerging environment. This study investigates the role of social distancing in tourists' preferences for anthropomorphism. Based on three experimental studies, this study found that tourists tend to prefer anthropomorphism more under conditions of social distancing (vs. nonsocial distancing). This effect was induced by the higher perceived warmth of anthropomorphism when one had to practice social distancing. Such effects are only significant among tourists with higher levels of interdependent self-construal. This study makes significant theoretical contributions and provides important practical implications for tourism marketing and service design during pandemic and epidemic crises.

1. Introduction

Social distancing has been widely adopted and even mandated in some countries as a non-pharmaceutical intervention to prevent the spread of the COVID-19 virus during the pandemic. Social distancing is tied to the physical distance between people and reduces the number of times people have close contact with each other, affecting people's ability to experience warmth and intimacy (Gallace & Spence, 2010). Social distancing may have significant psychological and behavioral consequences. However, little is known about the impact of social distancing on tourist behavior.

Owing to social distancing, high-contact services in the tourism and hospitality industries have had to find new practices to encourage customers to visit and use their products and services. In this context, the anthropomorphism of non-human objects may cause people to feel less alienated and distant. Indeed, marketers often endeavor to activate anthropomorphism by adding humanlike characteristics to products (e. g., Tiffany T smile pendant necklace) or by humanizing brands (e.g., a smile in Tui's logo) (Letheren et al., 2017). During the pandemic, when social distancing is required, anthropomorphic messages or service providers, such as service robots, may instill the warmth that people prefer. For example, Lv et al. (2021) found that the cuteness design of an

AI assistant can help enhance customers' tolerance of service failure through the mediating effect of tenderness, which is a warm feeling of sympathetic affection. Anthropomorphism could serve a social connectedness function by creating humanlike agents out of non-humans (Złotowski et al., 2015).

We argue that exposure to or interaction with anthropomorphism (e. g., products and services featuring characteristics of being alive via their design, interactivity with people, responsiveness, intelligence, or personality) could satisfy individuals' social needs (at least partially), which leads people to tend to choose anthropomorphism under social distancing rules. Owing to the fear of infectious disease transmission, people tend to reduce social contact and avoid venturing out and visiting crowded places, significantly affecting social needs (Van Bavel et al., 2020). People are generally encouraged to withdraw from attempts to connect with other people due to social distancing rules; this disconnection from humans may lead people to seek interactions with non-human agents via the process of anthropomorphism. The compensatory power of anthropomorphism could be driven by the fact that humanized objects and entities may enhance one's perception of connectedness toward them through warmth feelings generated by anthropomorphism (Puzakova & Aggarwal, 2018; Zhou et al., 2019). We further argue that such effects are more evident among those with high

interdependent self-construal. Self-construal captures individual differences in how people view themselves in relationships with others, and interdependent self-construal individuals tend to have stronger social needs than independent self-construal individuals (Markus & Kitayama, 1991). As such, people with higher interdependent self-construal are more likely to seek interactions with anthropomorphic agents to fulfil their social needs under social distancing conditions than those with lower interdependent self-construal.

In this paper, building upon previous work, we explore whether interacting with nonhuman yet anthropomorphic entities can fulfil individuals' social needs in response to the experience of social distancing rules. Specifically, the current research aims to examine, first, whether social distancing can increase tourists' preferences for anthropomorphism. Second, this research reveals the underlying mechanism of this effect by testing whether the perceived warmth of anthropomorphism engenders such a connection and whether interdependent self-construal plays a moderating role, impacting the relationship between social distancing and tourists' preferences for anthropomorphism.

This study attempts to contribute to the relevant research in several important ways. First, anthropomorphism in service encounters is being researched in hospitality and tourism literature (Akdim et al., 2021; Tuomi et al., 2021), and the factors driving consumers' willingness to use anthropomorphism need to be discussed (e.g., Murphy et al., 2019; Shao et al., 2020); therefore, more empirical studies are necessary in this field. By examining the link between social distancing and anthropomorphism, this study attempts to fill this gap and contributes to the literature by investigating how an external factor, i.e., social distancing, influences tourists' preferences for anthropomorphism and the underlying mechanism of why social distancing impacts their preferences for anthropomorphism. Second, this study contributes to the literature on social distancing. Most tourism scholars have focused on crowd management and over-tourism (Jacobsen et al., 2019; Oklevik et al., 2019; O'Toole, 2019); however, due to COVID-19, the field has been transformed, and emerging efforts have been directed toward tourists' responses to social distancing. Existing studies have investigated how social distancing shapes tourists' trust and purchase intention (Kim & Liu, 2022), and influences tourism companies' performance (Im et al., 2021). This study provides a novel view of social distancing in the tourism and hospitality context by studying whether it shapes customers' preferences for anthropomorphism. Third, by empirically examining the moderating effect of interdependent self-construal, this study explores the conditions under which social distancing influences tourists' preferences for anthropomorphism.

2. Theoretical background

2.1. Social distancing

Pandemics, such as COVID-19, are not only highly infectious, but are also likely to be inherently social phenomena; their successful containment will depend on effectively limiting social connections with humans (He et al., 2021; Marroquín et al., 2020). Social distancing is a public health response to highly infectious diseases. In the literature, social distancing is viewed as a behavioral response in which "individuals avoid potentially infectious contacts in response to available information on an ongoing epidemic or pandemic" (Yu et al., 2017, p. 2). The behavioral responses included, but were not limited to, avoiding mass gatherings, wearing protective face masks, and staying at home.

Social distancing, as one of the non-pharmaceutical interventions, can help lower virus transmissions from infected individuals to other susceptible humans by raising the physical distance between humans or decreasing the frequencies of gathering in socially dense community settings, including schools and workplaces (Ahmed et al., 2018). Social distancing practices have been shown to be effective in slowing the trajectory of an influenza pandemic, such as the 1918 influenza pandemic (Yu et al., 2017). However, social distancing appears to have

negative effects on individuals. It has been reported that social distancing during COVID-19 has had a detrimental effect on people's mental well-being and could exacerbate depression and psychological strain (Ammar et al., 2020; Marroquín et al., 2020). Social distancing can also lead to loneliness and trigger social motivation (Rosenfeld et al., 2021). According to evolutionary and developmental theories, human beings possess an essential need to engage with others (Anderson et al., 2015; Hazan & Diamond, 2000; Mathes, 1981). When this need is threatened, such as under the social distancing rule, people may desire to engage in compensatory behaviors, such as interacting with objects that seem alive and attempting to restore their sense of social connectedness and warmth (Mandel et al., 2017). The impact of social distancing on tourists' behavior during pandemics remains unknown. Investigating tourist behavior during a situation of social distancing is important to help the industry adapt to pandemics or epidemics; thus, we hope to address this important research gap by studying the link between social distancing and anthropomorphism.

2.2. Anthropomorphism

Humans have incorporated anthropomorphic characteristics among objects since behavioral modernity 50,000–10,000 BC (Trinkaus, 2005). However, only within the past few decades have scholars begun to investigate the psychological processes and mechanisms of engaging in anthropomorphism (Waytz et al., 2010). Anthropomorphism refers to the allocation of human characteristics to non-human entities (Epley et al., 2007; Martin et al., 2020). The literature has shown that individuals normally have an intrinsic need to anthropomorphize non-living objects, which is driven by the motivation to build social connections and maintain control over unpredictable things (Epley et al., 2008). The perceived humanlike features of either real or imaginary nonhuman agents lie at the core of anthropomorphism. These humanlike features include physical appearance, mental or emotional states, characteristics, personalities, cognitions, and behaviors that are perceived to be unique to humans (Ding et al., 2022; Epley et al., 2008; Golossenko et al., 2020). According to Lee and Oh (2021), anthropomorphism tactics can be divided into visual anthropomorphism, which relies on physical humanlike features (e.g., humanoid robots), and linguistic anthropomorphism, which relies on humanlike communication, such as chatbots using human conversations (Seeger et al., 2021) and personification in advertising (Delbaere et al., 2011).

In marketing, hospitality, and tourism literature, past studies have demonstrated that anthropomorphism can effectively predict customers' favorable evaluations of a product because they tend to favorably identify humanlike factors in nonhuman entities (Shao et al., 2020). For example, Delbaere et al. (2011) identified that successful food commercials used anthropomorphism (e.g., characters who speak) to promote products, such as Mr. Peanut and M&M chocolate candy characters. Previous tourism and hospitality studies on anthropomorphism have investigated service robots (e.g., Akdim et al., 2021; Choi et al., 2019; Christou et al., 2020; Tuomi et al., 2021) and anthropomorphic messages (Letheren et al., 2017; Shao et al., 2020). For example, Tuomi et al. (2021) investigated the implications of the integration of humanoid service robots in hospitality service encounters and found that the adoption of service robots is impacted by four layers of determinants, including contextual, social, interactional, and psychological factors, as well as intrinsic and extrinsic drivers of adoption. Shao et al. (2020) interestingly found that anthropomorphic messages have a positive impact on customers' purchase intentions of ugly food, i.e., food that is oddly shaped, sized, or colored.

3. Hypothesis development

3.1. The impact of social distancing on the preferences for anthropomorphism

Due to the social distancing rules, people may be disconnected from others, and social needs may be significantly impacted. Prior studies have found that individuals who feel dispositionally socially disconnected from other humans, and lonely usually attribute anthropomorphic qualities to various objects or entities, such as pets, more than people who feel connected with others (Geerdts, 2016; Waytz et al., 2010). When socially disconnected from others, one may compensate by attributing human features to nonhuman agents through anthropomorphism, increasing beliefs in anthropomorphized religious agents, such as God, or perceiving nonhumans (e.g., pets) to be more humanlike. Those who feel disconnected hence anthropomorphize more than those who are socially connected (Im Shin & Kim, 2020). Chen et al. (2017) extended this literature to consumer behavior, establishing that socially excluded brands have a higher preference for anthropomorphism than non-excluded brands because of an increased need for social affiliation. Zhu et al. (2019) explored the impact of anthropomorphizing environmental objects on conservation behaviors. They built on the insight that anthropomorphized entities are imbued with the same self-identity and consciousness as humans, and thus ought to be treated as moral agents worthy of concern and care. Anthropomorphism enables one to humanize anthropomorphized entities by imbuing them with agency and experience (Yam et al., 2020).

Being disconnected from others has adverse effects on psychological well-being, such as loneliness and distress (Steptoe et al., 2013; Tilvis et al., 2012). However, humans are relatively smart in their ability to develop a sense of social connectedness, even in the absence of real humans. TV characters, photos, and spiritual/religious figures, to name a few, appear to be good substitutes for actual human interaction. Our present study, however, goes beyond predicting that chronic social disconnectedness increases the attraction to nonhuman anthropomorphic agents. As part of a larger theory of anthropomorphism (Epley et al., 2008), we suggest that the indispensable need for social connection with others, which is restricted during the COVID-19 pandemic, is an important determinant of the preference for anthropomorphism. We hypothesize that under social distancing rules, people tend to show a preference for anthropomorphism.

H1. Tourists have a greater preference for anthropomorphism under social distancing conditions than under nonsocial distancing conditions.

3.2. The mediating role of perceived warmth

We expanded the study by including the perceived warmth of anthropomorphism as a potential mediator. Evolutionary and developmental theories posit that humans are generally habituated to look for intimate social interactions with other humans (Hazan & Diamond, 2000; Mathes, 1981). Relatedly, the social production function theory (Ormel et al., 1999) suggests that social well-being is one of two universal vital human goals, the other being physical well-being. Collectively, these theories merge around the belief that social needs and warmth are essential to human experience. Perceived warmth is a fundamental judgment dimension of social life (Fiske et al., 2007). Warmth is the primary dimension in the interpersonal context, compared to competence (Zhou et al., 2019), and is influential in developing consumers' intention to use a product or service (Lee & Oh, 2021); thus, warmth plays an important role in the service context.

Although social distancing can help prevent infections, it can result in unintended consequences. For example, social needs could be triggered by social distancing rules when face-to-face human interaction is limited. Indeed, feeling socially disconnected decreases psychological and physical well-being, empathetic responses, and feelings of trust,

while increasing the risk of depression (Hutcherson et al., 2008). People who feel disconnected because of social distancing rules may seek warmth from anthropomorphism. This is because humanlike characteristics can improve individuals' perceptions of interpersonal warmth (M. Zhang, Hou, & Li, 2020).

In the current study, we examine the perceived warmth of the nonhuman entities to capture perceived affiliation, companionship, and belongingness (Bloemer et al., 2003). Once the nonhuman entity is anthropomorphized via physical humanlike features or behaviors, tourists may find warmth increasingly relevant. In other words, the perception of warmth is likely to develop when a product or service is portrayed with humanlike characteristics (Lee & Oh, 2021); in turn, people will demonstrate more positive attitudes and affinity toward the anthropomophic product or servicethan to nonanthropomorphic agents such as self-service machines (Kim et al., 2019). In the absence of human interaction to reduce virus transmission during pandemics, people may seek the warmth of humanlike agents and reveal a preference for anthropomorphism. Thus, we hypothesize that perceived warmth plays a mediating role between social distancing and the preference for anthropomorphism:

H2. Tourists have a greater preference for anthropomorphism under social distancing conditions due to the higher perceived warmth of anthropomorphism compared to nonsocial distancing conditions.

3.3. The moderating role of interdependent self-construal

Self-construal refers to a collection of feelings, behaviors, and thoughts concerning the self – how individuals consider themselves, and how they relate to the wider context (Triandis, 1989). There are two self-construal dimensions: interdependent and independent. Interdependent self-construal individuals are conceptualized as those considering themselves to have a flexible self; they perceive that they are intertwined with others and can be easily molded according to different situations (Lin & Huang, 2018). On the other hand, highly independent self-construal individuals are those who are relatively separate from the social context, and they tend not to be readily impacted by others' thinking and behaviors or to change their own thinking (Lin & Huang, 2018).

As self-construal reflects individuals' differences in valuing social relationships and interaction orientations (Chang, 2015), this study proposes that self-construal, specifically interdependent self-construal, could moderate the effects of social distancing on tourists' anthropomorphism preferences. Interdependent self-construal individuals consider themselves part of the social context and tend to emphasize belongingness, kinship, social obligations, and relationships (Fiske et al., 1998). As such, they seek to build social connections when they feel socially isolated, such as in the context of social distancing during the pandemic. Anthropomorphism can fulfil social needs through humanlike features or behaviors (Mourey et al., 2017), which could trigger feelings of warmth (Lee & Oh, 2021). Highly interdependent self-construal individuals perceive themselves as relational and interconnected with others, and such anticipations may cause them to search for cues of warmth (Chang et al., 2021). In the absence of human interactions during imposition of social distancing rules, interdependent individuals may resort to anthropomorphized nonhuman agents to seek the warmth of humanlike features, showing a preference for anthropomorphism. Chang et al. (2021) also suggested that interdependent self-construal individuals tend to react more positively to a cute anthropomorphized 'spokescharacter' because of their higher need for social connections and warmth, compared to individuals with independent self-construal. Thus, we argue that under the social distance condition, individuals with higher interdependent self-construal will show a stronger preference for anthropomorphism due to higher perceived warmth than those with lower interdependent self-construal.

In line with the above arguments, the following hypotheses are

proposed:

H3. Interdependent self-construal positively moderates the relationship between social distancing and preferences for anthropomorphism.

H4. Interdependent self-construal positively moderates the mediation effect of perceived warmth on the relationship between social distancing and preferences for anthropomorphism.

The conceptual model of this paper is illustrated in Fig. 1.

4. Overview of the studies

Three studies were conducted to test these hypotheses. In Study 1, the effect of social distancing on tourists' preferences for anthropomorphism was investigated by manipulating social distancing in a tourism marketing context (H1). Study 2 replicated the findings of Study 1 through a factorial experimental design by manipulating both social distancing and anthropomorphism in a hotel service encounter context. Study 2 also tested perceived warmth as the underlying mechanism of the influence of social distancing on the preference for anthropomorphism (H2). Study 3 further tested the moderating effect of interdependent self-construal on the direct and indirect effects of social distancing on the preference for anthropomorphism in a hotel marketing context (H3 and H4). It also attempted to extend the findings of Studies 1 and 2 from the context of the COVID-19 pandemic to a normal flu epidemic context. Manipulation of anthropomorphism can be achieved through visual representations (humanlike physical features), linguistic representations (using first-person language or personification), or both (Delbaere et al., 2011; Lee & Oh, 2021). To improve the generalizability of the studies' findings, we used linguistic representations in Studies 1 and 3 and visual presentations in Study 2 to manipulate anthropomorphism.

Participant profiles for the three studies are exhibited in Table 1.

4.1. Study 1

The first study examined the causal effect of social distancing on tourists' preference for anthropomorphism through a one-factor (social distancing: yes vs. no) between-subjects design experiment. In this study, social distancing was manipulated through two hypothetical scenarios, and respondents were randomly assigned to these two conditions. Consumers' preference for anthropomorphism was measured through respondents' preference for two destination marketing messages (anthropomorphism: yes vs. no).

4.1.1. Participants

Participants for Study 1 were recruited from China through www.wjx.cn, which is the largest online survey data collection platform in China, with 6.2 million registered members (Qin et al., 2022). It has been widely used in tourism and hospitality research (e.g., Chi & Chi, 2022; Jian et al., 2021; Yin & Ni, 2021). A total of 168 effective survey responses were collected in June 2020, with 47.0% of the participants being male and the majority (85.1%) being between 21 and 40 years of age (see demographic profiles in Table 1). The sample size was adequate

Fig. 1. Conceptual model.

Table 1
Demographic profiles of the participants.

	Study 1	Study 2	Study 3
Age			
18-20	4.8%	7.5%	3.0%
21-30	41.1%	48.1%	43.2%
31-40	44.0%	35.8%	42.6%
41-50	6.6%	6.0%	8.1%
51-60	3.0%	2.4%	2.0%
61-70	0.6%	0.3%	0%
Gender			
Male	47.0%	43.6%	48.0%
Female	53.0%	56.4%	52.0%
Education			
High school or less	2.4%	6.6%	1.4%
Technical/vocational high school	1.2%	1.8%	3.4%
Some college	15.5%	17.6%	14.2%
College graduate	74.4%	63.9%	72.3%
Graduate work/advanced degree	6.5%	10.1%	8.8%
Other	0%	0%	0%
Annual household income			
Less than 4000 RMB	7.8%	5.7%	3.7%
4000–6999 RMB	10.1%	12.2%	11.5%
7000–9999 RMB	19.0%	17.3%	14.2%
10,000–19,999 RMB	28.6%	38.2%	32.8%
20,000–29,999 RMB	22.0%	18.8%	19.3%
30,000–49,999, RMB	10.1%	6.3%	12.8%
50,000 RMB or more	1.8%	1.2%	5.1%
Prefer not to say	0.6%	0.3%	0.7%

because a power analysis using G*Power software (Faul et al., 2009) showed that a sample size of 64 per condition would provide 80% power to detect a medium effect at an alpha level of 5% in an experimental design (Zhang, Hou, & Li, 2020). Hence, the sample size for this study was deemed appropriate.

4.1.2. Procedures

Participants were first asked to imagine a hypothetical scenario in which social distancing was manipulated. In the *social distancing* condition, participants were asked to imagine that, although COVID-19 was under control in the next few months and leisure travel was allowed, no effective vaccines or drugs were available yet, and social distancing was required at the destination and tourist attractions. A picture depicting tourists queuing in a line following social distancing guidelines was shown after the scenario description. In the *nonsocial distancing* condition, participants were asked to imagine that, in the next few months, the COVID-19 pandemic was over as a result of the development of effective vaccines or drugs, and everything returned to normal. People were permitted to travel as before, and social distancing was no longer required at the destination and tourist attractions. A picture depicting tourists queuing in a line without social distancing was shown to the participants after the scenario was described. The manipulation materials for social distancing can be seen in the Appendix. To strengthen the manipulation of social distancing, all participants were asked to write down their feelings and what they would do in the hypothetical scenario shown to them.

After the writing task, the participants were asked to imagine that they would like to travel to a domestic destination under the conditions described in the hypothetical scenario. While searching for relevant information on social media, they saw two destination marketing messages about City C: one was the normal version (Version A), and the other was an anthropomorphic version (Version B). The two destination marketing messages were designed in accordance with Letheren et al. (2017). In the normal version, the marketing message described City C as a destination city and introduced its tourism resources, whereas in the anthropomorphic version, City C was described as a lady and the introduction focused on her personality (see Appendix). Participants were then asked to indicate their preferences for these two destination marketing messages. Social distancing manipulation and the two types
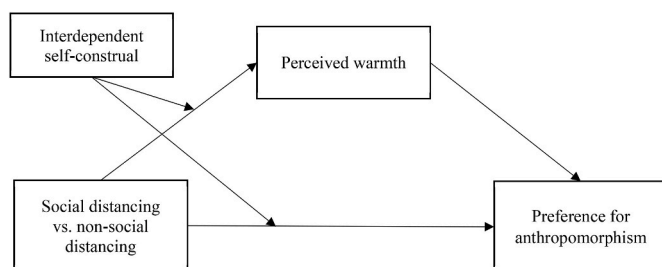
of destination marketing messages were pretested to ensure effectiveness.

4.1.3. Measurement

Tourists' preference for anthropomorphism was measured using two items drawn from Rodas and John (2020), "which is more attractive" and "which is better." Respondents were asked to rate these two items using a bipolar 7-point scale, with 1 being "Version A of the destination marketing message is more attractive/better" and 7 being "Version B of the destination marketing message is more attractive/better." The correlation coefficient (r) was 0.858 ($p < 0.01$) for the two items. In addition, the perceived novelty of the destination marketing message was measured using one item, "which one is more novel" as a control variable based on feedback from pretest participants. Participants were asked to rate novelty using a bipolar 7-point scale, in which 1 represented "Version A of the destination marketing message is more novel," and 7 represented "Version B of the destination marketing message is more novel."

4.1.4. Results

4.1.4.1. Manipulation check.
Participants were asked to rate the extent to which social distancing was needed in the hypothetical scenario using two questions on a bipolar 7-point scale. In the first question, 1 represents "social distancing is still necessary" and 7 represents "social distancing is no longer necessary." In the second question, 1 denotes "tourists have to keep a safe distance from other tourists at a tourist attraction," and 7 denotes "tourists do not have to keep a safe distance from other tourists at a tourist attraction." Independent t-test results showed that participants perceived social distancing to be more necessary in the social distancing condition ($M = 6.53$, $SD = 0.70$) than in the nonsocial distancing condition ($M = 1.89$, $SD = 0.97$; $t[161] = 36$, $p < 0.01$, $d = 5.45$), and tourists had to keep a larger safe distance from other tourists at a tourist attraction in the social distancing condition ($M = 6.55$, $SD = 0.71$) than in the nonsocial distancing condition ($M = 1.84$, $SD = 0.98$; $t[161] = 35.83$, $p < 0.01$, $d = 5.42$). Therefore, the manipulation of social distancing was successful.

A separate dataset containing 160 effective survey responses collected from the same subject pool was used to test the effectiveness of anthropomorphism manipulation in this study. They were presented with two descriptions of a city at the same time: the normal version (Version A) and the anthropomorphic version (Version B). All participants then answered the following two questions on a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree): "The description of Version A reads like an introduction to a person" and "The description of Version A is presented in an anthropomorphic way." For the description of Version B, they answered the same two questions as above. The paired-sample t-test showed that participants thought that the description of Version B read more like introducing a person ($M_A = 2.32$, $SD_A = 1.13$, $M_B = 6.24$, $SD_B = 0.97$; $t[159] = -26.51$, $p < 0.001$, $d = 1.95$) and that it was more like introducing in an anthropomorphic way ($M_A = 2.08$, $SD_A = 1.14$, $M_B = 6.29$, $SD_B = 0.91$; $t[159] = -29.05$, $p < 0.001$, $d = 2.06$). This result suggests that the anthropomorphic manipulation of the destination was successful.

4.1.4.2. The effect of social distancing on the preference for anthropomorphism.
The two items used to measure the preference for anthropomorphism were averaged before the data analysis. An ACOVA test was conducted to examine the influence of social distancing on tourists' preferences for anthropomorphism. As the anthropomorphic marketing message appeared to be more novel and uncommon than the normal marketing message, the perceived novelty of the marketing message was incorporated into the analysis as a control variable. The results showed that the participants preferred the anthropomorphic version of the destination marketing message more than the normal version in the

social distancing condition ($M = 5.26$, $SD = 0.13$) than in the nonsocial distancing condition ($M = 4.89$, $SD = 0.13$; $F[1, 165] = 4.20$, $p < 0.05$, $\eta^2 = 0.03$). These findings provide strong support for Hypothesis 1 that social distancing increases individuals' preference for anthropomorphism.

4.1.5. Discussion

Study 1 provides support for the causal effect of social distancing on tourists' preferences for anthropomorphism in the context of marketing tourist destinations by manipulating social distancing. However, it is unclear why this causal effect occurred. In the next study (Study 2), we aimed to uncover the underlying mechanism of the causal effect of social distancing on tourists' preferences for anthropomorphism and replicate the findings in Study 1 through a more rigorous experimental design by manipulating both social distancing and anthropomorphism.

4.2. Study 2

Study 2 had the following three objectives: First, it aimed to test the causal effect of social distancing on tourists' preferences for anthropomorphism through a more rigorous experimental design by manipulating both social distancing and anthropomorphism. Hence, a 2 (social distancing: yes vs. no) × 2 (anthropomorphism: yes vs. no) between-subjects design was adopted. Second, this study attempted to replicate the findings of the first study on the effect of social distancing on tourists' preferences for anthropomorphism in a hotel service encounter context. Two types of service modes were used to manipulate anthropomorphism: self-service machines and service robots. Third, and more importantly, this study attempted to test the underlying mechanism of the proposed effect by incorporating the perceived warmth of the anthropomorphic service mode as a potential mediator.

4.2.1. Participants

The participants for Study 2 were recruited from China through the same online platform as Study 1. The participants were randomly assigned to the four manipulated conditions, and 335 effective survey responses were collected in September 2020. Of the participants, 43.6% were male, and the majority (83.9%) of the respondents were between 21 and 40 years of age (see details of demographic profiles in Table 1). The sample size was deemed appropriate based on power analysis results (Faul et al., 2009) and previous experimental studies (Hwang & Mattila, 2018; K. Zhang, Hou, & Li, 2020).

4.2.2. Procedures

Study 2 adopted the same manipulation of social distancing as Study 1 (see Appendix). Participants were first asked to imagine a hypothetical scenario regarding social distancing. The same writing task was then assigned to the participants to strengthen the manipulation of social distancing. After the writing task, the participants were asked to imagine another hypothetical scenario in which anthropomorphism was manipulated. Following Choi et al. (2019), anthropomorphism was manipulated using two different service modes: humanoid service robots (anthropomorphized service mode) and self-service machines (non-anthropomorphized service mode). Participants were asked to imagine that they were traveling to a domestic destination under the conditions described in the hypothetical scenario. After checking in at the hotel and resting for a short while in the hotel room, they came to the hotel concierge desk and enquired about nearby attractions and restaurants. They find that this hotel used a self-service machine or a service robot to provide concierge services for guests. A picture depicting the self-service machine or service robot at the hotel concierge desk was shown after the description of the scenario (see Appendix). After exposure to the hypothetical scenario regarding the two different service modes, participants were asked to rate their preferences for the service mode and the perceived warmth of the service provider.

4.2.3. Measurement

Tourists' preference for anthropomorphism was measured using two items adapted from Liu et al. (2020), "I like concierge service provided by the self-service machine/service robot" and "I would like to use the concierge service provided by the self-service machine/service robot" ($r = 0.669$, $p < 0.01$). The perceived warmth of the service provider was measured using two items adapted from Wang et al. (2017): warm and friendly ($r = 0.79$, $p < 0.01$). In addition, perceived novelty was measured using one item as the potential control variable. Respondents were asked to rate their level of agreement with the above items using a 7-point Likert scale, ranging from "strongly disagree" (1) to "strongly agree" (7).

4.2.4. Results

4.2.4.1. Manipulation check.
The same two questions were asked to check the effectiveness of the manipulation of social distancing. A 2 (social distancing: yes vs. no) × 2 (anthropomorphism: yes vs. no) analysis of variance (ANOVA) was conducted, using the two social distancing manipulation check questions as dependent variables. The results show a significant main effect of social distancing on whether it is necessary ($F[1, 331] = 129.16$, $p < 0.001$, $\eta^2 = 0.28$) and whether tourists have to maintain a safe distance from each other at a tourist attraction ($F[1, 331] = 129.20$, $p < 0.001$, $\eta^2 = 0.28$). Neither the main effect of anthropomorphism nor the interaction effect between social distancing and anthropomorphism was significant in these two ANOVA models. These results suggest that the manipulation of social distancing was successful.

We checked the effectiveness of anthropomorphism manipulation in Study 2 through a separate sample of data. We recruited 177 participants online from the same pool. They were randomly assigned to either of the 2 scenarios, i.e., self-service machine or the service robot. All experimental materials and scenes were the same as those in the main experiment. Participants were asked to rate the degree of anthropomorphism of the service provider as follows:1 = very non-humanlike/very low anthropomorphism; 7 = very humanlike/very high anthropomorphism. The ANOVA revealed that the participants perceived the service robot to be more humanlike ($M_{robot} = 4.33$, $SD_{robot} = 1.38$, $M_{machine} = 3.90$, $SD_{machine} = 1.52$; $F[1, 175] = 3.78$, $p = 0.05$, $\eta^2 = 0.30$) and more anthropomorphic ($M_{robot} = 4.99$, $SD_{robot} = 1.37$, $M_{machine} = 4.24$, $SD_{machine} = 1.52$; $F[1, 175] = 11.80$, $p < 0.01$, $\eta^2 = 0.52$) than the self-service machine. This result shows that our anthropomorphic manipulation of service providers was successful.

4.2.4.2. The effect of social distancing on the preference for anthropomorphism.
The two items used to measure the preference for anthropomorphism were averaged before the data analysis. A 2 (social distancing: yes vs. no) × 2 (anthropomorphism: yes vs. no) analysis of covariance (ANCOVA) test was conducted to test the influence of social distancing on tourists' preference for anthropomorphism. As in Study 1, perceived novelty was incorporated into the analysis as a control variable. The results revealed a significant interaction effect between social distancing and anthropomorphism on preference ratings ($F[1, 330] = 8.44$, $p < 0.01$, $\eta^2 = 0.03$). The interaction effect is shown in Fig. 2. According to the figure, under the social distancing condition, respondents indicated a significantly greater preference for service robots ($M = 5.61$, $SD = 0.11$) than for self-service machines at the 0.1 significance level ($M = 5.32$, $SD = 0.11$; $t = 1.84$, $p = 0.066$). In contrast, under the nonsocial distancing condition, respondents indicated a significantly greater preference for self-service machines ($M = 5.71$, $SD = 0.10$) than service robots ($M = 5.38$, $SD = 0.11$; $t = -2.27$, $p < 0.05$). The results suggest that tourists prefer service robots more than self-service machines under the social distancing condition (vs. the nonsocial distancing condition), thus supporting Hypothesis 1.
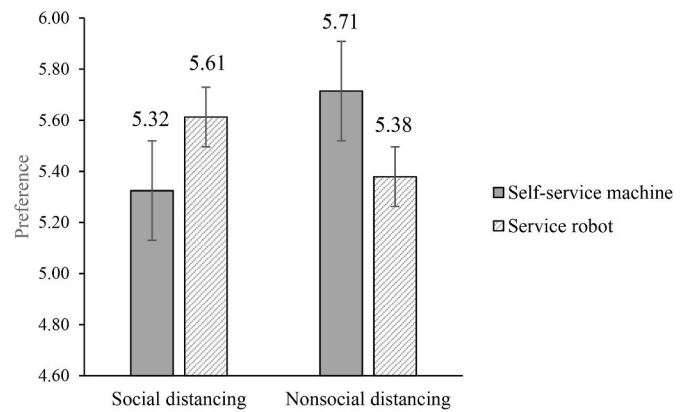
Fig. 2. Moderating effect of anthropomorphism (manipulated by service mode, Study 2).

4.2.4.3. Moderated mediation test.
To test whether perceived warmth comprised the mechanism underlying the interaction effect between social distancing and anthropomorphism on consumer preference, a moderated mediation analysis using PROCESS Model 8 with 10,000 bootstrapped samples (Hayes, 2013) was conducted. The results showed that the index of moderated mediation was significant for perceived warmth ($b = 0.22$, $SE = 0.10$, 95% boot CI = [0.02, 0.42]). A significant indirect effect of social distancing on respondents' preferences through perceived warmth was found when the service mode was a robot ($b = 0.14$, $SE = 0.07$, 95% boot CI = [0.008, 0.28]), but not in the case of a self-service machine ($b = -0.08$, $SE = 0.07$, 95% boot CI = [-0.22, 0.06], which includes zero). More specifically, respondents showed a greater preference for service robots owing to their higher perceived warmth, under social distancing than under nonsocial distancing (see Fig. 3). No such differences were found when the service mode was a self-service machine. This result supports the proposed mechanism. Hence, Hypothesis 2 is supported.

4.2.5. Discussion

Using a different tourism-related setting, i.e., hotel service encounters, Study 2 provided additional support for Hypothesis 1 regarding the causal effect of social distancing on tourists' preferences for anthropomorphism. The consistent findings regarding Hypothesis 1 in the two studies, using different contexts and manipulations of anthropomorphism, indicate that the effect of social distancing on tourists' preferences for anthropomorphism is robust and generalizable to different contexts. Furthermore, the significant mediation effect of perceived warmth found in this study provides strong support for Hypothesis 2, suggesting that tourists prefer anthropomorphic service providers under social distancing conditions because of the perceived warmth of anthropomorphism.
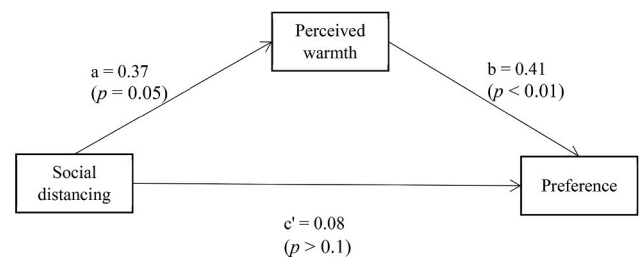
When anthropomorphism is yes, i.e., service robot

Fig. 3. Mediation path in Study 2.

4.3. Study 3

Study 3 had the following four objectives: First, it aimed to test the robustness of the effects of social distancing on tourists' preferences for anthropomorphism and the mediation effect of perceived warmth using different manipulations of social distancing and anthropomorphism. Instead of the COVID-19 pandemic, a flu epidemic was used as the context of the social distancing manipulation. The pictures depicting social distancing versus nonsocial distancing scenes at tourist attractions used in Studies 1 and 2 were replaced with pictures that strictly controlled all other factors except social distancing, leading to a more rigorous experimental design and noise-free manipulation of social distancing. In addition, anthropomorphism was manipulated using two hotel marketing messages: a normal version and an anthropomorphic version. Second, this study attempted to test the robustness of the findings in Studies 1 and 2 using a different measurement of preference for anthropomorphism, which contains well-established scales for attitudinal and behavioral preferences. Third, this study aimed to test the boundary condition of the effect of social distancing on tourists' preferences for anthropomorphism by testing the moderating effect of participants' interdependent self-construal. Hence, a quasi-experimental design was adopted, with social distancing (yes vs. no) being manipulated and interdependent self-construal being measured. Lastly, this study aimed to rule out two alternative explanations for the effect of social distancing on tourists' preferences for anthropomorphism: perceived risk and mood induced by social distancing practices.

4.3.1. Participants

The participants in Study 3 were recruited from the same online platform as in Studies 1 and 2. The participants were randomly assigned to the two manipulated conditions, and 296 effective survey responses were collected in November 2022. The sample consisted of slightly more female participants (52.0%) than male participants (48.0%), and most of the respondents were between 21 and 40 years old (85.8%; see details of demographic profiles in Table 1). The sample size was deemed appropriate based on the power analysis results (Faul et al., 2009).

4.3.2. Procedures

A slightly different manipulation of social distancing, as compared to that in Studies 1 and 2, was used in Study 3 (see Appendix). In the hypothetical scenarios for social distancing and nonsocial distancing, a flu epidemic was used to replace the COVID-19 pandemic. The pictures used to show the social distancing and nonsocial distancing scenes at tourist attractions were replaced by two pictures that were exactly the same, except for social distancing. After exposure to the social distancing manipulation, the same writing task used in Studies 1 and 2 was requested to strengthen the manipulation of social distancing.

After the writing task, participants were presented with a manipulation of anthropomorphism in a hypothetical scenario. The participants were asked to imagine that they were planning to travel to a domestic destination under the condition described in the earlier hypothetical scenario (either social distancing or nonsocial distancing condition) and that they needed to book a hotel. While searching for relevant information on social media, they saw marketing messages for two new hotels in the destination city: one was written normally, from a third-person perspective (Hotel A), while the other was written as if the hotel was a human, from a first-person perspective (Hotel B, see Appendix). Participants were then asked to indicate their preferences for these two hotel marketing messages, as well as the perceived warmth of both of them.

4.3.3. Measurement

Tourists' preference for anthropomorphism was measured using two scales, representing the two dimensions of consumer preference: attitudinal and behavioral preference (Chen et al., 2017; Liu et al., 2020). Attitudinal preference was measured using three items drawn from Chen

et al. (2017), including "I like which one more (liking)," "which is better (good)" and "which is more positive (positive)" ($\alpha = 0.937$). 7-point bipolar scales were used to measure these items, with 7 indicating greater attitudinal preference for the anthropomorphic hotel marketing message and 1 indicating greater attitudinal preference for the normal hotel marketing message. Behavioral preference was measured using purchase intention through three items adopted from Song and Luximon (2021): "I am more willing to book which hotel," "The likelihood for me to book which hotel is higher," and "The probability that I would consider booking which hotel is higher" ($\alpha = 0.959$). 7-point bipolar scales were used to rate these items, with 7 indicating greater behavioral preference for the hotel promoted in an anthropomorphic manner and 1 indicating greater behavioral preference for the hotel promoted in a normal way. The perceived warmth of the hotel marketing message was measured using the same two items used in Study 2 ($r = 0.804$, $p < 0.001$). Self-construal was measured using 12 items adopted from Chen and Huang (2016), with six items measuring independent self-construal ($\alpha = 0.629$), for example, "My personal identity is important to me," and six items measuring interdependent self-construal ($\alpha = 0.731$), for example, "I will sacrifice my self-interest for the benefit of my group." A 7-point Likert scale was used to measure these items (1 = strongly disagree and 7 = strongly agree). Following Chen and Huang (2016), a self-construal index was calculated using the formula (interdependent - independent)/(interdependent + independent), with higher scores reflecting a higher level of interdependent self-construal. The results show that the self-construal index was not affected by social distancing manipulation ($t[294] = 0.552$, $p = 0.581$).

Additionally, perceived risk and mood induced by the social distancing manipulation were included in this study to rule out alternative explanations for the effect of social distancing on preferences for anthropomorphism. The perceived risk of the scenario was measured using two items: "the above scenario makes me feel risky" and "the above scenario makes me feel unsafe" ($r = 0.855$). Following Hou et al. (2021), the mood induced by the social distancing manipulation was captured by an open-ended question and converted into a variable through content analysis. After exposure to the social distancing and nonsocial distancing manipulation, participants were asked to write down their feelings under the assigned condition. Two authors coded these feelings independently on a scale from 1 to 7, where 1 = very unhappy and 7 = very happy. The two ratings were averaged to measure the mood.

4.3.4. Results

4.3.4.1. Manipulation and realism check.
The same two questions used in Studies 1 and 2 were asked to check the effectiveness of social distancing manipulation. Independent *t*-test results showed that participants perceived social distancing to be more necessary in the social distancing condition ($M = 5.91$, $SD = 1.44$) than in the nonsocial distancing condition ($M = 4.71$, $SD = 2.10$; $t[294] = 5.76$, $p < 0.01$, $d = 1.80$), and that tourists had to keep a greater safe distance from other tourists at a tourist attraction in the social distancing condition ($M = 5.88$, $SD = 1.44$) than in the nonsocial distancing condition ($M = 4.73$, $SD = 2.15$; $t[294] = 5.44$, $p < 0.01$, $d = 1.83$). Two questions were used to test the effectiveness of anthropomorphism manipulation: "Hotel A's marketing message is anthropomorphic" and "Hotel B's marketing message is anthropomorphic." Paired *t*-test results show that participants rated Hotel B's marketing message ($M = 5.73$, $SD = 1.22$) as significantly more anthropomorphic than Hotel A's ($M = 3.30$, $SD = 1.74$, $t[295] = 16.09$, $p < 0.01$, $d = 2.60$). Together, these results indicate that the manipulations of social distancing and anthropomorphism in this study were successful.

Additionally, two questions were asked to assess the realism of the scenarios used in this study. Results show that the participants perceived the tourist decision-making scenarios used in this study as realistic ($M = $

5.66 out of 7) and felt that these scenarios often occur in reality (*M* = 5.36 out of 7).

4.3.4.2. The effect of social distancing on the preferences for anthropomorphism. The items used to measure attitudinal and behavioral preferences for anthropomorphism were averaged before the data analysis. Independent t-tests were conducted to test the influence of social distancing on tourists' preferences for anthropomorphism. The results showed that participants exhibited a greater attitudinal (*M* = 4.51, *SD* = 1.81, *t*[294] = 2.19, *p* < 0.05, *d* = 1.92) and behavioral preferences (*M* = 4.52, *SD* = 1.95, *t*[294] = 2.50, *p* < 0.05, *d* = 2.01) for the anthropomorphic hotel marketing message in the social distancing condition than in the nonsocial distancing condition (attitudinal preference: *M* = 4.03, *SD* = 2.02; behavioral preference: *M* = 3.94, *SD* = 2.06). These results lent further support to Hypothesis 1.

4.3.4.3. Moderation test. To test Hypothesis 3, a moderation test using

PROCESS Model 1 (Hayes, 2013) was performed, with social distancing (yes vs. no) as the independent variable, attitudinal and behavioral preferences for anthropomorphism as the outcome variables, and interdependent self-construal as the moderator. The results show that interdependent self-construal significantly moderates the effect of social distancing on attitudinal preference for anthropomorphism ($b_{\text{social distancing x self-construal}}$ = 6.29, SE = 2.32, *p* < 0.01). Specifically, the positive effect of social distancing on attitudinal preference was significant only when participants exhibited high interdependent self-construal (+1 SD, *b* = 1.11, SE = 0.31, *p* < 0.01), but not when participants had low interdependent self-construal (- 1 SD, *b* = −0.11, SE = 0.31, *p* = 0.73). Similarly, interdependent self-construal also significantly moderated the effect of social distancing on behavioral preference for anthropomorphism ($b_{\text{social distancing x self-construal}}$ = 5.22, SE = 2.43, *p* < 0.05), and the positive effect of social distancing on behavioral preference for anthropomorphism was significant only among participants with high interdependent self-construal (*b* = 1.10,
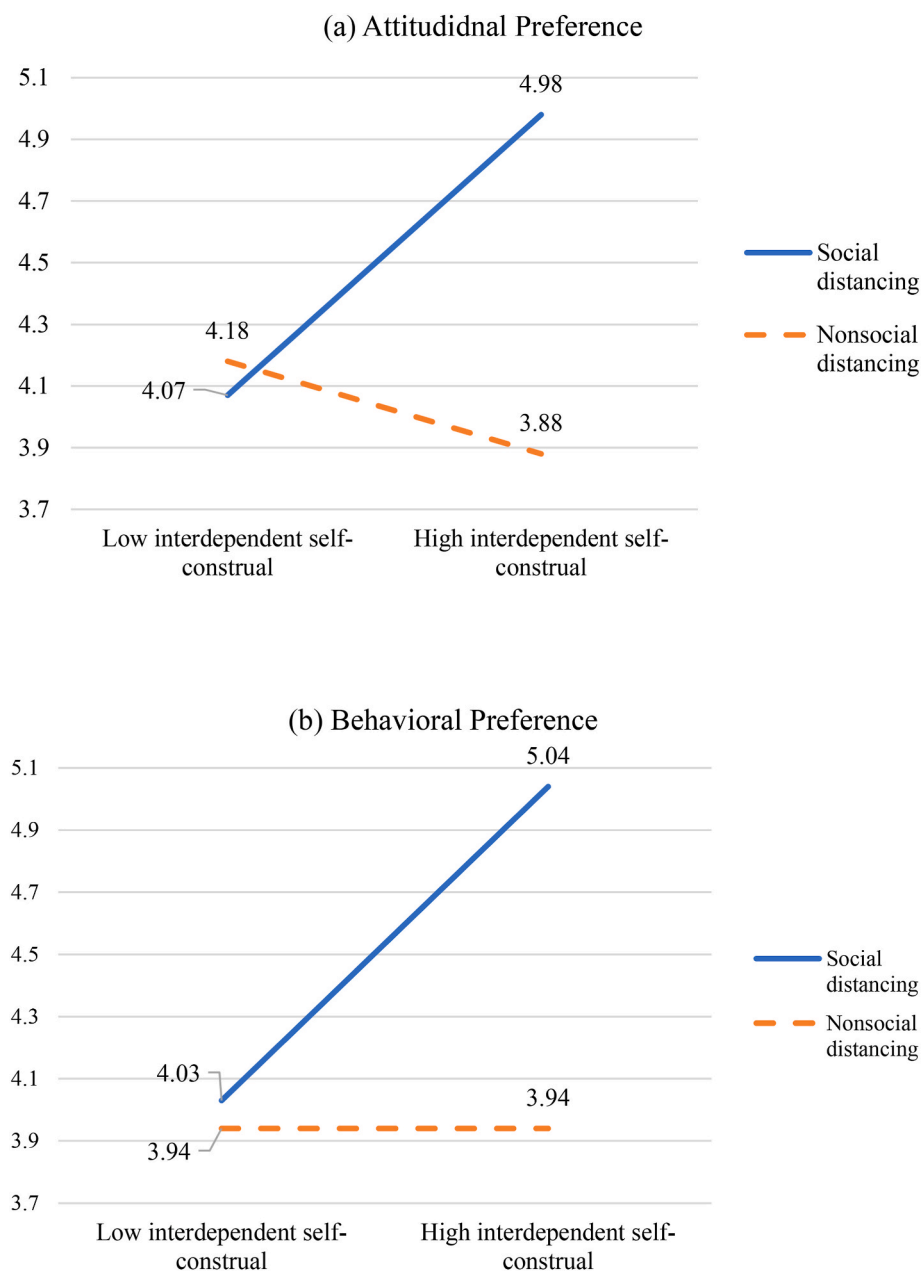

Fig. 4. Moderating effect of interdependent self-construal.

SE = 0.33, $p < 0.01$), but not among those with low interdependent self-construal ($b = 0.09$, SE = 0.33, $p = 0.78$). The moderating effect of interdependent self-construal is shown in Fig. 4. Together, these results provided strong support for Hypothesis 3.

4.3.4.4. Moderated mediation test. To test whether perceived warmth comprised the mechanism underlying the interaction effect between social distancing and interdependent self-construal on tourists' preferences for anthropomorphism, moderated mediation analyses using PROCESS Model 8 with 10,000 bootstrapped samples (Hayes, 2013) were performed. The results showed that the index of moderated mediation was significant for perceived warmth as a mediator between social distancing × interdependent self-construal interaction and attitudinal preference for anthropomorphism ($b = 3.82$, SE = 1.80, 95% boot CI = [0.33, 7.34]). A significant indirect effect of social distancing on participants' attitudinal preferences through perceived warmth was found only when participants had high interdependent self-construal ($b = 0.80$, SE = 0.24, 95% boot CI = [0.35, 1.28]). Such an effect was not significant among participants with low interdependent self-construal ($b = 0.12$, SE = 0.23, 95% boot CI = [−0.33, 0.59], which includes zero). Similarly, the index of moderated mediation was significant for perceived warmth as a mediator between social distancing × interdependent self-construal interaction and behavioral preference for anthropomorphism ($b = 3.75$, SE = 1.79, 95% boot CI = [0.39, 7.36]). A significant indirect effect of social distancing on participants' behavioral preferences through perceived warmth was found only when the

participants had high interdependent self-construal ($b = 0.79$, SE = 0.24, 95% boot CI = [0.33, 1.29]), but not when they had low interdependent self-construal ($b = 0.12$, SE = 0.23, 95% boot CI = [−0.33, 0.58], which includes zero). The moderated mediation results are shown in Fig. 5. These results indicate that social distancing has a positive effect on preferences for anthropomorphism due to its perceived warmth among participants with high interdependent self-construal, but not among those with low interdependent self-construal. Hence, Hypothesis 4 is well supported.

To rule out alternative explanations for the effect of social distancing on preferences for anthropomorphism, moderated mediation analyses using PROCESS Model 8 with 10,000 bootstrapped samples (Hayes, 2013) were performed with perceived risk and mood induced due to the social distancing manipulation as potential mediators. The results showed that the indices of moderated mediation for perceived risk as a mediator between social distancing × interdependent self-construal interaction and preferences for anthropomorphism were non-significant (attitudinal preference: $b = 0.01$, SE = 0.15, 95% boot CI = [−0.31, 0.36], which includes zero; behavioral preference: $b = 0.01$, SE = 0.15, 95% boot CI = [−0.31, 0.36], which includes zero). The indices of moderated mediation for mood as a mediator between social distancing × interdependent self-construal interaction and preferences for anthropomorphism were also non-significant (attitudinal preference: $b = −0.07$, SE = 0.28, 95% boot CI = [−0.78, 0.44], which includes zero; behavioral preference: $b = −0.04$, SE = 0.24, 95% boot CI = [−0.63, 0.40], which includes zero). Therefore, we can exclude

(a) Attitudinal preference

a = 0.98 ($p < 0.01$)
b = 0.82 ($p < 0.01$)
c' = 0.05 ($p = 0.74$)

When participants had high interdependent self-construal (+1 SD)

(b) Behavioural preference

a = 0.98 ($p < 0.01$)
b = 0.81 ($p < 0.01$)
c' = 0.15 ($p = 0.33$)

When participants had high interdependent self-construal (+1 SD)
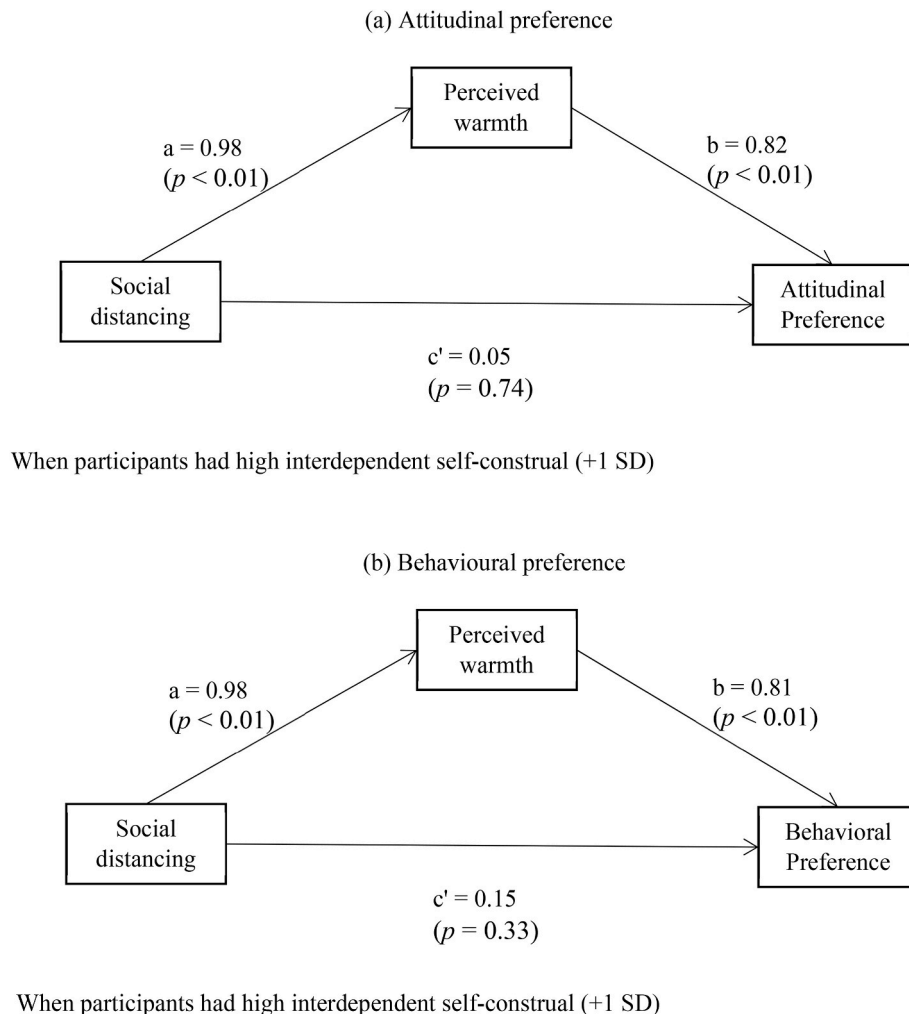
Fig. 5. Moderated mediation effect.

perceived risk and mood as alternative explanations for the effects of social distancing on tourists' preferences for anthropomorphism.

4.3.5. Discussion

Study 3 provided further support for Hypotheses 1 and 2 using different manipulations of social distancing and anthropomorphism. It improved the generalizability of the findings regarding social distancing by shifting the social distancing context from the COVID-19 pandemic to normal flu epidemics, and by using a different anthropomorphism context, that is, hotel marketing. Study 3 also improved the robustness of the findings by using a well-established measurement scale of consumer preference. By adding behavioral preference for anthropomorphism, it extended Study 1 from testing attitudes toward the marketing message to testing behavioral intentions toward the marketed products. Moreover, Study 3 tested the moderating effect of interdependent self-construal and found that the effect of social distancing is contingent on tourists' interdependent self-construal. Finally, Study 3 ruled out perceived risk and mood induced due to social distancing practices as alternative explanations for the effects of social distancing on the preferences for anthropomorphism.

5. General discussion and conclusion

Social distancing is an effective and widely adopted measure during pandemics and epidemics when infectious diseases spread rapidly. It is important to understand tourist attitudes and behaviors against the background of social distancing to help the tourism industry better adapt to pandemics or epidemics. However, little is known about how tourists change their behaviors in response to social distancing rules during tourism consumption. The purpose of this study was to investigate the influence of social distancing on tourists' preferences for anthropomorphism, its underlying mechanism and boundary conditions. Through three studies in different contexts of tourism consumption, this research finds that 1) tourists have a greater preference for anthropomorphism under social distancing conditions (vs. nonsocial distancing conditions); 2) this effect is mediated by the perceived warmth of anthropomorphism; and 3) the direct and indirect effects of social distancing on tourists' preferences for anthropomorphism only occur among those with high interdependent self-construal. These findings have important theoretical and practical implications.

5.1. Theoretical implications

First, this study is among the first to explore the influence of social distancing on tourism consumption, representing a significant contribution to the tourism literature. We found that tourists prefer anthropomorphized to normal marketing messages and anthropomorphized service robots to self-service machines under social distancing conditions (vs. nonsocial distancing conditions). Tourists show not only attitudinal, but also behavioral preference (i.e., intention to use or purchase) for anthropomorphism. Our study extends the research by Chen et al. (2017), who found that social exclusion, that is, being rejected or excluded from social relationships, leads to a preference for anthropomorphized brands. Social distancing shares common ground with social exclusion in that social distancing involves social isolation and reduced social interactions due to the need for physical distancing (Sikali, 2020). Social distancing is conceptually distinct from social exclusion. Social exclusion results from passive rejection from others, whereas social distancing involves active, either voluntary or forced, withdrawal and avoidance behaviors, such as avoiding interactions or keeping a distance from others (Park & Youn, 2022; Westphal & Khanna, 2003). Social distancing focuses on maintaining physical distance, while social exclusion implies being kept apart from others, either physically or psychologically/emotionally (Ali et al., 2021; Eck & Riva, 2016). Social exclusion is essentially a negative experience that involves hurt feelings, negative emotions, and diminished self-esteem (Rawat et al.,

2022). According to Williams (2009), social exclusion threatens four basic human needs: belongingness, control, self-esteem, and meaningful existence. In contrast, social distancing is not necessarily negative, as it can be voluntary, and it does not harm one's need for control, self-esteem, and meaningful existence. As such, this study provides a novel theoretical contribution to the tourism literature by focusing on the effects of social distancing on tourist consumption behaviors.

Second, drawing on research in social cognition (Fiske et al., 2007), this study reveals the psychological mechanism (i.e., the perceived warmth of anthropomorphism) that drives the positive effect of social distancing on tourists' preferences for anthropomorphism. This enriches the tourism and hospitality, and general psychology literature on social distancing and anthropomorphism. Previous research has demonstrated that there are individual-level factors that may influence people's preferences for anthropomorphism, including age, personality, relationship status (Letheren et al., 2016) and financial status (Wan & Chen, 2020). This study contributes to the literature by investigating an external factor, i.e., social distancing, which influences people's preferences for anthropomorphism. Moreover, social distancing during the COVID-19 pandemic could lead to social isolation, impersonality, loneliness, and other negative impacts on individuals' mental well-being, owing to the lack of social interactions (Marroquín et al., 2020; Sikali, 2020). This study suggests that anthropomorphism can be employed to mitigate the negative psychological impacts of social distancing through the perceived warmth of humanlike characteristics associated with anthropomorphic products in both tourism and more general consumption contexts.

Third, this study further adds to the growing body of research on anthropomorphism by uncovering the moderating role of interdependent self-construal. Existing studies have investigated the relationship between interdependent self-construal and anthropomorphism. For example, Fan et al. (2020) found that customers with low interdependent self-construal tended to show less dissatisfaction with humanoid self-service machines (vs. non-humanoid ones) after service failure. Kwak et al. (2017) revealed that brand anthropomorphism makes consumers with interdependent self-construal react more negatively to procedural injustice after service failure. Studies also show that consumers with independent self-construal prefer anthropomorphized brands that play partner (Hsieh et al., 2021) or master roles (Lin & Huang, 2018) rather than servant roles. This study extends this body of work by demonstrating that tourists with a higher level of interdependent self-construal prefer anthropomorphized marketing messages or products under social distancing rather than under nonsocial distancing conditions. This result further indicates cultural differences in the role of social distancing on tourists' preferences for anthropomorphism, since self-construal is connected to national cultural differences in terms of individualism and collectivism (Cross et al., 2011). This study suggests that more attention should be paid to cross-cultural research on social distancing and anthropomorphism, considering the cross-cultural nature of international tourism.

Finally, this study contributes to the literature on self-service technologies, including service robots. Although existing research has indicated the important role of self-service technologies in minimizing human contact in tourism and hospitality services during the pandemic (Seyitoğlu & Ivanov, 2020; Shin & Kang, 2020; Zeng et al., 2020), it is not clear how these different types of self-service technologies should be used to better serve tourists' needs. Our findings corroborate those of Christou et al. (2020), who reported that tourists prefer anthropomorphic robots to other types of service robots. Our research further extends existing studies by finding that tourists prefer anthropomorphized self-service technologies and humanoid service robots in service encounters to fulfil their social needs under social distancing conditions. Additionally, our research contributes to the literature on the factors influencing adoption of service robots (Hou et al., 2021; Leung et al., 2018; Tussyadiah et al., 2020) by identifying the role of social distancing in driving consumer adoption of humanoid robots in service encounters.

5.2. Practical implications

This study provides important implications for both tourism marketing and service design during crises when social distancing is required, like pandemics and epidemics. This study found that tourists tend to prefer anthropomorphic marketing messages or products and indicate a higher purchase intention toward anthropomorphic products to fulfil their social needs under social distancing conditions. Therefore, it is recommended that tourism marketers use anthropomorphism in their marketing communications, such as likening a destination to a human character, emphasizing desirable destination personalities in marketing messages, and using an anthropomorphic logo or mascot. Such tourism marketing communications could convey warmth and sociability, which helps create a sense of social and emotional connection between tourists and the destinations or tourism business. Therefore, using anthropomorphic tactics in tourism marketing campaigns could help the tourism industry recover during pandemics or epidemics when social distancing is necessary.

Further, this study provides suggestions regarding how to serve customers at tourism destinations, such as concierge services, front desk services, room service in hotels, and customer services at tourist attractions during pandemic and epidemic crises. Tourists need to minimize contact with other humans to reduce infection risk, but at the same time, maintain social connectedness under social distancing conditions. Tourism and hospitality operators may consider adopting anthropomorphized self-service technologies such as anthropomorphic machines or humanoid service robots in their service design during social distancing conditions. Such anthropomorphized design not only conveys warm feelings and improves service experience, but also promotes tourists' trust in self-service machines or service robots (Park, 2020; Tussyadiah et al., 2020).

In addition, this study sheds light on service operations in socially crowded tourism environments. Social crowding can occur in nonsocial distancing conditions. Owing to the accelerated growth of global tourism and widespread media coverage, overcrowding and over-tourism at popular destinations were widely observed and reported before the outbreak of COVID-19 (Forbes, 2018; UNWTO, 2018). This is expected to happen again once COVID-19 is over and social distancing rules have been completely lifted. Overcrowding at tourism destinations could damage the tourist experience, decrease tourist satisfaction, and lead to a diminished sense of control and avoidance behaviors among tourists (Consiglio et al., 2018; Jacobsen et al., 2019). Notably, tourists may avoid human beings and social communication in a crowded environment due to the tendency to withdraw socially (Hou et al., 2021). This study further revealed that tourists tend to prefer objectified self-service machines to humanoid service robots under nonsocial distancing conditions. Therefore, tourism and hospitality practitioners should avoid using anthropomorphic self-service technologies in crowded environments, such as during peak seasons, or peak hours of service operation. In contrast, in an uncrowded environment and during non-peak seasons or non-peak hours of service operation, humanlike service providers such as anthropomorphic machines and humanoid service robots are highly recommended to enhance tourists' social experience.

Finally, service providers in the tourism and hospitality industry need to be aware of their target market's self-construal style to provide appropriate services. Our findings indicate that tourists with higher interdependent self-construal tend to have a stronger preference for anthropomorphism in the context of social distancing due to their stronger needs for social interactions and social warmth. Therefore, tourism and hospitality professionals should use anthropomorphic tactics in marketing and service delivery among consumers with high interdependent self-construal during pandemic or epidemic crises when social distancing is required or in uncrowded service environments such as during non-peak seasons. Although self-construal is an individual attribute, it differs at the group level depending on elements such as culture (Markus & Kitayama, 1991) and gender (Cross & Madson, 1997). Markus and Kitayama (1991) proposed that East Asian (vs. Western) culture encourages an interdependent (vs. independent) self-construal. Regarding gender, men are believed to create and maintain autonomous self-construal, whereas women are believed to create and maintain interdependent self-construal (Cross & Madson, 1997). Thus, anthropomorphism tactics would be more effective for destinations or tourism/hospitality businesses in regions with a collectively dominant interdependent self-construal style, such as East Asia, or when female tourists are the target consumers in social distancing contexts.

5.3. Limitation and future research

Several future research directions warrant further investigation. First, only Chinese samples were used in the three studies, which could help minimize confounding effects in the responses. As a result, the generalizability of the findings could be compromised. Future research could test the proposed relationship in other cultural contexts and demographic backgrounds. Second, this study examined only the influence of social distancing on tourists' preferences for anthropomorphism. Future research could explore the impacts of social distancing on other attitudes and behaviors of tourists to help the industry better adapt to pandemic and epidemic situations. Third, this study tested only the moderating effect of interdependent self-construal on the effect of social distancing on tourists' anthropomorphism preferences. Future research could identify other potential moderators and boundary conditions for the impact of social distancing. Lastly, this study only tested self-reported behavioral intention as outcome variables through online experiments. Future research on social distancing and tourist behavior could measure actual behaviors using lab or field experiments to improve the validity of the conclusions (Viglia & Dolnicar, 2020).

Declaration of competing interest

There is no known financial/personal interest or belief that could affect the objectivity of the research findings.

Appendix

Manipulation of social distancing (Study 1 & Study 2)

Social distancing condition

Imagine in the next few months that the COVID-19 pandemic is largely under control. However, there are not yet any effective vaccines or drugs. Although you can travel for leisure purposes, social distancing is still requested at tourist attractions. You have to be at least 1 m away from each other in a queue or while visiting an attraction. Reduced traffic is requested by attractions, restaurants and shops, and hence you have to make reservations

in advance or wait in line outside the venue. You will not see crowded scenes at tourist attractions as before the pandemic, and people must wear masks during the trip.

Nonsocial distancing condition

Imagine in the next few months that the COVID-19 pandemic is over as a result of the development of effective vaccines or drugs. Everything is back to normal. You can visit a tourist attraction just as before the pandemic. You do not have to worry about social distancing, and you do not have to wear face masks. You can sit or stand next to other tourists without worrying about getting infected with COVID-19. You will see crowded scenes at the tourist attractions as before.

The pictures used to manipulate social distancing were withdrawn due to copyright issues, but are avaiable upon request.

Manipulation of anthropomorphism (Study 1)

*Normal destination marketing message (Version A)*

Welcome to City C! City C is located in China's southeastern coast. It has over three million residents and attracts tens of millions of tourists each year. C is a city with a long history and profound cultural heritage. There are many historical and modern cultural resources. City C has aspects of both traditional and modern culture, and it is famous for its combination of Chinese and Western elements, as well as the local people's hospitality.

Anthropomorphized destination marketing message (Version B)

City C welcomes you! City C is located in China's southeastern coast. She is currently home to over three million residents and welcomes tens of millions of tourists each year. C owns rich historical and cultural resources. She is eclectic, having the classical beauty of Oriental culture, the temperament of modern fashion, and the exotic beauty of Western culture. She is charming and graceful, passionate and vibrant—full of fascination.

Manipulation of anthropomorphism (Study 2)

Imagine that you are traveling to a domestic destination in the previously described scenario. After checking in at the hotel and resting for a short while in the hotel room, you come to the hotel concierge desk and would like to ask about nearby attractions and restaurants. There you find that the hotel uses a self-service machine/service robot, as shown in the picture, to provide concierge services for guests.
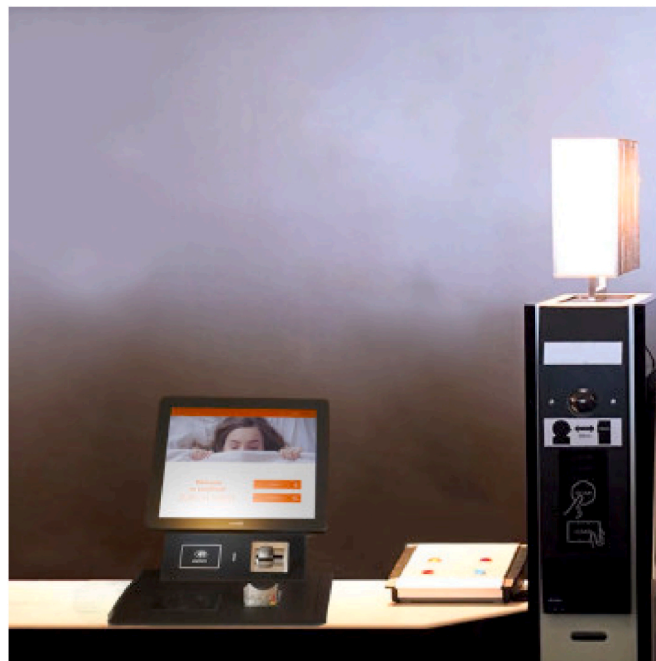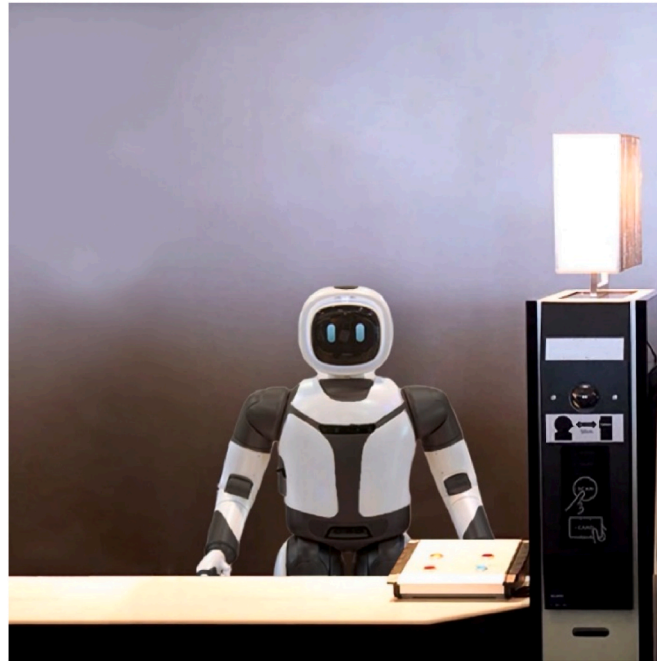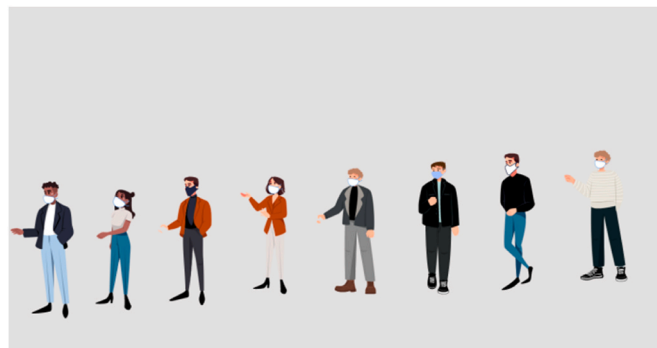
Manipulation of social distancing (Study 3)

Social distancing condition

Imagine that you are planning a domestic trip. A flu epidemic is occurring. Although leisure travel is allowed, social distancing is required at the destination and tourist attractions, and face coverings are recommended. Tourists need to keep a distance of at least 1 m away from other tourists while queuing and touring. A picture showing tourists queuing in a line at tourist attractions is exhibited below:

Nonsocial distancing condition

Imagine that you are planning a domestic trip. Despite there is a flu epidemic, leisure travel is allowed. Social distancing is not required at the destinations and tourist attractions, and there is no need to wear face coverings. Tourists can stay close to each other while queuing and touring. A picture showing tourists queuing in a line at tourist attractions is exhibited below:

Manipulation of anthropomorphism (Study 3)

Normal hotel marketing message (Hotel A)

Welcome to Hotel A, Enjoy Your Stay!

This is a new brand launched by the Moddisen hotel group. During your stay, you will enjoy quality sleeping, dining and entertainment experiences. Hotel A will serve you with warm and thoughtful service!

Anthropomorphized hotel marketing message (Hotel B)

Try me, Enjoy Your Stay!

Hello, I am a new member of the Vermont hotel family. During your stay, I will offer you quality sleeping, dining and entertainment experiences. Order me, and I will serve you with warm and thoughtful service!

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