RESEARCH PAPER

AI-based chatbots in conversational commerce and their effects on product and price perceptions

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Abstract
The rise of AI-based chatbots has gradually changed the way consumers shop. Natural language processing (NLP) technology and artificial intelligence (AI) are likely to accelerate this trend further. However, consumers still prefer to engage with humans and resist chatbots, which are often perceived as impersonal and lacking the human touch. While the predominant tendency is to make chatbots appear more humanlike, little is known about how anthropomorphic verbal design cues in chatbots influence perceived product personalization and willingness to pay a higher product price in conversational commerce contexts. In the current work, we set out to test this through one pre-test ($N = 135$) and two online experiments ($N = 180$ and 237). We find that anthropomorphism significantly and positively affects perceived product personalization, and that this effect is moderated by situational loneliness. Moreover, the results show that the interaction between anthropomorphism and situational loneliness has an impact on the willingness to pay a higher product price. The research findings can be used for future applications of AI-driven chatbots where there is a need to provide personalized and data-driven product recommendations.

Introduction

Conversational commerce (also called conversational marketing) can be defined as an interaction between a brand and a consumer that simulates human dialogue (Gartner, 2019) and refers to purchasing products or services through a chatbot

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(also known as a digital assistant, conversational agent, virtual assistant, virtual agent). The term "conversational commerce" was coined in a 2015 Medium post by Chris Messina, a former Uber and Google employee who invented the hashtag (#) in tweets (Edwards, 2013). In his post, Chris Messina stated that service providers would shift towards conversational commerce, which offers convenience, personalization, and decision support while people are on the go and can only partially pay attention (Messina, 2015). The current growth of conversational commerce is fuelled by technological advances in artificial intelligence (AI) (Reavie, 2018) and is forecasted to grow almost sevenfold by 2025, amounting to some 290 billion US dollars worldwide (statista.com). As consumers demand immediate responses and tailored recommendations and continuously outsource their purchase decisions to algorithms (Rabassa et al., 2022; Stucke & Ezrachi, 2018), conversational commerce offers firms an entirely new channel that prioritizes convenience and personalization (Campbell et al., 2020). For example, American Eagle Outfitters and Domino's Pizza use chatbots to take orders or recommend products, and major

platforms such as Amazon, eBay, Facebook, and WeChat have started adopting them for conversational commerce transactions (De Cicco et al., 2020).

Chatbots have become an increasingly important gateway to digital services and information (Følstad et al., 2021) that provide scalability, cost-effectiveness, and control over the quality of interactions and additional customer data (Crolic et al., 2021). As software-based systems designed to interact with humans with natural language (Feine et al., 2019; McTear et al., 2016), chatbots are employed in various areas such as customer service (e.g., Hadi, 2019; Sheehan et al., 2020), education (e.g., Smutny & Schreiberova, 2020), eCommerce (e.g., Shafi et al., 2020), healthcare (e.g., Fitzpatrick et al., 2017), fintech (e.g., Huang & Lee, 2022), and retail (e.g., Tran et al., 2021), among others. As chatbots provide a more engaging platform for customers to submit their contact information, they can also serve to generate consumer interest for a product or service, potentially increasing company revenue (Lee and Lee, 2020). Additionally, extant research on artificial intelligence applications in marketing (e.g., Campbell et al., 2020; Chung et al., 2020; Kumar et al., 2021) points to the creation of customized products and services. Chatbots in this application area allow products and services to be personalized based on individual needs and sold through one-to-one conversations in real-time (Diederich et al., 2020).

Despite the technological developments in natural language processing (NLP) technology and artificial intelligence (AI) systems, conversational commerce is currently experiencing a void in e-commerce between early adopters and the early majority (Han, 2021; Rabassa et al., 2022; Arsovski et al., 2018), with consumers still preferring to interact with humans than with chatbots (Adam et al., 2021). It therefore becomes critical for marketers to reduce consumer scepticism towards chatbots and understand how to ensure positive consumer perceptions of and behavior towards the latter (Araujo, 2018; Roy & Naidoo, 2021). Further, the rise of omnichannel retail, in which consumers seamlessly move between different channels, raises the question of whether technologies used in conversational commerce can mimic traditional sales conversations in online environments (Luo et al., 2019). Overall, improvements in technology come from a desire to make interactions in online channels more human-like (Van der Broeck et al., 2019; Go & Sundar, 2019; van Pinxteren et al., 2019) with anthropomorphism emphasized as a key feature of AI-powered technologies (Troshani et al., 2020). Given the extensive use of anthropomorphism in conversational technologies, marketers seem to hold an implicit belief that anthropomorphic cues in chatbots enhance positive consumer perceptions and behavior (Velasco et al., 2021). While prior work has especially focused on traditional e-commerce, e-retailing, and social commerce (Bugshan & Attar, 2020; Tang, 2019) contexts and chatbots in customer service (e.g., Campbell et al., 2020; Crolic et al., 2021), there is currently limited research on AI-powered chatbots that can

assist consumers with designing and selling products tailored to individual customers (Rabassa et al., 2022). While many firms employ chatbots with human-like features, it remains unclear whether these efforts to anthropomorphize chatbots will pay off in terms of consumers engaging with them and specifically, whether anthropomorphic verbal cues may be efficient in influencing product and price perceptions.

In addition to anthropomorphism, personalization — the chatbot's ability to understand and satisfy a user's unique needs (Brusilovsky & Maybury, 2002; Serino et al., 2005) — has become an important feature in AI-driven conversational technologies. Past studies have primarily focused on multiple chatbot features, e.g., appearance (Ciechanowski et al., 2019), name (Araujo 2020), gender (e.g., Beldad et al., 2016), among others, and their impact on interactions with the consumer. Despite its great potential, research analyzing how chatbot anthropomorphism may impact perceived product personalization is still scarce, especially in conversational commerce settings.

Further, with the rise of personalization and digital technologies, dynamic pricing emerged as a novel approach, allowing firms to increase profits by 3% to 25% (Vomberg, 2021; BenMark et al., 2017; Kimes & Wirtz, 2003). Personalized pricing enables companies to get a better understanding of what their customers are willing and able to pay, which in turn helps them create offers that will be more profitable for both parties involved (Vomberg, 2021). However, would individuals be willing to pay a higher product price for the same product if they interact with an anthropomorphic chatbot versus non-anthropomorphic? To address these research gaps, in the present paper, we investigated whether anthropomorphic verbal design cues in chatbots designed for conversational commerce would positively impact users' perceptions of product personalization and willingness to pay a higher product price.

We further argue that the perception of chatbots as human-like is contingent on an individual's situational loneliness. The COVID-19 pandemic has led to an increase in lonely consumers, deeply embedded by social isolation (Killgore et al., 2020; Wang et al., 2021). Despite the rise of lonely consumers, marketing research has only recently begun to shed light on how loneliness affects consumer decision-making (Chen et al., 2021). Prior research (e.g., Epley et al., 2008) has shown that individuals even briefly experiencing surges of loneliness are more likely to anthropomorphize. If that is the case, one should expect that the effect of anthropomorphism on the product personalization and willingness to pay a higher product price would be influenced by situational loneliness. While anthropomorphism has been well explored in the AI literature both conceptually and empirically (e.g., Adam et al., 2021; Konya-Baumbach et al., 2023), introduction of situational loneliness as a moderator constitutes a central contribution of this research paper.

The objective of this paper is twofold. First, this paper attempts to answer how anthropomorphic verbal design cues affect perceived product personalization and willingness to

pay a higher product price when interacting with an AI-based chatbot in conversational commerce. Second, we examine how situational loneliness moderates the effect of anthropomorphism on perceived product personalization and willingness to pay a higher product price, which have rarely been examined in conversational commerce settings.

With eCommerce on the rise and fierce competition among online retailers (Mu & Zhang, 2021) as well as an increase in AI-powered chatbot applications in marketing, our findings can be relevant for both research and practice. First, our research contributes to the emerging area of human-chatbot interaction in conversational commerce settings by testing if designing AI-based chatbots as anthropomorphic motivates consumers to perceive products and services recommended and purchased via chatbots as more personalized. Practically, the results of this study can provide marketers with guidelines to better understand the effect of verbal anthropomorphic cues on the perception of product personalization, thus enhancing conversion opportunities when selling products online. Finally, our paper aims to add to the research stream of loneliness in consumer behavior and helps marketers understand situational loneliness as a factor that makes consumers perceive products as more personalized and of a higher value.

Theoretical background

AI-based chatbots and anthropomorphism

Chatbots are defined as software-based systems designed to interact with humans using natural language (Feine et al., 2019; McTear et al., 2016). They differ in their embodiment/disembodiment as well as engagement levels (Thomaz et al., 2020) and can perform simple tasks such as booking flights, to more complex tasks such as giving health, financial or shopping advice (Araujo 2020). Chatbots often feature an avatar with human-like features, such as a face and body parts (Han, 2019). Embodied chatbots have a virtual body or face, engage in a conversation via language (text or speech) and can use non-verbal communication cues such as facial expressions, gaze, and body movements (Kramer et al., 2009). Chatbots can be text-based or speech-based (Gnewuch et al., 2017). During interactions with chatbots, consumers can actively participate and communicate their preferences by possessing a certain level of control over the conversation's direction.

The first known text-based chatbot ELIZA (Weizenbaum, 1966) was developed in the 1960s as a computer program that used natural language to simulate human-like conversation. This was followed in the 1980s by speech-based dialog systems, voice-controlled user interfaces, embodied chatbots, and social robots (McTear et al., 2016). Since then, researchers in computer science, information systems, human–computer interaction, and marketing have extensively explored chatbots.

The recent technological advancements in NLP technology and AI allow the development of new and more efficient chatbots (Pantano & Pizzi, 2020) giving them traits that make them seem increasingly more human.

While today's chatbots use artificial intelligence to conduct sophisticated dialogs, earlier chatbots had a more fixed interaction style based on multiple-choice questions (Turban et al., 2018). Due to advances in NLP and AI, AI-powered chatbots can maintain more sophisticated conversations with consumers and are more adept at the unstructured exchanges consumers used to have with retail assistants. AI-based chatbots typically capture users' historical data, predict their current needs, and thus support more complex consumer decision-making processes (Ma & Sun, 2020). Such chatbots allow users to communicate by being able to provide feedback on the recommendations they receive to improve the next recommendation cycles. Hence, chatbots using artificial intelligence can understand unstructured information, learn, and improve with each interaction and outcome.

Prior research suggests that chatbots should be designed as anthropomorphic and feature characteristics of human-to-human communication (e.g., Derrick et al., 2011; Elkins et al., 2012). Anthropomorphism refers to the attribution of human characteristics to non-human entities (Chandler & Schwarz, 2010; Waytz et al., 2014; Epley et al., 2007; Epley et al., 2008). Most studies have successfully found that the inclusion of anthropomorphic cues, e.g., human face and voice (Epley et al., 2007; Haley & Fessler, 2005, Jipson & Gelman, 2007), human-like form (Aggarwal & McGill, 2007), and human-like behavior (Epley et al., 2008), triggers the tendency for anthropomorphism. People tend to anthropomorphize various non-human objects, including products, brands, and technological artifacts when they feature visual or linguistic anthropomorphic cues (Aggarwal & McGill, 2012; Kim & McGill, 2011; May & Monga, 2014; Nowak & Rauh, 2005).

Non-human objects tend to be anthropomorphized when they feature human characteristics, which activates a human schema. The schema theory states that individuals tend to organize their knowledge into collections of information stored in long-term memory called schemata and use these schemata as a quick and accessible way to interpret and process new information (Kleider et al., 2008). This readily available human schema is widely used to make assumptions and judgments about other individuals and non-human objects in the environment. The accumulated knowledge about human appearance, characteristics, intelligence, social status, among others, is categorized and stored in memory with an associated affective tag. When an object fits the evoked category, individuals evaluate the object according to the affect associated with the category (Fiske & Pavelchak, 1986). For example, people may evaluate the product negatively if they see it as a good match with a certain category, like "criminal" (Aggarwal & McGill, 2007).

Anthropomorphic cues in non-human objects spontaneously activate human schemas via particular verbal, visual, and auditory cues, e.g., facial features, gender, and name tags. As in human-to-human interactions, individuals also make attributions about chatbot performance based on these cues. The activated human schema connects with a non-human object representation through associative networks and influences what individuals think of a non-human object. When consumers interact with an anthropomorphized chatbot, they use a familiar frame (e.g., a social connection), which makes them think they are interacting with a social entity (MacInnis & Folkes, 2017). In line with the Computers Are Social Actors (CASA) paradigm (Nass et al., 1994; Nass & Moon, 2000), when conversational agents possess anthropomorphic cues (e.g., name, gender, typing emulation, etc.) individuals react to them as if they would react to human beings (e.g., Go & Sundar, 2019). Even rudimentary anthropomorphic cues, such as human face resemblance or gender, are sufficient to evoke social responses from individuals (Nass et al., 1994; Nass & Moon, 2000).

As summarized in the review of Table 1, the effects of anthropomorphic cues on consumer perceptions and purchasing decisions have been fairly positive (e.g., Balakrishnan & Dwivedi, 2021) across studies, but some recent research shows an adverse effect (e.g., Crolic et al., 2021; Ciechanowski et al., 2019).

Anthropomorphism in chatbots is expected to influence consumer perceptions about the chatbot and behavioral outcomes. Positive perceptions towards chatbots are expected to foster positive behavioral intentions among individuals. In the current work, we investigate two such beneficial outcomes: we will specifically test whether chatbot anthropomorphism will lead to increased perceived product personalization and induce consumers to pay a higher product price.

The effect of chatbot anthropomorphism on perceived product personalization

With the rise in competition, companies are releasing more customized products and finding ways to set themselves apart from others (Murgai, 2018). Product personalization refers to the extent to which a consumer perceives the product offered as relevant, based on his/her unique characteristics and product preferences (Xiao & Benbasat, 2007; Lee & Park, 2009; Chellappa and Sin, 2005). Interaction with a chatbot requires consumers to either proactively or reactively disclose private information (Sundar, 2020; Zhang & Sundar, 2019). In this paper, we point to personalized products which are based on consumers' disclosed information. Based on and extended from the previous product personalization literature (e.g., Arora et al., 2008; Vesanen, 2007), we presume that product personalization refers to consumers' perception of the individualization level of products they can buy via AI-based chatbots.

Personalization has been shown to evoke positive consumer responses, such as attitude towards the website (e.g., Kalyanaraman & Sundar, 2006; Sundar & Marathe, 2010). Product personalization is also important in online shopping settings as personalized products and services powered by AI are supposed to bring consumers more satisfactory experiences, increase loyalty (Srinivasan et al., 2002), and help retailers to reach their sales targets (Chellappa & Sin, 2005; Postma & Brokke, 2002). To evaluate a personalized product, consumers are supposed to deal with an element of uncertainty (Laroche et al., 2004, 2005) and rely on intrinsic and extrinsic cues to infer a hidden quality (Donath, 2007). Intrinsic cues (e.g., size, color, construction, etc.) are directly related to the product (Aqueveque, 2006), whereas extrinsic cues (e.g., price, packaging, brand name, country of origin) are defined as product attributes that are difficult to assess prior to purchase and can be changed without changing the product (Velasco et al., 2021; Aqueveque, 2006; Franke et al., 2004).

Extant research shows that anthropomorphic cues in human-chatbot interactions are essential for consumers to make inferences about a product and reduce uncertainty (Velasco et al. 2021). We argue that chatbot anthropomorphic cues act as extrinsic cues and — building on the endorsement theory (Dean, 1999) — consumers use these extrinsic cues to infer beliefs and product attributes. As extrinsic cues do not directly relate to product quality and are difficult to assess prior to purchase, these cues are supposed to play a more important role in affecting consumers' product perceptions. Further, prior literature suggests that humans tend to form and maintain relationships with non-human entities (Bickmore & Picard, 2005). Therefore, we expect that chatbots with anthropomorphic cues should help consumers reduce uncertainty of a product and make them feel a sense of connectedness.

The effectiveness of endorsements has been extensively studied in the marketing literature, with several theories used to examine this effect. We draw on the identified psychological effect of endorsement cues using the source credibility and source attractiveness models and the concept of congruence between the endorser and the endorsed products. The first, called the source credibility model, suggests that the effectiveness of an endorsement depends on how credible and persuasive the message sender or source is (Hovland et al., 1953; Goldsmith et al., 2000). Highly credible sources are more likely to produce a positive attitude and behavioral changes in message receivers (Lafferty & Goldsmith, 1999), with anthropomorphic cues positively linked to perceived credibility (Nowak & Rauh, 2005). In the source attractiveness model (McGuire 1985, p. 264), the effectiveness of a message depends on three components — "familiarity," "similarity," and "likability" of an endorser. If the source of information is familiar, similar, and likable, then the message is more likely to be persuasive. In line with these two theories, chatbots possessing anthropomorphic cues, which are thus supposed to be more credible and attractive, should enhance

Table 1 Review of relevant literature findings

Study	Main independent variables	Dependent variables	Contribution
Adam et al., 2021	Anthropomorphic cues (identity, small talk, empathy); Foot-in-the-door technique	User compliance	Anthropomorphism as well as the need to stay consistent significantly increase the likelihood that users comply with a chatbot's request for service feedback
Araujo 2020	Language style; Name; Framing	Social presence; Mindful and mindless anthropomorphism; Attitudes towards the company; Customer satisfaction; Level of emotional connection	Human-like language and name increase the perception of the agent as anthropomorphic No significant differences in social presence between the human-like and the machine-like conditions. Human-like cues have significant influence on emotional connection
Balakrishnan & Dwivedi, 2021	Perceived anthropomorphism; Perceived Intelligence; and Perceived animacy	Attitude towards digital assistants; Purchase intention	Perceived anthropomorphism positively impacts attitude and purchase intention
Chong et al., 2021	Anthropomorphic role; Appearance; and Interactivity	Intention to use; Customer enjoyment and satisfaction; willingness to pay	Different combinations of chatbot design elements (anthropomorphic role, appearance, and interactivity) have a different impact on customers' perceptions
Ciechanowski et al., 2019	Appearance; Language Style	Attitude towards cooperation with chatbots; Anhropomorphism	Participants experience lesser uncanny effects and less negative affect in cooperation with a simpler text chatbot than with the more complex, animated avatar chatbot
Crolic et al., 2021	Anthropomorphism; Customer anger	Customer satisfaction; Firm evaluation; Purchase intentions	Chatbot anthropomorphism has a negative effect on customer satisfaction, firm evaluation and purchase intentions when interacting with angry consumers
Go & Sundar, 2019	Anthropomorphic cues; Message Interactivity; and Identity cues	Purchase intention	High level of anthropomorphic cues and message interactivity affect favorable consumer decisions
Knijnenburg & Willemsen, 2016	Appearance; Language style		Users of the more humanlike agents try to exploit capabilities that are not signaled by the system
Konya-Baumbach et al., 2023	Anthropomorphism	Trust; Purchase intention; Word of mouth; Satisfaction with the shopping experience	Chatbot anthropomorphism has a positive effect on trust, purchase intention, word of mouth, and satisfaction with the shopping experience. These effects are mediated by social presence
Rizomyliotis et al, 2022	Anthropomorphism; Perceived usefulness; Effective problem-solving skills; Customization; Social presence; Emotions	Customer experience	Anthropomorphism, perceived usefulness, effective problem-solving skills, customization, social presence, and emotions positively influence customer experience
Sheehan et al., 2020	Chatbot mis(communication)	Adoption; Anthropomorphism; Need for human Interaction	Chatbot miscommunication reduces anthropomorphism and adoption intent. An error-free chatbot and chatbot seeking clarification produce similar results on anthropomorphism and adoption scores. The need for human interaction moderates the relationship between anthropomorphism and adoption intent

Table 1 (continued)

Study	Main independent variables	Dependent variables	Contribution
Zhu et al., 2022	Certainty of consumer needs	Acceptance of AI chatbots	Consumers are more likely to accept AI chatbots when their needs are certain, with consumers' perceived effectiveness as a mediator and product type as a moderator
Zierau et al., 2022	Interface Modality; Semantic Fluency; Conversational Turns	Service perception Firm perception Behavioral outcomes (contract renewal, conversion rates, and consumer sentiment)	Voice-based (vs. text-based) interfaces positively affect flow-like user experiences, service experiences, and behavioral firm outcomes

persuasive communication and should be perceived as being able to grasp consumers' needs better compared to chatbots without such cues. Finally, in line with the concept of congruence between an endorser and the endorsed product (Park et al., 1991), products suggested by chatbots with anthropomorphic cues should be perceived as being more similar to their endorser — the chatbot itself, that is, are more personalized. To summarize, we hypothesize that individuals feel more connected and closer with an anthropomorphized chatbot versus a non-anthropomorphized one, and therefore will consider the anthropomorphized chatbot as reducing the uncertainty of a product and addressing their needs better.

Thus:

H1. An anthropomorphized (vs. non-anthropomorphized) chatbot increases the perceived personalization of a tailor-made product.

Anthropomorphic versus non-anthropomorphic chatbot and willingness to pay a higher product price

In addition to the effect of a chatbot's anthropomorphism on perceived product personalization, we further propose an effect of a chatbot's anthropomorphism on consumers' willingness to pay a higher product price. Willingness to pay reflects consumers' maximum perceived product value (Sweeney & Soutar, 2001).

Prior research has argued that anthropomorphism has a positive and significant influence on product value (Hart et al., 2013) and leads to an enhanced evaluation of the product (Landwehr et al., 2011). However, it remains uncertain whether individuals would be willing to pay a higher product price for the same product if they interact with an anthropomorphic chatbot versus non-anthropomorphic. We argue that anthropomorphic cues possessed by chatbots are likely to strengthen consumers' self-product connections, thus increasing consumers' willingness to pay a higher product price for a tailor-made product. We develop our hypothesis using the attachment and "person-positivity bias" theories.

Many prior studies have focused on the rational side of consumer buying behavior (Dennis et al., 2016) considering factors such as price, product value, and trust in the seller among others. Considering the rational aspect, the price people are willing to pay for a product should be the same whether it is promoted by an anthropomorphized chatbot or not. Yet, prior studies show that consumer purchasing decisions can also be guided by factors unrecognized by decision makers and lead to nonconscious decisions (Fitzsimons et al., 2002). For example, the human schema theory states that the way humans respond to a stimulus can be predicted based on what category it falls into (Fiske, 1982).

Attachment theory argues that the bond between an infant and their caregiver is so strong that it shapes the way they

behave, their personality, and even what kind of relationships are formed (Ainsworth, 1969). Initially developed to understand the emotional bonds between infants and caregivers, attachment theory is now being applied across disciplines including marketing. Following Hinson et al. (2019), here attachment is defined as a bonding-based attachment that results from an emotional connection between a person and a chatbot. Consumers are likely to express their attachment to a chatbot through continual emotional bonding and identification with it (Hinson et al., 2019). Anthropomorphic cues that cause consumers to perceive chatbots as anthropomorphic also trigger this bonding-based attachment.

Prior research shows that anthropomorphizing can be mindless (Kim & Sundar, 2012) and individuals unconsciously treat a non-human object in the same way they treat other humans. Extant research (e.g., Alvarez & Fournier, 2016) shows that people are more likely to develop humanlike relationships with products that are anthropomorphized vs. non-anthropomorphized. As the usage of human-like cues in chatbots has significant positive influence on emotional connection (Araujo, 2018) and enhances attachment to a product (Yuan & Dennis, 2019), individuals are willing to pay more for products that are displayed in an anthropomorphized format than for the same products displayed in a non-anthropomorphized format (Yuan & Dennis, 2019).

Moreover, prior research (e.g., Sweeney & Soutar, 2001; Zeithaml, 1988) demonstrates that consumers' emotional attitudes towards products influence how much they value them. The consumer's emotional attitude towards a chatbot influences the perceived product value, such that a chatbot displaying anthropomorphic cues might influence the willingness to pay a higher product price. Likewise, Kim and Swaminathan (2021) state that people develop an emotional connection with an anthropomorphized product and therefore set higher selling prices for them. In the same vein, Zhou et al. (2019) demonstrate that anthropomorphism enhances charitable giving. Based on this, we expect that consumers are likely to increase the subjective value of a tailor-made product when they interact with a chatbot with anthropomorphic cues versus a chatbot without such cues.

Further, "person-positivity bias" theory argues that people evaluate objects more favorably the more they are similar to humans (Moon & Conlon, 2002; Sears, 1983). As perceived similarity increases liking (Alves et al., 2016), human-like objects attract more favorable evaluations than inanimate objects. Using this direct comparison between a chatbot with anthropomorphic cues and a machine-like chatbot, we expect that users will evaluate the performance and thus the product endorsed by an anthropomorphic chatbot more favorably, and thus will be willing to pay a higher product price.

Based on the above, we propose:

H2. An anthropomorphized (vs. non-anthropomorphized) chatbot increases the willingness to pay a higher price for a tailor-made product.

Moderating effect of situational loneliness

The COVID-19 pandemic has increased consumers' tendencies towards isolation (both physical and social) (Killgore et al., 2020; Wang et al., 2021) and has dramatically increased eCommerce (Tran et al., 2021). As consumers are increasingly turning to online purchases, eCommerce growth is predicted to continue (Tokar et al., 2021). Regardless, consumers have now adapted to online purchases as well as online interactions — both professionally (e.g., via Zoom, Microsoft Teams) as well as socially (e.g., via social media apps such as Facebook, Telegram, WhatsApp, WeChat, among others). Therefore, it is important to examine this tendency towards isolation and loneliness and the effects it will have on marketing. Specifically, we examine the potential moderating effects loneliness has on perceived product personalization and willingness to pay a higher product price in conversational commerce settings.

Loneliness is a subjective feeling of social pain which can be triggered by social exclusion and can be damaging to one's well-being (Cacioppo & Patrick, 2008; Heu et al., 2019). It can be defined as a discrepancy between an individual's actual and desired levels of social relationships (Peplau & Perlman, 1982). Loneliness should be differentiated from the status of being alone (Peplau & Perlman, 1982; Perlman & Peplau, 1981) as it is a more subjective, emotional, and cognitive appraisal of a person's isolated position in his/her social environment rather than the pure absence of social support or social networks (Macdonald et al., 2000). The loneliness construct can either be a chronic personality trait or a temporary set of feelings resulting from an episode of social exclusion (Jiao & Wang, 2018; Zhou et al., 2008). The effects of loneliness are well documented in the psychology literature and refer to multiple mental and physical health problems such as depressiveness, suicidal thoughts, as well as increased alcohol and drug consumption, reduced self-regulation, aggressiveness, and physical health problems such as obesity, elevated blood pressure, sleep deprivation, and even premature death (Cacioppo et al., 2015; Cacioppo and Patrick, 2008). In this paper, we manipulate loneliness and define it as a feeling of isolation and exclusion from other people, a state that is likely associated with lowered felt security.

In line with the attachment theory, people are born with a psychological system which motivates them to seek proximity and maintain emotional bonds (Ainsworth, 1969; Bowlby, 1969). This system is designed to maintain a sense of safety and security, which can be made salient by encounters with actual or symbolic threats (Coplan & Bowker, 2014). Loneliness makes individuals feel less secure and has been shown to

have various implications for human behavior. For instance, Sheldon and Kasser (2008) demonstrated that when individuals experience existential, economical, or interpersonal threat, including social exclusion, they increase their priorities towards financial success, popularity, and image. These threats activate psychological needs for security, such as money, image, and status (Maslow, 1971).

The natural tendency for people is to seek substitutes or compensations when their basic needs are frustrated (Deci & Ryan, 2000). Prior research has shown that lonely consumers seem to compensate for high-quality social connections by buying physical products and services. When individuals experience threat of uncertainty, they aim to find alternative sources of security to protect themselves against threats to their psychological equanimity. For example, lonely consumers who lack essential relationships are more likely to engage in impulsive purchasing (Sinha & Wang, 2013) and higher spending (Baumeister et al., 2008). Such consumers are more attached to their belongings for reasons of "reassurance and comfort" (Keefer et al., 2012) and feeling socially excluded turns to materialism (Chang & Arkin, 2002).

The ability to find temporary comfort in an object provides people with a valuable psychological benefit (Keefer et al., 2012). When this happens, individuals may turn towards material substitutes that can be replaced quickly and provide an instant reward without much effort. Money and a preoccupation with money acts as a defense mechanism for those who feel vulnerable (Zhou & Gao, 2008) with material purchases providing a temporary sense of need satisfaction (Van Boven & Gilovich, 2003).

Consequently, we argue that individuals experiencing high (vs. low) situational loneliness and interacting with an anthropomorphic (vs. non-anthropomorphic) chatbot will perceive the subjective product value as higher and thus will be willing to pay a higher product price. Further, this effect will be stronger for individuals experiencing situational loneliness and interacting with an anthropomorphic chatbot.

Thus:

H3. Situational loneliness moderates the effect of a chatbot's anthropomorphism on the willingness to pay a higher product price.

Humans are motivated to maintain social connection with others, and those who lack this may try to compensate for it by creating a sense of human-like connection through non-human beings (Epley et al., 2008). When people feel threatened, their need for belonging becomes more pressing (Lu & Sinha, 2017). For example, participants who watched a video clip of a character that experiences isolation and loneliness were more likely than others to attribute human qualities to pets (Epley et al., 2008). Likewise, people

experiencing social exclusion tend to spend more time shopping as it provides an opportunity to escape from the social reality and feel connected (Dennis et al., 2016). Similarly, lonely consumers are more likely to interact with salespeople in-store (Rippé et al., 2018), have higher social presence of social agents, and provide more positive social responses to the agents than non-lonely people (Lee et al., 2006). The need for social assurance can be satisfied (at least partially) by positioning anthropomorphic products as companion pals (Mourey et al., 2017).

Based on the above, we hypothesize that individuals interacting with an anthropomorphic (vs. non-anthropomorphic) chatbot will be more likely to perceive the chatbot as addressing their needs better and thus will perceive the product as being more personalized and tailored to their own needs. Additionally, this effect will be stronger for individuals experiencing situational loneliness and interacting with an anthropomorphic chatbot.

Therefore:

H4. Situational loneliness moderates the effect of a chatbot's anthropomorphism on perceived product personalization.

Research framework

The conceptual framework proposed in Fig. 1 shows the research hypotheses. As outlined in the conceptual framework, our research examines the direct effects of anthropomorphic verbal design cues on perceived product personalization and willingness to pay a higher product price. Moreover, we also examine the role of situational loneliness in moderating the effect of chatbot anthropomorphism on perceived product personalization and willingness to pay a higher product price.

Research methodology

Overview of studies

We tested our hypotheses in three online studies, one pre-test ($N = 135$) and two experimental studies ($N = 180$ and 237). In the pre-test, manipulation checks were conducted to ensure that the anthropomorphic verbal cues induced the perception of a chatbot as anthropomorphic. Study 1 investigates the effect of a chatbot's anthropomorphism on perceived product personalization (H1). Study 2 replicates the effect of a chatbot's anthropomorphism on perceived product personalization (H1) and, in addition, investigates the effect of a chatbot's anthropomorphism on the willingness to pay a higher product price (H2) while also showing how situational loneliness can moderate the effect on perceived product personalization and willingness to pay a higher product price.

Fig. 1 The proposed model discussing the effect of chatbot anthropomorphism on product and price perceptions, and the moderating role of situational loneliness
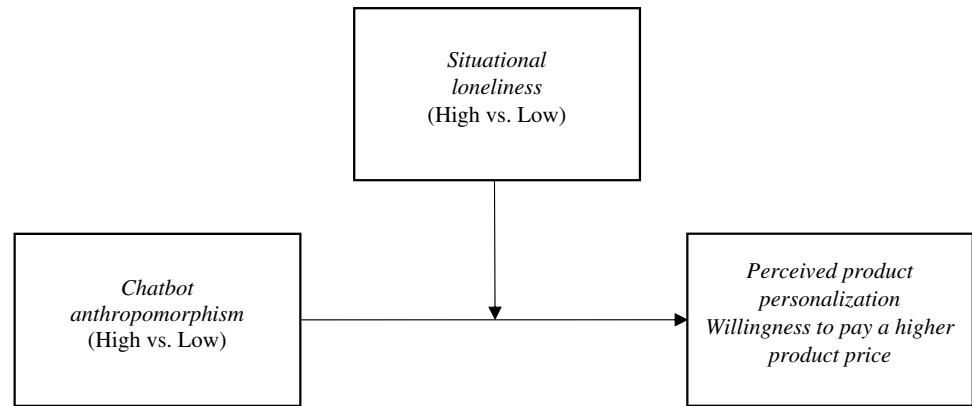
Pre-test

In the pre-test, we checked whether designing an AI-based chatbot with anthropomorphic verbal cues (versus a chatbot without such cues) made individuals perceive the chatbot as anthropomorphic. For that reason, for the experiments, we created a chatbot consisting of two conditions (control vs. anthropomorphic) using the IBM Watson Assistant handling natural conversations with the help of natural language understanding (NLU) and natural language processing (NLP).

A commonly employed method for human–robot interactions is the Wizard-of-Oz (WoZ) technique (Kelley, 1984). However, this technique raises methodological, ethical, and engineering concerns (Riek, 2012), as a WoZ-controlled robot is a substitute for a human rather than an independent entity (Weiss et al., 2011). Moreover, this technique is resource-intense because research assistants must interact individually with every participant. Finally, ensuring that each interaction follows the same script and flow can take extensive measures and introduce variations not intended by the research design (Araujo, 2020). In contrast to Wizard of Oz studies (e.g., Adler et al., 2016), where participants interact with an agent controlled by a human, IBM Watson Assistant uses artificial intelligence to understand customer questions in context while trying to provide fast, consistent, and accurate answers and help complete the user's intended action. We created chatbots using IBM Watson Assistant as it makes the studies more meaningful and applicable to real life than studies not using the actual technology and instead simulating the whole interaction.

Further, the AI-based functionalities of IBM Watson Assistant are different from rule-based chatbots that have databases with responses, and the conversation is prompted by choices directly or through logic jumps. IBM Watson Assistant as an AI-based chatbot outperforms rule-based chatbots because it continuously improves through data collection, analyzes, and understands user behavior patterns, provides more accurate responses to user queries, and has a wide range of decision-making capabilities (Adamopoulou & Moussiades, 2020). Based on the consumer responses, Watson builds a predictive model of their personality.

For the current research, the chatbots were designed to guide their users in choosing a perfume, to buy it directly from a chatbot for themselves, or as a gift. The participants were asked to imagine that they want a scent that fits their personality and desires. To find a unique fragrance, they decide to interact with an AI-driven chatbot from a fragrance company which produces custom fragrances. By interacting with the chatbot, customers provide answers that enable the fragrance company to know more about their customers and fragrance desires. Then the company creates unique formulas based on a careful assessment of responses they receive from each customer interaction with the agent. The customers can order these fragrances and get them shipped straight to their doors.

We chose a personalized fragrance as a product category because such products can be highly customized. This context can be used for future applications of AI-driven chatbots where there is a need to provide personalized and data-driven product recommendations or create tailored products to satisfy specific consumer needs. The chatbots used several criteria to define the consumer profile for whom the perfume is intended: gender, other favorite perfumes, and types of smells liked (citrus, woody, among others). The chatbots were designed to understand each customer query that was typed into the chat along with its context and intent and, with NLP and NLU capabilities, can generate suitable responses to these queries. The participants interacted with the chatbots by freely entering their messages and pressing "Enter" or clicking "Send."

In the anthropomorphic condition, participants were told they would interact with "Jessie, the Fragrance Assistant" from the Custom Fragrances company. In this condition, the chatbot was designed in such a way that (1) it used a singular first-person pronoun (e.g., "I") using informal language; (2) it had a gender-neutral human name, "Jessie;" (3) it addressed research participants by their names; (4) it echoed respondents' answers; and (5) it used dialogical cues characteristic of human-to-human communication (e.g., "Hi, have a pleasant day") and used small talk.

In the control condition, participants were told that they would interact with the "Automated Fragrance Chatbot" from the Custom Fragrances company. The non-anthropomorphic chatbot was designed to interact with the participants using form/computer-like language, had a non-human name (Automated Fragrance Chatbot), and featured dialogical cues associated with human–computer interactions (e.g., start and quit). Both chatbots had no profile pictures and interacted with participants only with text (Figs. 2 and 3).

A total of 135 Amazon Mechanical Turk (MTurk) participants ($M_{age} = 38.82$ years; 41.5% female) who did not take part in the main experiments participated in the pre-test for a monetary reward and were randomly assigned to one of the two chatbots. After the conversation, chatbot anthropomorphism ($\alpha = 0.95$) was rated using a seven-point Likert scale (Epley et al., 2008; Kim & McGill, 2011) with 9 items (sample items: "the extent to which the chatbot comes alive (like a person in your mind)", "has some humanlike qualities", "seems like a person", feels human, among others). The pre-test also tested for mindless anthropomorphism which is an automatic and mindless attribution of human traits to nonhuman entities (Kim & Sundar, 2012). Mindless anthropomorphism was measured ($\alpha = 0.94$) by asking participants to rate how well each adjective described the chatbot using eight items that needed to be rated using 10-point scales ("1" describes very poorly to "10" describes very well): attractive, exciting, pleasant, interesting, likeable, sociable, friendly, and personal (Kim & Sundar, 2012).

Two one-way ANOVAs were performed to test the effect of anthropomorphic verbal cues on anthropomorphism. Participants in the anthropomorphic condition perceived the chatbot to be significantly more anthropomorphic than those in the control condition ($M_{anthrop} = 5.24$, $SD_{anthrop} = 1.20$, $M_{control} = 4.78$, $SD_{control} = 1.4$; $F(1, 134) = 4.16$, $p = 0.043$). Also, participants in the anthropomorphic condition perceived the chatbot to be significantly more mindlessly anthropomorphic than those in the control condition ($M_{mindless} = 7.83$, $SD_{anthrop} = 1.48$, $M_{control} = 7.22$, $SD_{control} = 2.07$; $F(1, 134) = 3.92$, $p = 0.049$. The pre-test confirmed that the AI-based chatbot with anthropomorphic verbal cues was perceived as anthropomorphic versus a chatbot without such cues.

Study 1

The primary objective of study 1 was to test the effect of chatbot anthropomorphism on perceived product personalization (H1). H1 suggests that participants interacting with an anthropomorphized chatbot will perceive the product sold/advertised by the chatbot as more personalized. In this study, chatbot anthropomorphism was manipulated in the same way as in the pre-test.
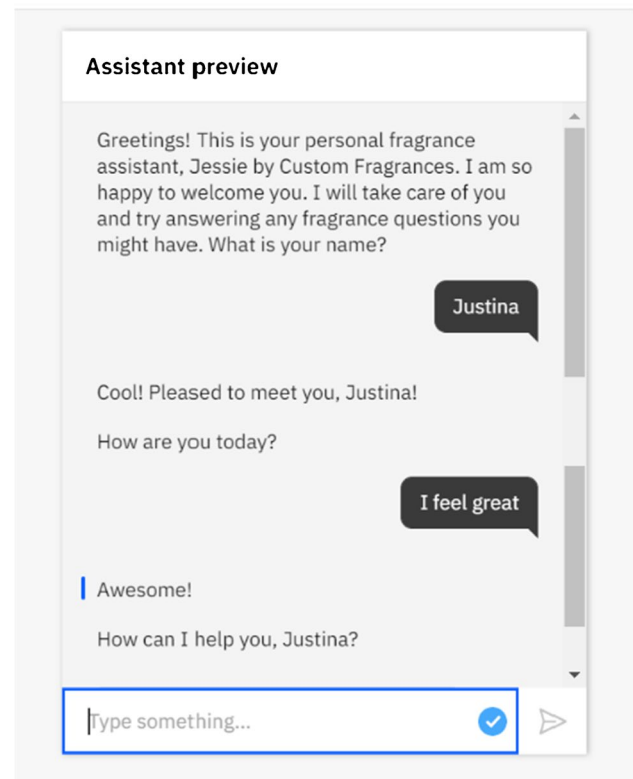

Fig. 2 Chatbot preview in the high-anthropomorphic condition

Participants and design

One hundred and eighty Amazon Mechanical Turk (MTurk) participants ($M_{age} = 37.45$ years; 33.8% female) participated in study 1 for a monetary reward. We employed a single-factor, between-subjects design with chatbot anthropomorphism (anthropomorphized vs. control) as the independent variable and perceived product personalization as the dependent variable.

Measures

We measured perceived product personalization ($\alpha = 0.80$) with the scale developed by Srinivasan et al. (2002). We adapted the scale to the context of the current study. Sample items include "This chatbot would make a fragrance recommendation that matches my needs", "I think that this chatbot would enable me to order a fragrance that is tailor-made for me" (scored from 1 = strongly disagree, and 7 = strongly agree; see Appendix for all scale items). The participants were also asked how often they use chatbots using a 1-item scale ranging from 1 = Never to 5 = Daily. The analysis revealed that participants had an above average *Chatbot Usage* experience ($M_{usage} = 3.36$, SD = 1.14).
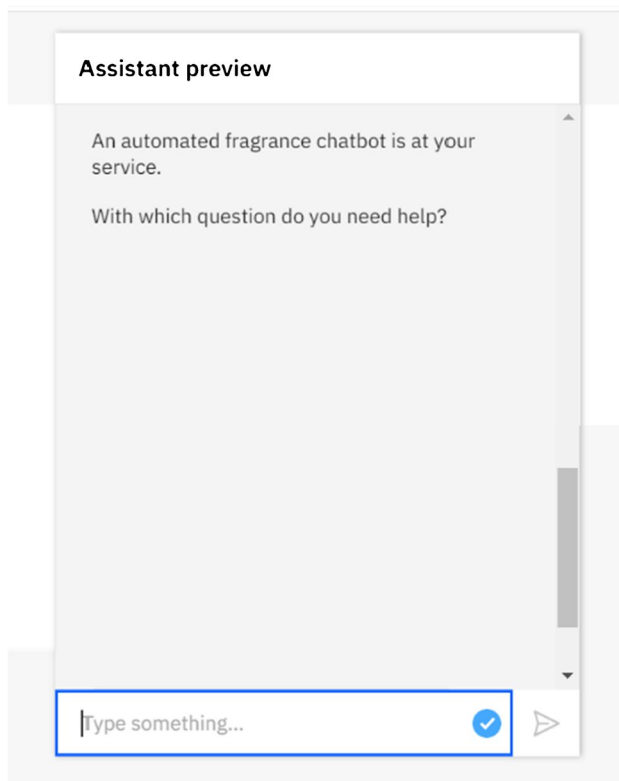
Fig. 3 Chatbot preview in the low-anthropomorphic condition

Procedure

Participants were asked to provide an informed consent form to approve their participation. After they consented, we asked for demographic information (gender and age), and they were randomly assigned to either the anthropomorphic or control condition. Then the participants were asked to read a scenario (see Appendix) in which they were instructed to introduce themselves to a chatbot and ask it to create a custom fragrance for themselves or as a gift. After interacting with the chatbots, the participants were provided with a link to a post-experiment questionnaire. At the end of the experiment, participants were fully debriefed on the purpose of this study. The steps of experimental procedure are depicted in Fig. 4.
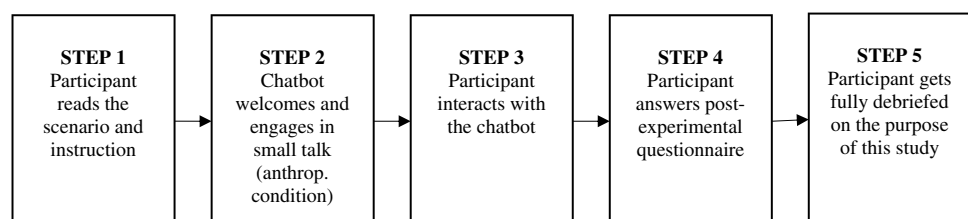
Results

An analysis of variance (ANOVA) revealed a significant effect of chatbot anthropomorphism on perceived personalization. Participants in the anthropomorphic condition perceived the product to be significantly more personalized than those in the control condition ($M_{anthrop} = 5.70$, $SD_{anthrop} = 0.68$, $M_{control} = 5.48$, $SD_{control} = 0.68$; $F(1, 179) = 4.22$, $p = 0.041$). The results from study 1 demonstrate that when consumers are exposed to an anthropomorphic chatbot, they consider the product to be more personalized to their needs. Hence, study 1 presented initial support for H1. In a follow-up study, we tested if the relationship between chatbot anthropomorphism and perceived product personalization would be moderated by situational loneliness, as well as if chatbot anthropomorphism influences the willingness to pay a higher product price.

Study 2

This study aims to provide additional support for H1 and tests whether attribution of verbal anthropomorphic cues increases the willingness to pay a higher product price (H2). In addition, this study also examines whether these effects vary depending on participants' situational loneliness (H3), such that lonely individuals perceive products as more personalized (H3) and are willing to pay a higher product price (H4).

Participants and design

Two hundred and thirty-seven Amazon Mechanical Turk (MTurk) participants ($M_{age} = 39.59$ years; 33.8% female) participated in this study. We employed a 2 (anthropomorphism: low vs. high) × 2 (situational loneliness: low vs. high) between-subjects design. The hypotheses were tested via an online experiment with participants randomly assigned to one of the four experimental conditions. The rest of the experimental procedure followed the same steps as study 1.

Manipulation of independent variables

Anthropomorphism was manipulated in the same way as in study 1. Situational loneliness was manipulated in two

Fig. 4 Experimental procedure

stages (Appendix) by administering a false feedback personality test based on the University of California LA (UCLA) loneliness scale (Russell et al., 1980; Wildschut et al., 2006; Zhou et al., 2008; Zhou et al., 2012). In the high (vs. low) loneliness condition, participants responded to scale questions designed to create agreement (vs. disagreement) with scale items, e.g., "I sometimes feel isolated from others"; "I sometimes feel left out", and others. After completing the scale, participants received false feedback on the sum scores (Russell et al., 1980; Wildschut et al., 2006; Zhou et al., 2008; Zhou et al., 2012). After providing false feedback, and as a manipulation check we asked participants about their current feelings of loneliness using two items ("I am feeling lonely right now"; "At this moment, I feel a bit lonely") rated on a 7-point Likert scale (ranging from 1 "Strongly disagree" to 7 "Strongly agree").

Measures

We measured perceived product personalization ($\alpha = 0.80$) with the same items as in study 1. Additionally, participants were asked to indicate the minimum price they would be willing to pay for a product (Kim & Swaminathan, 2021). Moreover, in addition to our dependent variables, we also tested for demographic information (age and gender) and the following control variable such as Chatbot Usage that has been identified as relevant in the literature. Chatbot usage was measured on a 5-point scale ranging from 1 = never to 5 = daily.

Results

The experimental manipulation of situational loneliness was successful as those in the high loneliness condition reported significantly greater loneliness than those in the low loneliness condition ($M_{low} = 5.03$, $SD_{low} = 1.43$, $M_{high} = 5.36$; $SD_{high} = 1.39$; $F(1, 237) = 4.32$, $p = 0.038$).

Effect of anthropomorphism and situational loneliness on perceived product personalization

A two-way ANOVA was performed to test the effects of chatbot anthropomorphism (control vs. high) and situational loneliness (low vs. high) on perceived personalization (Fig. 5). The main effect of anthropomorphic cues was significant on perceived personalization, $F(1, 236) = 7.82$, $p = 0.008$, thus replicating the effect found in study 1. Compared to participants in the control condition ($M_{control} = 5.40$, $SD_{anthrop} = 0.81$), those in the anthropomorphic condition ($M_{anthrop} = 5.71$, $SD_{anthrop} = 0.71$) perceived the product to be significantly more personalized. Furthermore, the effect of situational loneliness on perceived personalization was also significant, showing that momentarily lonely consumers perceive the product to be significantly more personalized ($M_{high} = 5.70$, $SD_{high} = 0.67$, $M_{low} = 5.39$, $SD_{low} = 0.86$; $F(1, 236) = 7.82$, $p = 0.006$).

The anthropomorphic cues and situational loneliness interaction effect were also significant, $F(1, 236) = 5.64$, $p = 0.018$. Pairwise comparisons revealed that in the high loneliness condition, the difference between the anthropomorphic and control condition was significant, $p < 0.001$, with participants in the anthropomorphic condition ($M_{anthrop} = 5.71$, $SD_{anthrop} = 0.71$) seeing the product as significantly more personalized than in the control condition ($M_{control} = 5.4$, $SD_{anthrop} = 0.81$). In the low loneliness condition, there was no significant difference in terms of product personalization between the anthropomorphic condition and the control condition, $p = 0.846$.

Effect of anthropomorphism and situational loneliness on the willingness to pay a higher product price

While the raw maximum prices participants were willing to pay for a product were higher for the anthropomorphic chatbot, the analysis showed this difference as not significant. The main effects of anthropomorphic cues on the willingness to pay a higher product price ($M_{high} = 258.84$, $SD_{high} = 640.51$, $M_{low} = 210.19$, $SD_{low} = 594.75$; $F(1, 236) = 0.2$, $p = 0.66$) were also not significant. The effect of situational loneliness was also not significant ($M_{high} = 249.31$, $SD_{high} = 628.19$, $M_{low} = 219.16$, $SD_{low} = 608.34$; $F(1, 236) = 0.75$, $p = 0.78$).

However, there was a marginally significant interaction effect between anthropomorphic cues and situational loneliness ($F(1, 236) = 3.82$, $p = 0.052$) showing that the effect of anthropomorphic cues on perceived product personalization is likely to be more pronounced when consumers experienced high (vs. low) situational loneliness. Planned comparisons revealed that within the anthropomorphic condition, participants were willing to pay a higher product price, ($F(1, 236) = 0.2$, $p < 0.001$, CI 0.229 to 0.753) after experiencing situational loneliness (Table 2).

The results from study 2 confirm that anthropomorphic cues in chatbots have a positive effect on perceived product personalization (H1 was supported). However, the effect of anthropomorphic cues was not significant on the willingness
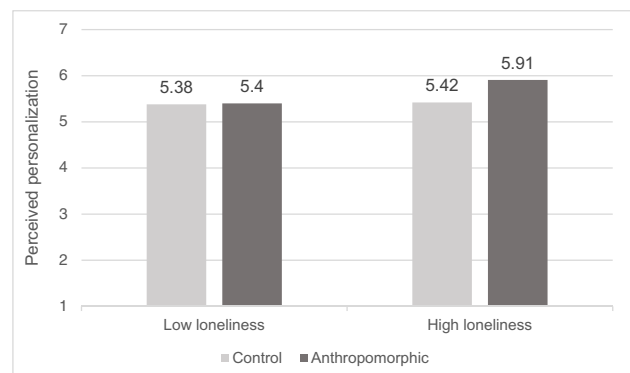
Fig. 5 The effect of chatbot anthropomorphism and situational loneliness on perceived product personalization (study 2)

to pay a higher product price (H2 was not supported). Further, this study extends the theoretical framework by proposing situational loneliness as a moderator revealing that the anthropomorphic cues and situational loneliness interaction effect was marginally significant on the willingness to pay a higher product price (H3 was partially supported). Finally, this study shows that situational loneliness moderates the effect of anthropomorphic cues on perceived product personalization (H4 was supported).

Discussion and conclusions

As smart digital devices and advanced technologies continue to evolve, they are gradually enabling the shift towards "untact" service, allowing consumers to interact with brands without a face-to-face contact (Lee & Lee, 2020). This paper focuses on AI-powered chatbots as a channel to motivate the consumer to take an interest in the product and encourage purchasing of tailor-made products. Our research shows that as people continue to use chatbots more, they are still inclined to attribute human-like traits to non-human agents.

This manuscript presents research investigating the influence of anthropomorphic cues on consumers' perceived product personalization and willingness to pay a higher product price. The basic premise of this research is that if chatbots are designed to be anthropomorphic, they are likely to enhance perceived product personalization and willingness to pay a higher product price. Our findings (Table 3) show that, in general, people react to AI-powered chatbots with anthropomorphic cues more positively compared to chatbots without such cues and anthropomorphic verbal cues facilitate consumers' product evaluations through a human-like interaction with a chatbot.

The results across two experimental studies demonstrate that when consumers are exposed to an anthropomorphic

chatbot, they tend towards positively perceived product personalization. By employing anthropomorphic cues, chatbots create a familiar frame of reference by evoking the human schema and reducing ambiguity associated with the product. Thus, the anthropomorphic cues can be used as extrinsic cues to infer product attributes.

These findings are further supported by the fact that the effect of anthropomorphic cues on perceived product personalization is more pronounced when consumers experience high (vs. low) situational loneliness. Specifically, these results thus indicate that the effectiveness of anthropomorphism is dependent not just on chatbot features but also on consumer characteristics. This finding also suggests that when people experience loneliness, they may try to compensate for it by creating a sense of human-like connection through non-human objects (Epley et al., 2008). Further, the willingness to pay a higher product price refers to the reflection of the perceived value of the product. This research found that participants were willing to pay a higher product price when they interacted with an anthropomorphic chatbot and when they were experiencing high situational loneliness. However, the main effect itself was higher for an anthropomorphic chatbot, but not significant.

Overall, these findings have several theoretical contributions and practical implications that we discuss in the following.

Contributions

From a theoretical perspective, this research contributes to the nascent literature on AI-powered chatbots in conversational commerce both for how chatbots should be designed and for context-related deployment considerations. First, our paper contributes to emergent theories on the effects of anthropomorphism on consumer behavior and the psychological mechanisms that underlie this relationship. The current research shows that positioning chatbots powered by artificial

Table 2 Pairwise comparisons

Pairwise comparisons							
Dependent variable: perceived product personalization							
Loneliness	(I) anthrop	(J) anthrop	Mean difference (I-J)	Std. error	Sig.[a]	95% confidence interval for difference[a]	
						Lower bound	Upper bound
Low loneliness	Control	Anthropomorphic	− 0.028	0.143	0.846	− 0.309	0.253
	Anthropomorphic	Control	0.028	0.143	0.846	− 0.253	0.309
High loneliness	Control	Anthropomorphic	− 0.491*	0.133	0.000	− 0.753	− 0.229
	Anthropomorphic	Control	0.491*	0.133	0.000	0.229	0.753

Based on estimated marginal means

*The mean difference is significant at the 0.05 level

[a]Adjustment for multiple comparisons: least significant difference (equivalent to no adjustments)

Table 3 Summary of findings

Hypothesis	Result
H1. An anthropomorphized (vs non-anthropomorphized) chatbot increases the perceived personalization of a product	Supported
H2. An anthropomorphized (vs. nonanthropomorphized) chatbot increases the willingness to pay a higher price for a product	Not supported
H3. Situational loneliness moderates the effect of a chatbot's anthropomorphism on the willingness to pay a higher price for a product	Marginally supported
H4 Situational loneliness moderates the effect of a chatbot's anthropomorphism on perceived product personalization	Supported

intelligence as anthropomorphic can motivate consumers to perceive products and services recommended and purchased via chatbots as more personalized. Our findings also complement the anthropomorphism literature and how AI-driven chatbot anthropomorphism can be used to provide personalized and data-driven product recommendations and produce products customized to individual customers. Past research (e.g., Araujo 2020, Go & Sundar, 2019, Sundar et al., 2016, Mou & Xu 2017) has demonstrated positive effects of visual, verbal, and auditory anthropomorphic cues on a wide range of variables, namely attitude, purchase intention, social presence, satisfaction, and others, mainly in the customer service domain. However, to the best of our knowledge, no previous research has examined anthropomorphic cues in artificial intelligence powered chatbots and their impact on perceived product personalization and willingness to pay a higher product price in the conversational commerce area.

Second, our findings also extend the loneliness literature by demonstrating its broad behavioral effects — even in contexts with no direct relevance to social isolation. Loneliness is already recognized as a serious social issue, and COVID-19 has made it even more prominent and concerning (Wang et al., 2021). This study adds to the research stream analyzing the psychological dynamics between loneliness and non-human entities (e.g., David & Roberts, 2017; Duclos et al., 2013; Gentina et al., 2018) explaining the linkage between loneliness and attachment to nonhuman agents as a compensatory mechanism to achieve a psychological balance. Our research uncovers the situational loneliness through which anthropomorphic cues owned by AI-powered chatbot induce positive reactions from consumers. As much less attention has been paid to the role of loneliness in the AI-powered systems context, this paper fills the gap by examining the role of loneliness on perceived product personalization and willingness to pay a higher product price in conversational commerce settings. The factor of social contact provided by an anthropomorphic chatbot represents a means to fill a social void. Our results reveal that people experiencing situational loneliness are more attuned to social cues and thus have a higher perception of product personalization. Moreover, such consumers interacting with an anthropomorphic chatbot are more willing to pay a higher product price.

Managerial implications

Despite chatbots being used for quick responses and personalized features, academic studies confirming the use of chatbots for eCommerce to secure new customers, and sell tailor-made products are still lacking. Consequently, this paper provides a more detailed understanding of consumer behavior in chatbot technology, which can be better leveraged to assist retailers with their marketing strategies.

This research could be beneficial for companies that operate online and are considering chatbots as a channel for acquiring customers and selling tailored products. AI-powered chatbots in eCommerce can address consumer needs through deeper insights, build predictive models of consumer personalities, and provide personalized or targeted offers to consumers. This research shows that a firm's decision to deploy a chatbot with human traits should be a carefully planned strategic choice. Our findings suggest that a chatbot with verbal anthropomorphic cues (vs. a chatbot without such cues) increases consumers' perceived product personalization and thus enhances the chance for conversion opportunities when selling products online. The findings can help marketers understand that adding the human element more often adds value to technology, especially where there is a need to provide data-driven product recommendations and sell highly personalized experience products.

This paper stresses product personalization which can be critical in eCommerce settings; it can be highly beneficial for online merchants and their consumers. An AI-powered chatbot can become an active sales channel for the firm, which can give consumers enjoyable shopping experiences previously available only in physical stores and empowers a higher level of one-to-one individualization in products that would not have been available in brick-and-mortar stores. Moreover, such a high level of product personalization can be made available at scale and at much lower costs online than in traditional retail settings.

Finally, given the rise of lonely consumers due to Covid-19 (Killgore et al., 2020; Wang et al., 2021), these research findings shed light on how situational loneliness impacts consumer product perceptions. Our findings indicate that consumers experiencing situational loneliness would

perceive products offered by chatbots as more personalized. Moreover, momentarily lonely consumers interacting with an anthropomorphic chatbot would also be willing to pay a higher product price than consumers not experiencing situational loneliness. Managers would thus be well advised to consider this segment and review and enhance the effectiveness of their positioning and communication campaigns.

Overall, our findings show that firms can benefit from deploying chatbots with verbal anthropomorphic cues in conversational eCommerce settings, which in turn motivates consumers to perceive products and offers as more targeted and personalized, especially for individuals who experience situational loneliness.

Limitations and future research

Across all three studies, the findings are consistent; however, this research has certain limitations. First, participants interacted with the chatbot and were asked to complete a task to purchase a fictional product from a fictional online commerce company. Future research should refine these results by evaluating how chatbots may impact the perception of product personalization and willingness to pay a higher product price measured with actual consumer behavior rather than consumer intentions. Measuring the actual consumer behavior is also important due to the intention-behavior gap, which is considerably large. Prior research shows that when people intend to do something, they are able to translate those intentions into actions just under half of the time (Sheeran & Webb, 2016).

Second, the sample was recruited from Mechanical Turk and may not represent typical consumers buying highly personalized products. Future research should consider additional recruitment methods, especially when extending these findings to higher cost personalized products.

Additionally, the generalizability of the experimental material is limited. The effect of anthropomorphism was proposed by employing chatbots in the context of selling personalized fragrances. Personalized fragrance can be considered an experience product because it contains attributes that cannot be assessed before buying and using the product (Franke et al., 2004). In contrast, consumers can fully assess the quality of search products (e.g., a laptop, or a camera) prior to purchase (Hur et al., 2015; Wang et al., 2018). That said, future research should replicate the current study findings with different types of products, such as search or experience products. Product type (search or experience) could be investigated as a potential moderator. Given that experience products (versus search products) evoke more uncertainty (Mitra et al., 1999), the product type could yield different results for the effect of anthropomorphism on product perceptions and willingness to pay a higher product price. As intrinsic cues directly relate to product quality and are sufficient for product evaluations,

the effect of anthropomorphism on product personalization perception and willingness to pay a higher product price can be marginal (Velasco et al., 2021; Wang et al., 2018).

Further, the study included respondents from the USA. It has been proposed that in Western cultures, a more significant proportion of information is conveyed by verbal content (Kitayama & Markus, 2000) in contrast to cultures, e.g., Japan and the Philippines, where non-verbal cues play a more important role. Therefore, future research could investigate whether the results differ across different cultures. As Culley and Madhavan (2013) state, it is unlikely that a generic anthropomorphic chatbot would be universally appealing because of differences in etiquette, tone, formality, and colloquialisms across different cultures. This issue is important for firms promoting their products and services in global markets to individuals with diverse cultural backgrounds. In addition to being affected by anthropomorphism, cultural orientation can affect loneliness as well. For example, research by Heu et al. (2019) shows that individual-level collectivism is consistently related to lower loneliness. Thus, cultural orientation (collectivism vs. individualism) could be tested as a potential moderator.

To specifically examine the role of chatbots' anthropomorphic cues in affecting the perception of product personalization and willingness to pay a higher product price, we controlled for a range of verbal anthropomorphic cues. Future research could investigate how these, and other visual and auditory cues interact with verbal cues. For instance, would a chatbot with anthropomorphic cues benefit more from using visual cues (such as an avatar), variance in typing emulation and typeface? And if so, how?

Finally, AI-powered chatbots may be helpful in selling highly personalized products, but humans should be aware of the power they may have on personal data collection and distribution and the subsequent implications for privacy. This rise in algorithmic consumers and society dedicating their decisions to bots and personal information disclosure issues could be another interesting research avenue.

Conclusion

Consumers will gradually continue outsourcing their purchasing decisions to algorithms. The rise of algorithmic consumers or digital assistants acting as purchasing agents on behalf of their users has the potential to dramatically change the way firms conduct businesses, raising new challenges. Despite the growing interest in conversational technologies, anthropomorphic verbal cues of AI chatbots and their impact on consumer product and price perceptions have received limited academic attention. Our empirical findings, based on two experimental studies, suggest that

AI-based chatbot anthropomorphism has a causal impact on perceived product personalization, especially in individuals who are more prone to situational loneliness. When people encounter an unfamiliar or complex product, they often use human-like features to help them make sense of it. Chatbots that employ anthropomorphic cues create a familiar frame of reference for consumers and reduce uncertainty associated with the product. Moreover, consumers are willing to pay a higher product price when experiencing situational loneliness and interacting with anthropomorphic chatbots. These insights provide promising avenues for further research in the emerging conversational commerce area of AI chatbots and their effects on consumer product and price perceptions.

Appendix

Table 4 Measurement scales

Construct	Items	Cronbach's α
Perceived personalization (Srinivasan et al., 2002)	This chatbot would make a fragrance recommendation that matches my needs I think that this chatbot would enable me to order a fragrance that is tailor-made for me Overall, interaction with this chatbot is tailored to my situation This chatbot makes me feel that I am a unique customer I believe that this fragrance would be customized to my needs	0.80
Anthropomorphism (Epley et al., 2008; Kim & McGill, 2011)	The chatbot comes alive (like a person in your mind) The chatbot has some humanlike qualities The chatbot seems like a person The chatbot feels human The chatbot seems to have a personality The chatbot seems to have a mind of his/her own The chatbot seems to have his/her own intentions The chatbot seems to have free will The chatbot seems to have consciousness	0.95
Mindless anthropomorphism (Kim & Sundar, 2012)	Please rate how well each adjective describes the chatbot: Attractive Exciting Pleasant Interesting Likeable Sociable Friendly Personal	0.94

Table 5 Adapted UCLA-Loneliness scale to induce high and low levels of loneliness

UCLA-Loneliness scale items in the high-loneliness condition	UCLA-Loneliness scale items in the low-loneliness condition
I sometimes feel isolated from others	I always feel isolated from others
I sometimes feel left out	I always feel left out
I sometimes feel alone	I always feel alone
My social relationships are sometimes superficial	My social relationships are always superficial
There are some people who do not know me well	No one knows me completely

Imagine that you would like to buy a new fragrance for yourself. You want a scent that fits your personality and desires. However, looking for a perfect fragrance is not an easy thing to do, and you find yourself overwhelmed in perfume stores.

To create a custom fragrance for yourself, you decide to interact with an Automated Fragrance Chatbot (Jessie, the Fragrance Assistant) by a Custom Fragrances company, which produces custom fragrances.

Data Availability The data that support the findings of this article are available on request from the corresponding author. The data are not publicly available due to them containing information that could compromise research participant consent.

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