



# I Am ChatGPT, the ultimate AI Chatbot! Investigating the determinants of users' loyalty and ethical usage concerns of ChatGPT

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## ARTICLE INFO

### Keywords:

Information quality  
Perceived coolness  
Technology affinity  
Posthuman ability  
Loyalty  
Ethical usage concerns

## ABSTRACT

This research aims to explore the determinants of users' satisfaction and loyalty towards ChatGPT while also investigating ethical concerns related to the usage of the artificial intelligence (AI) chatbot. For this purpose, the study develops a framework based on five models and theories (information system success, technology acceptance model, affinity theory, coolness theory, and posthumanism) as well as other important constructs (user ethical perceptions and user ethical beliefs). Analysis of data collected from 456 actual ChatGPT users in the US reveals several key findings. First, information quality significantly and positively affects users' satisfaction, perceived usefulness, and coolness. Second, perceived usefulness, coolness, technology affinity, and posthuman ability also have a positive impact on users' satisfaction, which subsequently influences their loyalty to the AI chatbot. Furthermore, the findings demonstrate that user ethical perceptions and beliefs negatively moderate the relationship between satisfaction and loyalty. The main implication of this research is that brand managers and programmers should regularly assess the chatbot's performance to ensure that the information provided is relevant, reliable, concise, and delivered promptly. This is because users highly value the quality of information delivered by the AI chatbot. Additionally, they should prioritize the ethical aspect, as it directly influences users' satisfaction and loyalty towards the chatbot services.

## 1. Introduction

*"ChatGPT is scary good. We are not far from dangerously strong AI."*  
(Elon Musk).

Recently, there has been a great deal of hype and excitement around a newly developed technology known as ChatGPT (Dwivedi et al., 2023). The artificial intelligence (AI) chatbot and writing assistant is significantly altering and revolutionizing the way people communicate and interact with technology (Mvondo et al., 2023a). Thanks to its advanced language processing abilities, it can understand and respond to natural language in real-time. It can hold meaningful conversations that feel natural and human-like and assist users with quick, accurate, and entertaining responses that set it apart from other chatbots in the market (Science Focus, 2023).

ChatGPT is an AI-based, pre-trained language model developed by OpenAI (Dwivedi et al., 2023), an American AI research laboratory. The AI chatbot is based on GPT3.5 architecture (i.e., third-generation generative pre-trained transformer), a deep neural network designed for processing sequential data, such as text (Kooli, 2023). The model has

been trained using an extensive volume of varied textual information gathered by crawling the internet, which makes it possible to interact in a conversational way, answer follow-up questions, admit mistakes, challenge incorrect premises, and reject inappropriate requests (OpenAI, 2022). ChatGPT possesses the ability to revolutionize a number of industries, such as customer service, education, healthcare, and finance. By providing assistance and facilitating the automation of tasks that were traditionally performed by humans, the AI chatbot can enhance efficiency, boost productivity, lower expenses, and create fresh avenues for growth (McKinsey, 2022).

ChatGPT has been a sensational hit since its launch in November 2022. It attracted 100 million users just two months after launching and averaged 25 million daily visitors in January 2023, making it the fastest-growing consumer application ever (Similarweb, 2023). By comparison, it took the popular app TikTok about nine months after its global launch to reach 100 million users and Instagram more than two years (Milmo, 2023). Despite ChatGPT's increasing popularity and disruptive nature, the literature lacks studies that have systematically examined the factors influencing consumers to use the AI chatbot. Owing to this, empirical

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<https://doi.org/10.1016/j.jretconser.2023.103562>

Received 19 May 2023; Received in revised form 1 September 2023; Accepted 2 September 2023

Available online 22 September 2023

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examination of the determinants of users' satisfaction and loyalty to the AI chatbot becomes relevant. For this purpose, we rely on a sample of 456 actual ChatGPT users in the US and use structural equation modeling (SEM).

This research considers information quality (IQ) as the major factor affecting user satisfaction and loyalty. IQ was initially proposed in the information system success (ISS) model developed by DeLone and McLean (1992). It has been extensively studied in various contexts, such as in research on ubiquitous computing applications (Kim et al., 2009), location-based apps (Chen and Tsai, 2019; Wang and Lin, 2017), e-learning system success (Al-Fraihat et al., 2020), and chatbot customer services (Kwangsawad and Jattamart, 2022). According to Setia et al. (2013), IQ is "the accuracy, format, completeness, and currency of information produced by digital technologies" (p. 268). IQ measures how well information serves its intended purpose and meets the user's expectations. The higher the quality of information, the more trustworthy and valuable it is for making decisions, solving problems, and achieving objectives (Kim et al., 2009; Kwangsawad and Jattamart, 2022).

In addition to IQ, this research also takes into account other relevant factors from established models and theories. These factors include perceived usefulness from the technology acceptance model (TAM), technology affinity from the media affinity theory, perceived coolness from the coolness theory, and posthuman ability from posthumanism. Perceived usefulness, as defined by Davis (1989), refers to the extent to which individuals believe that using a particular system would enhance their job performance. It is a crucial factor in determining user acceptance of technology. Technology affinity represents users' perceived importance of technology in their lives, reflecting their affinity towards technology and its role in various aspects of their daily routines and activities (Aldás-Manzano et al., 2009; Perse, 1986). Perceived coolness encompasses the overall judgment of a technological product, including its perceived originality, attractiveness, and the potential to build a subculture around it (Sundar et al., 2014). Coolness plays a significant role in shaping user perceptions and attitudes toward technology (Mamonov and Koufaris, 2020; Sundar et al., 2014). Posthuman ability refers to the enhanced capabilities or attributes that surpass those of typical human beings (Nath and Manna, 2023). It represents the ability of technology to perform a specific task better than a human (Gambino and Sundar, 2019).

Earlier studies have argued that ethical concerns may have an impact on users' attitudes toward technology (Cheung and To, 2021; Nadeem et al., 2020; Román, 2007). ChatGPT is a versatile technology with a wide range of applications. However, concerns have been raised regarding unethical practices associated with the AI chatbot. Therefore, this research also examines the interaction effect of user ethical perceptions of ChatGPT and user ethical beliefs on the relationship between satisfaction and loyalty.

In summary, the objective of this research is three-fold: (1) To develop a novel integrated framework that provides a comprehensive understanding of the determinants of user satisfaction and loyalty towards ChatGPT. (2) To conduct an empirical analysis to validate the conceptual model. (3) To understand the potential moderating role of user ethical perceptions of ChatGPT and user ethical beliefs on the relationship between satisfaction and loyalty. The findings of this research will offer valuable guidance to programmers and brand managers involved in the development and management of AI chatbots. By understanding the factors that contribute to user satisfaction and loyalty, as well as the potential influence of ethical concerns, programmers and brand managers can make informed decisions to enhance user experiences and foster stronger relationships with their users.

## 2. Literature review on chatbots

Shawar and Atwell (2005) defined chatbots as "machine conversation systems [that] interact with human users via natural conversational language" (p. 489). They are identified under different names, including

AI service agents (Ashfaq et al., 2020; Wang et al., 2023), intelligent assistants (Rajaobelina et al., 2021), virtual agents (Araujo, 2018), and e-service agents (Selamat and Windasari, 2021). Chatbots are commonly used as company representatives to improve customer service, engage and entertain customers, and support businesses by either replacing or augmenting human support agents with AI (Chung et al., 2020; Jin and Youn, 2021). They support users for various purposes, including information seeking, handling search queries, and building social relationships (Ashfaq et al., 2020). Chatbots can replicate spoken (voice-based AI chatbots) and written (text-based AI chatbots) human dialogue, allowing users to communicate with AI agents as if they were engaging with live agents (Gkinko and Elbanna, 2022; Konya-Baumbach et al., 2023; Zhou et al., 2023). ChatGPT and traditional chatbots differ in the training data and approach. ChatGPT is trained on a massive amount of publicly available information, enabling it to provide answers and insights on various topics and inquiries, even if it does not have a valid answer (Dai et al., 2023). Furthermore, ChatGPT can assist writers by generating human-like texts and even programming computers. Unlike other chatbots, which are trained on specific topics and simply provide pre-written responses, ChatGPT generates answers rather than just copying and pasting them (Loepky, 2023).

In recent years, scholars have shown increased interest in examining the relationship between humans and virtual agents. A review of the literature suggests that most studies have focused on comparing human-chatbot and human-human communication (e.g., Hill et al., 2015; Mou and Xu, 2017), with most research employing the "computer are social actors" paradigm, which was advanced by Nass et al. (1994). Additionally, Chatbots have been studied in various contexts, including healthcare services (Ben-Shabat et al., 2022), customer services (Tran et al., 2021), finance (Huang and Lee, 2022), education (Celik, 2023), and travel services (Nguyen et al., 2022).

Scholars have also scrutinized the association between virtual agents and users' satisfaction. For example, Ashfaq et al. (2020) studied the determinants of user satisfaction with chatbots, taking into account the ISS model, expectation-confirmation model, and TAM. They found that these factors positively affect user satisfaction. Hsu and Lin (2023) analyzed consumer satisfaction and loyalty toward e-service agents and found that AI chatbot service recovery quality and AI chatbot conversational quality significantly influence user satisfaction. Moreover, Nguyen et al. (2022) compared user interactions with chatbot interfaces and menu-based interfaces; they found that chatbot systems lead to a lower level of perceived autonomy and higher cognitive load compared with menu-based interface systems, resulting in a lower degree of user satisfaction.

Despite the growing number of studies on chatbots, the determinants of user satisfaction and loyalty are still limited. Additionally, the existing literature lacks studies that provide a comprehensive understanding of the relationship between IQ, satisfaction, and loyalty. Earlier studies have investigated the association between IQ and satisfaction, but they adopted a holistic perspective and did not shed light on the underlying mechanisms (i.e., factors) of IQ and how they impact user satisfaction (e.g., Ruan and Mezei, 2022; Tisland et al., 2022). IQ is a complex and multidimensional phenomenon (Ge et al., 2011); accordingly, it is critical to determine the key aspects important to customers to help companies develop effective strategies for improving the quality of information.

To extend the literature on chatbots and fill the gap, the current study proposes a model based on the ISS model by including IQ and its underlying factors comprising relevance, reliability, conciseness, and quickness. The model also incorporates other factors from models and theories such as TAM (perceived usefulness), media affinity theory (technology affinity), coolness theory (perceived coolness), and posthuman ability (posthumanism). Additionally, the model includes two new constructs: user ethical perceptions of ChatGPT and user ethical beliefs, which serve as moderators in the relationship between satisfaction and loyalty. Users' ethical perceptions and beliefs can influence

their behavior (Cheung and To, 2021; Nadeem et al., 2020). Ajzen and Fishbein (2005) conducted a comprehensive analysis of attitude-behavior research, wherein they observed that while overall attitudes can significantly impact behavior, this influence is contingent upon specific circumstances or individual characteristics. In other words, the relationship between attitude (i.e., satisfaction) and behavior (i.e., loyalty) is generally moderated by factors pertaining to the individual performing the behavior. Ethical perceptions and beliefs are considered to be plausible factors that reflect individual differences (Cheung and To, 2021; Román, 2007). Hendriana et al. (2013) argued that ethical beliefs represent opinions that users adhere to in order to form a generally accepted standard of conduct, and Román (2007) suggested that ethical perceptions refer to how users perceive a company's responsibility, integrity, and commitment to ensuring secure, honest, fair, and confidential treatment of users, with a priority on consumer protection. To the best of the authors' knowledge, previous research has not examined the interaction effect of user ethical perceptions and user ethical beliefs on the satisfaction-loyalty relationship. The inclusion of these two constructs will enhance the model's reliability and provide a deeper understanding of ethical concerns surrounding ChatGPT.

### 3. Theoretical foundation

#### 3.1. Information system success: information quality

In today's fast-paced information-driven world, businesses and individuals rely heavily on information to make informed decisions and take effective actions. IQ measures the quality of the content of an IS (Ma, 2021; Zhong and Chen, 2023; Zrnek et al., 2022). This study defines IQ as the quality of the information provided by AI chatbots. IQ is critical because it directly affects decision-making accuracy and effectiveness (Cheng et al., 2021; Demoulin and Coussement, 2020; Kumar, 2023). High-quality information is vital to users and helps them save time and effort. Poor IQ may result in incorrect decisions and lower competitiveness (Hausvik et al., 2021; Song et al., 2022; Torres and Sidorova, 2019).

IQ is a multidimensional construct that encompasses important relationships among multiple factors. In a study on data quality management, Wang and Strong (1996) classified IQ into four groups: contextual, intrinsic, accessibility, and representational. Meanwhile, in a study on ubiquitous computing applications, Kim et al. (2009) identified three dimensions of IQ: relevance, accuracy, and timeliness. Ge et al. (2011) further assessed IQ by distinguishing between raw data stored in databases and the information product delivered to users and identified nine dimensions of IQ. This research builds upon earlier studies by Wang and Strong (1996), Kim et al. (2009), and Ge et al. (2011) and identifies four dimensions of IQ that are relevant to the study context: relevance, reliability, conciseness, and quickness. *Relevance of information* refers to "the correspondence between users' requests and system responses or between users' expectations and service" (Kim et al., 2009, p. 440). *Reliability of information* refers to the trustworthiness and dependability of information (Ge et al., 2011). *Conciseness of information* is the degree to which the information is well-formatted, well-organized, and aesthetically appealing (Wang and Strong, 1996). Information provided by an information system (IS) should be clear, concise, and well-presented (Ge et al., 2011). In this research, we modified the term "timeliness" to "quickness." This is necessary because ChatGPT does not provide up-to-date information, as it has limited knowledge of the world and events beyond 2021 (OpenAI, 2023). As a result, the AI chatbot cannot answer current questions. We then define *quickness of information* as the speed at which users obtain information from ChatGPT. Quick access to information is highly valued, as it can significantly impact decision-making, productivity, and overall efficiency.

#### 3.2. Technology acceptance model: perceived usefulness

TAM is a popular model in IS research. The model was proposed by Davis (1985, 1989) to explain how consumers come to adopt computer technology and has been widely used in various contexts, such as in studies on wearable healthcare technology (Kim and Ho, 2021), video game consoles (Nan et al., 2022a), virtual reality (Seong and Hong, 2022), and fashion mobile apps (Pop et al., 2023). TAM suggests that the acceptance of an IS by users depends on two key factors: perceived usefulness and perceived ease of use. The use of an IS is determined by "a behavioral intention to use the system, where the intention to use IS is determined by an individual's attitude toward using the system and its perceived usefulness" (Verma et al., 2018, p. 3). This research only adopted the concept of perceived usefulness because it is believed that ChatGPT is user-friendly, as users only need to type a question or paste content. This research defines perceived usefulness as an individual's perception of how AI chatbots can provide practical benefits, improve efficiency, increase productivity, or enhance overall effectiveness. It is the perception that an IS is beneficial in helping an individual achieve their work-related goals.

#### 3.3. Media affinity theory: technology affinity

The media affinity theory is defined as "the importance of the medium in the lives of individuals" (Aldás-Manzano et al., 2009, p. 741). This theory is grounded in uses and gratifications research, which explains that individuals actively seek and consume media content with the objective of gratifying their needs and satisfying their various interests (Perse, 1986; Rubin, 1981). This research conceptualizes technology affinity as users' perceived importance of AI chatbots in their life. Media affinity has been used to evaluate individuals' attitudes toward technology. For instance, Xu and Du (2018) studied the determinants of user loyalty to digital libraries and found that IQ, service quality, and system quality are critical determinants of users' affinity to digital libraries. Likewise, Aldas-Manzano et al. (2009) explored the drivers of mobile shopping acceptance and found that mobile affinity increases usage intentions.

#### 3.4. Coolness theory: perceived coolness

The coolness theory, also known as perceived coolness, was proposed by Sundar et al. (2014) to explain the perception of coolness in technological products. They defined perceived coolness as an overall judgment of a technological product that is perceived as original, attractive, and capable of building a subculture around it (Sundar et al., 2014). A product's coolness contributes to its success in the marketplace because it plays a critical role in how consumers view and use it. Coolness is subject-specific; consumers may perceive a product's coolness differently (Warren et al., 2018). Several scholars assert that when consumers perceive a product/service as cool, they are more likely to show positive behavioral intentions, such as loyalty (Chen and Chou, 2019), adoption intention (Mamonov and Koufaris, 2020), usage intention (Ahn and Park, 2022), and purchase intentions (Reinikainen et al., 2021). Perceived coolness is a complex and multidimensional phenomenon "comprising attractiveness, subcultural appeal, and originality." *Attractiveness* denotes the aesthetic of a product. Sundar et al. (2014) pointed out that people tend to be attracted to products with aesthetically appealing features and functions. A *subcultural appeal* denotes products whose usage promotes the formation of subcultures. According to Nan et al. (2022a), "since the use of products that are unique in appearance and function is uncommon in mainstream society, their use tends to stand out, promoting the development of subcultures related to these products" (p. 3). *Originality* is related to a product's uniqueness and innovativeness. Products with unique designs and functions are generally perceived as original (Ahn and Park, 2022; Sundar et al., 2014).

### 3.5. Posthumanism: posthuman ability

Posthumanism is one of the well-known theories in the present day (Nath and Manna, 2023). In the book titled “Why I want to be a post-human when I grow up?” Bostrom (2013) argues that being “posthuman” means attaining at least one posthuman ability. He further explains posthuman ability as a competence that far surpasses the maximum achievable level for any human being without the assistance of smart technology. In IS research, posthuman ability has been conceptualized as the capacity of technology to outperform humans in a specific task (Gambino and Sundar, 2019; Nath and Manna, 2023). Intelligent systems capable of surpassing human intelligence in a particular field are considered posthuman (Nath and Manna, 2023).

The introduction of smart technologies with innovative features often leads to tensions as they take up roles traditionally reserved for humans. This is often seen through a pessimistic lens. However, “how well a technology can perform its job may combat negative factors” (Gambino and Sundar, 2019, p. 2). For instance, calculators, which are simple devices designed to perform mathematical calculations previously done mentally or on paper, are defined by their ability to considerably outperform humans. Autonomous vehicles are another example of technology perceived as posthuman (Gambino and Sundar, 2019). Although individuals may have issues and very important ethical dilemmas regarding driverless cars, they may still conclude that the technology is acceptable based on the sheer abilities of the driverless car and its network (Gambino and Sundar, 2019).

## 4. Hypotheses development and theoretical framework

### 4.1. Information quality, perceived usefulness, perceived coolness, and user satisfaction

Individuals invest significant time and effort seeking out answers to specific questions, advice on various topics, explanations of complex concepts, recommendations for products or services, opinions on current events, and assistance with problem-solving (Ashfaq et al., 2020). Thus, virtual agents should provide personalized, complete, easy-to-understand, and well-formatted information because IQ is one of the most important quality components to measure the success of a system (Teo et al., 2008).

Since its launch, ChatGPT has become a sensational hit because it can generate human-like responses to a wide range of queries and topics. It can understand natural language inputs from users and provide quick, relevant, and reliable (in most cases) information that is easy to understand. IQ can impact the perceived usefulness of an IS. Demoulin and Coussement (2020) argued that high-quality information enhances users' and businesses' performance and efficiency. The factors of relevance, reliability, conciseness, and quickness are important for determining the quality of information. Information that is well-organized, trustworthy, accurate, match users' needs or task, and is quickly accessible is more likely to be perceived as useful. Earlier research has found that IQ positively influences a digital device's perceived usefulness (Xu and Du, 2018). Accordingly, we propose that:

**H1.** Information quality dimensions of a) relevancy, b) reliability, c) conciseness, and d) quickness is related to perceived usefulness.

The perception of coolness is subject-specific (Warren et al., 2018). The association between IQ and coolness is not straightforward, as it depends on users' preferences. Generally, if the information provided is reliable and corresponds to users' needs or interests, it is more likely to be perceived as cool (Peng et al., 2016). ChatGPT can, in most cases, provide high-quality information on a wide range of queries and topics. Therefore, we assume that users may perceive the information provided by the AI chatbot as cool.

**H2.** Information quality dimensions of a) relevancy, b) reliability, c)

conciseness, and d) quickness is related to perceived coolness.

User satisfaction is “an established common measure of the success or effectiveness of IS in general” (Ghasemaghahi and Hassanein, 2015, p. 7). The ISS model posits that “the quality of information as an output of an IS is one of the major components explaining user satisfaction” (Laumer et al., 2017, p. 336). Individuals use an IS with the expectation that it helps them accomplish a task, and overall satisfaction is the main factor determining whether they will transact with it and return to it in the future (Arghashi and Yuksel, 2022; Ashfaq et al., 2020; Ghasemaghahi and Hassanein, 2015). In a study on users of enterprise content management systems, Laumer et al. (2017) revealed that when information is not relevant to a task or is difficult to understand, individuals may seek alternative ways to obtain the information. In contrast, when an IS provides quick, relevant, reliable, and easily understandable information, it can enhance users' satisfaction. Based on this reasoning, we propose that:

**H3.** Information quality dimensions of a) relevancy, b) reliability, c) conciseness, and d) quickness is related to user satisfaction.

### 4.2. Perceived usefulness and user satisfaction

Perceived usefulness and satisfaction are two major factors that determine the success of any IS, including ChatGPT. The perceived usefulness of a chatbot can be measured by its ability to provide relevant and helpful information, solve problems, and assist users in achieving their objectives (Van den Broeck et al., 2019; Kasilingam, 2020; Selamat and Windasari, 2021). Earlier research has examined the link between usefulness and satisfaction. For instance, Joo et al. (2017) found that digital textbooks' perceived usefulness is related to user satisfaction. Similarly, Li and Fang (2019) found that usefulness is a critical predictor of users' satisfaction. Thus, we propose that:

**H4.** Perceived usefulness has a positive effect on user satisfaction.

### 4.3. Technology affinity and user satisfaction

As explained earlier, technology affinity is users' perceived importance of technology in their life. Several scholars have suggested that the stronger a user's relationship with technology, the higher the likelihood they feel that using it meets their expectations (Aldás-Manzano et al., 2009). This is because a positive affinity towards technology fosters greater trust and comfort, resulting in a more positive overall experience (Perse, 1986). In the context of ChatGPT, if users have a positive affinity towards the AI chatbot, they are more likely to be satisfied with their interactions. In contrast, users with a negative affinity toward ChatGPT are more likely to be dissatisfied. Negative experiences can lead to frustration and mistrust, which can further decrease the user's affinity for the AI chatbot.

Earlier studies have found a strong relationship between users' affinity to technology and satisfaction. Soltani-Nejad et al. (2020) found that users who have a closer relationship with technology are more likely to develop an affinity for it and, as a result, tend to be more satisfied with the technology. Likewise, Xu and Du (2018) found that users' affinity for digital libraries increases satisfaction. To echo earlier research findings, we hypothesize that:

**H5.** Technology affinity positively influences user satisfaction.

### 4.4. Perceived coolness and user satisfaction

In recent years, perceived coolness has emerged as a critical construct in IS research. Coolness is the strongest positive expression validating a technological device's novelty, originality, and attractiveness (Chen and Chou, 2019; Nan et al., 2022a). A chatbot that is perceived as cool is more likely to be engaging and enjoyable to interact with, which can increase user satisfaction. Similarly, a chatbot that



effectively meets a user's needs and provides a satisfying experience is more likely to be perceived as cool by the users. Earlier research has demonstrated that coolness is an important determinant of user satisfaction (Liu and Mattila, 2019; Nan et al., 2022b). Therefore, we propose that:

**H6.** Perceived coolness positively influences user satisfaction.

#### 4.5. Posthuman ability and user satisfaction

Digital devices that outperform humans in specific tasks are perceived as posthuman (Gambino and Sundar, 2019). ChatGPT, an AI-powered chatbot, outperforms humans by providing accurate answers to a broad range of queries and topics. In addition, the AI chatbot can program computers, which has helped users who were struggling to write code. Gambino and Sundar (2019) argued that "the efficiency or the ability of a device to perform tasks at a very high level may be the key to the public acceptance of the technology" (p. 2). We predict that ChatGPT's ability to outperform humans in various tasks will lead to a positive user experience. Accordingly, we hypothesize that:

**H7.** Posthuman ability has a positive effect on user satisfaction.

#### 4.6. User satisfaction and loyalty

Jones and Sasser (1995) defined loyalty as "a feeling of attachment or affection for a company's people, products, or services" (p. 94). According to Oliver (1999), loyalty is "a deeply held commitment to rebuy or repatronize a preferred product/service consistently in the future" (p. 34). These two definitions suggest that loyalty is a multidimensional construct comprising attitudinal and behavioral loyalty. In fact, several researchers have argued that loyalty encompasses two dimensions: continuance intention and WOM (Chiu et al., 2013; Xu et al., 2015; Thakur, 2018). Other researchers have adopted a composite approach by integrating both attitudinal and behavioral loyalty into a measure of loyalty. For instance, Liu et al. (2011) integrated the items measuring recommendation and continuance usage into a measure of loyalty. This research adopts this perspective and integrates continuance usage and WOM in the measure of loyalty. We conceptualize loyalty as a feeling of attachment to the chatbot's information resources and related services, characterized by continued usage and positive WOM.

Individuals who develop a bond with a brand will remain loyal and engage in supportive behavior (Mvondo et al., 2023b). User satisfaction with ChatGPT represents an accumulative feeling developed throughout the process of using the AI chatbot and interacting with it. Several scholars have asserted that satisfaction and loyalty are closely related (Nan et al., 2022b). In a study on mobile commerce, Sarkar et al. (2020) asserted that when users are satisfied with technology, they are more likely to remain loyal and continue using the service over time. Similarly, in research on customer service chatbots, Hsu and Lin (2023) found that user satisfaction positively impacts loyalty. To echo previous research findings, we advance that:

**H8.** User satisfaction positively influences loyalty.

#### 4.7. Ethical concerns of ChatGPT

Ethical issues arise when a particular decision, scenario, or activity conflicts with the moral principles of a society. Both individuals and businesses can be involved in these conflicts, as any of their actions may be subject to ethical scrutiny (Indeed, 2022). With respect to ChatGPT, two types of ethical concerns can arise from its use: user ethical perceptions of the AI chatbot and user ethical beliefs.

According to Román (2007), consumer ethical perceptions refer to "consumers' perceptions of a company's responsibility and integrity behind the online platform in its attempt to deal with consumers in a secure, honest, fair, and confidential manner, ultimately giving

protection to consumers' interests" (p. 3). Privacy is the primary concern for users when interacting with technology (Nadeem et al., 2020). While users perceive ChatGPT as enjoyable and useful, they may also view it as potentially risky in terms of ethical lapses. When interacting with the AI chatbot, users provide sensitive information that becomes part of the public domain. Additionally, OpenAI collects a wide range of user information, including IP address, browser type and settings, and data on users' interactions with the site (Smith, 2023; Veale, 2023). These concerns can influence users' loyalty. Thus, we predict that user ethical perceptions will moderate the association between satisfaction and loyalty, resulting in decreased user loyalty to ChatGPT. Accordingly, we hypothesize that:

**H9.** The association between satisfaction and loyalty is negatively moderated by user ethical perceptions.

OpenAI has not been transparent about the algorithm and data source used to train ChatGPT (McGowan, 2023). The model is trained on data from the internet, which may contain biases, misinformation, or controversial content. As a result, there are instances where the AI chatbot inadvertently learns and reproduces these biases and inaccuracies in its responses (e.g., stereotypes, race, and gender discrimination) (Germain, 2023).

Users' ethical beliefs can significantly influence their behavior (Cheung and To, 2021). As mentioned earlier, user ethical beliefs refer to the opinions that users adhere to in order to establish a generally accepted standard of conduct (Hendriana et al., 2013). Individuals with strong ethical beliefs tend to apply strict moral standards when evaluating a company's conduct or its products (Vitell and Paolillo, 2004). These individuals are particularly attentive to whether a company prioritizes corporate social responsibility as an integral aspect of its operations (Vitell and Paolillo, 2004). When users perceive that AI firms have embraced ethical practices such as transparency in the data used to train AI chatbots and accountability, they may perceive these practices as aligning with their own stringent moral codes, which aim to protect others and society. Individuals identifying with a company's ethical practices are likely to reflect those practices through positive behaviors (Cheung and To, 2021), such as loyalty. Conversely, individuals who perceive a company's practices as unethical will not endorse or support those practices. Based on this reasoning, we predict that user ethical beliefs will moderate the association between satisfaction and loyalty, resulting in decreased user loyalty to ChatGPT.

**H10.** The association between satisfaction and loyalty is negatively moderated by user ethical beliefs (Fig. 1).

## 5. Methodology

### 5.1. Measures

The research instrument and items were developed by referring to existing literature and slightly adjusted to fit the study context. A 7-point Likert-type scale was used for measuring the items, with a rating scale ranging from "1 (strongly disagree) to 7 (strongly agree)." To assess IQ, a set of eleven items was adapted from the studies conducted by Ge et al. (2011), Kim et al. (2009), and Wang and Strong (1996). The scale consisted of three items for each relevance, reliability, and conciseness dimension. We revised the "timeliness" dimension to "quickness," removed the item "up to date," as it was irrelevant to this study, and assessed it using a two-item scale.

Perceived usefulness was assessed using a three-item scale adapted from Davis (1989). Technology affinity was measured using a three-item scale adapted from Xu and Du (2018). Perceived coolness was evaluated using a six-item scale adapted from Sundar et al. (2014). Posthuman ability was measured using a single item adapted from Gambino and Sundar (2019). Satisfaction was assessed using a three-item scale adapted from Oliver (1980), while loyalty was measured using a

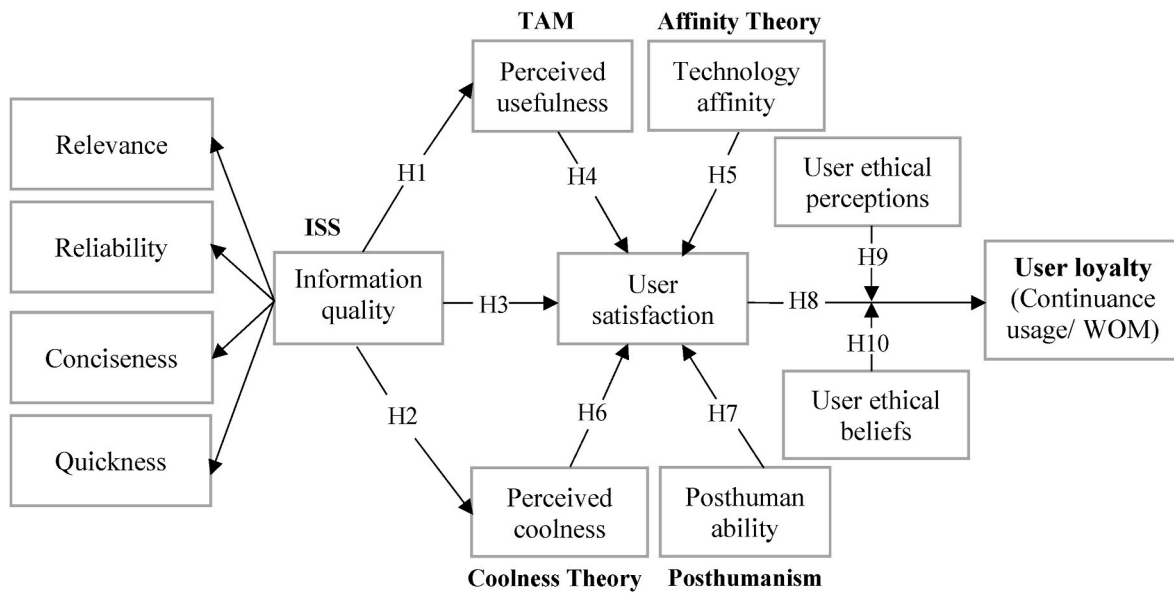


Fig. 1. Theoretical model.

four-item scale adapted from Zhao et al. (2012) and Bloemer et al. (1999). User ethical beliefs were evaluated using a five-item scale adapted from Chaudhry and Stumpf (2011) and Cheung and To (2021), and user ethical perceptions were measured using a five-item scale adapted from Román (2007). We conducted a small-scale pilot study on 41 ChatGPT users, and based on their feedback, we further revised and finalized the questionnaire. The reliability scale of all the constructs exceeded 0.50, which was considered acceptable.

### 5.2. Sample collection

The authors gathered data from US residents using a structured on-line questionnaire administered through Amazon Mechanical Turk (MTurk). MTurk is a widely-used platform among scholars due to its high-quality responses and the naivety of its respondents. Additionally, it enables researchers to collect data from diverse locations throughout the US.

We administered the survey between February and March 2023. The questionnaire was composed of three parts. First, we explained the purpose of the research. Second, we collected demographic information, including a question about respondents' frequency of ChatGPT use. The final section included the variables of interest. We proceeded with the data collection phase using a purposive sampling technique and a cross-sectional survey. We specifically targeted respondents who had used ChatGPT by incorporating a screening question that asked if they had used ChatGPT within the past three months. Those who answered "No" were directed to the end of the survey. A total of 456 valid responses were used for data analysis and comprised 284 men (62.3%) and 172 women (37.7%), 77.2% of the respondents were aged between 18 and 45, 89.5% held at least an undergraduate degree, and 60.7% were employees or businesspeople. Furthermore, 59.2% of the respondents reported using ChatGPT at least once a day (see Table 1).

### 5.3. Data analysis

The authors used IBM SPSS 27.0 to assess common method bias (CMB) and the demographics and Amos 24.0 to assess the measurement and structural model. Data were analyzed in two phases: (1) model fit, data reliability, and validity, and (2) hypotheses testing.

Table 1  
Demographic characteristics.

Items	Frequency (N = 456)	(%)
<b>Gender</b>		
Male	284	62.3
Female	172	37.7
<b>Age</b>		
18–25 Years	138	30.3
26–35 Years	118	25.9
36–45 Years	97	21.3
46–55 Years	63	13.8
55 Years or above	40	8.8
<b>Education</b>		
High School or Less	48	10.5
Bachelors	232	50.9
Masters	140	30.7
Doctor (PhD)	36	7.9
Others	80	9.2
<b>Profession</b>		
Student	171	37.5
Employee	146	32
Businessman/Businesswoman	101	22.1
Unemployed	30	6.6
Others	8	1.8
<b>How often do you use ChatGPT</b>		
More than Once a day	197	43.2
Once a day	73	16
More than once a week	58	12.7
Once a week	52	11.4
More than once a month	33	7.2
Once a month	26	5.7
Just on special occasions	17	3.7

## 6. Results

### 6.1. Common method bias

To address CMB, the questionnaire included instructions on the strict anonymity protocol of the study. Respondents were told to be neutral and honest and were informed that there were no right or wrong answers. We also performed Harman's single-factor approach, and the total variance for a single factor was 14.01%, which met the cut-off criteria. Furthermore, we conducted a full collinearity test, following Kock (2015)'s recommendation. The results demonstrated that all the variance-inflated factors were lower than 3.3. Thus, CMB is not of concern in this study.

## 6.2. Measurement validity

We measured the model fitness, construct reliability, and convergent and discriminant validity. The model delivered adequate fit indices as the value of chi-square ( $\chi^2/df = 1.053$ ), incremental fit index (IFI = 0.997), comparative fit index (CFI = 0.997), Tucker Lewis index (TLI = 0.997), normed fit index (NFI = 0.947), standardized root mean square residual (SRMR = 0.0266), and root mean square error of approximation (RMSEA = 0.011) were satisfactory.

Moreover, the constructs' composite reliability (CR) value exceeded 0.70, establishing the measurement instruments' reliability. The outer loadings were above 0.704, which proved to be acceptable. The average variance extracted (AVE) was confirmed as all items had factor loadings above the threshold of 0.50. Additionally, the Fornell-Larcker criterion and the Heterotrait-Monotrait (HTMT) ratio showed that discriminant validity was established in the study (see [Tables 2 and 3](#)).

## 6.3. Structural model

The proposed model and hypothesized relationships were analyzed using the R-squared method and evaluating the level and significance of the path coefficients. R-squared is the proportion of an endogenous construct's variance explained by its predictor constructs in a regression model (Mvondo et al., 2022a, 2022b). The results showed that the endogenous constructs, namely, perceived usefulness (0.564), perceived coolness (0.526), satisfaction (0.515), and loyalty (0.628), had large effects, indicating that the regression model was acceptable.

We found that the IQ factors of relevance ( $\beta = 0.291$ , 0.300, and 0.104, i.e., perceived usefulness, coolness, and satisfaction), reliability ( $\beta = 0.299$ , 0.295, and 0.093), conciseness ( $\beta = 0.186$ , 0.128, and 0.097), and quickness ( $\beta = 0.135$ , 0.156, and 0.126) positively influence perceived usefulness, perceived coolness, and satisfaction. Additionally, we found that perceived usefulness ( $\beta = 0.136$ ), technology affinity ( $\beta = 0.169$ ), perceived coolness ( $\beta = 0.093$ ), and posthuman ability positively influence user satisfaction, which, in turn, increases user loyalty ( $\beta = 0.597$ ) (see [Table 4](#)). The findings also revealed that user ethical perceptions ( $\beta = -0.216$ ) and User ethical beliefs ( $\beta = -0.168$ ) have a negative moderating effect on the association between satisfaction and loyalty (see [Tables 4 and 5](#), [Figs. 2 and 3](#)).

## 7. Discussion

This research examined the key determinants of user satisfaction and loyalty towards ChatGPT while also investigating ethical concerns related to the usage of the AI chatbot. To achieve this, an integrated model based on five models and theories (ISS, TAM, affinity theory, coolness theory, and posthumanism) was proposed, along with other important constructs such as user ethical perceptions and user ethical beliefs. The findings confirmed that the IQ dimensions of relevance, reliability, conciseness, and quickness have a significant and positive impact on perceived usefulness, perceived coolness, and satisfaction ([H1](#), [H2](#), [H3](#)). Additionally, perceived usefulness, technology affinity, perceived coolness, and posthuman ability were found to positively influence user satisfaction ([H4](#), [H5](#), [H6](#), [H7](#)), which, in turn, increased user loyalty ([H8](#)). As predicted, user ethical perceptions and beliefs negatively moderated the association between satisfaction and loyalty ([H9](#) and [H10](#)). These findings suggest that when the AI chatbot provides high-quality information and is perceived as useful and cool, users are more satisfied and likely to remain loyal. However, user ethical perceptions and beliefs can negatively affect the relationship between satisfaction and loyalty, highlighting the need to address ethical concerns to maintain user loyalty.

**Table 2**  
Reliability and validity.

Construct	Items	Loading	CR	AVE
			>0.7	>0.5
Relevance of Information	RV11: The information provided by ChatGPT is useful.	0.870***	0.88	0.711
	RV12: The information provided by ChatGPT is relevant.	0.822***		
	RV13: The information provided by ChatGPT is applicable.	0.836***		
Reliability of Information	RI1: The information provided by ChatGPT is reliable.	0.878***	0.893	0.736
	RI2: The information provided by ChatGPT is trustworthy.	0.845***		
	RI3: The information provided by ChatGPT is credible.	0.850***		
Conciseness of Information	CI1: The information provided by ChatGPT is well-presented.	0.863***	0.899	0.748
	CI2: The information provided by ChatGPT is aesthetically pleasing.	0.867***		
	CI3: The information provided by ChatGPT is well formatted.	0.865***		
Quickness of information	QI1: ChatGPT provides prompt information.	0.871***	0.885	0.794
	QI2: ChatGPT provides interesting information without any delay.	0.911***		
Perceived usefulness	PU1: Overall, ChatGPT is useful for me.	0.862***	0.89	0.729
	PU2: ChatGPT improves the quality of my daily life.	0.852***		
	PU3: ChatGPT is a useful device in my life.	0.847***		
Perceived coolness	PC1: ChatGPT is cool.	0.878***	0.941	0.725
	PC2: When I first heard of ChatGPT, I remember thinking it would be cool to use it.	0.843***		
	PC3: Using ChatGPT make me look cool.	0.832***		
	PC4: When I use ChatGPT, my response is often like, "That's cool!"	0.854***		
	PC5: ChatGPT has some cool features.	0.849***		
	PC6: ChatGPT is cooler than other chatbots.	0.853***		
Satisfaction	SAT1: I am satisfied with my decision to use ChatGPT.	0.862***	0.903	0.756
	SAT2 I am satisfied with my previous experiences with ChatGPT.	0.872***		
	SAT3: My choice to use ChatGPT is a wise one.	0.874***		
Technology affinity	TA1: Seeking information on ChatGPT is one of my main daily activities.	0.864***	0.881	0.712
	TA2: ChatGPT is important in my life.	0.836***		
	TA3: I cannot go for several days without using ChatGPT.	0.831***		
User loyalty	UL1: I intend to continue using ChatGPT in the future and will keep using it regularly as I do now.	0.836***	0.908	0.713
	UL2: I intend to increase my use of ChatGPT in the future.	0.863***		
	UL3: I will say positive things about ChatGPT to other people.	0.843***		
	UL4: I will strongly recommend others to use ChatGPT	0.835***		
User ethical perceptions	UEP1: I think ChatGPT collects my personal information.	0.794***	0.89	0.617
	UEP2: I recognize that disclosing personal information through ChatGPT is a risk.	0.764***		

(continued on next page)

Table 2 (continued)

Construct	Items	Loading	CR	AVE
			>0.7	>0.5
User ethical beliefs	UEP3: ChatGPT uses collected information for research purposes	0.814***		
	UEP4: I think that ChatGPT may disclose my information to third parties without consent.	0.774***		
	UEP5: ChatGPT denies users the right to choose if they wish their data to be collected.	0.781***		
	UEB1: A person should ensure that his/her actions never intentionally harm others.	0.774***	0.885	0.607
	UEB2: A person should never psychologically harm others.	0.789***		
	UEB3: A person should not perform an action that might in any way threaten the dignity and welfare of others.	0.785***		
	UEB4: A person should not harm innocent others.	0.756***		
	UEB5: A person should not sacrifice the welfare of others.	0.791***		

## 8. Implications and future research lines

### 8.1. Theoretical implications

This study has several academic implications. First, most research on ChatGPT has primarily focused on its application in education. For instance, [Tlili et al. \(2023\)](#) explored the use of ChatGPT in education among early adopters, while [Arif et al. \(2023\)](#) and [Eysenbach \(2023\)](#) examined its application in medical education. This paper is unique in that it pioneers the identification of the determinants of users' loyalty and ethical usage concerns of ChatGPT. In other words, we integrate five models and theories (ISS, TAM, affinity theory, coolness theory, and posthumanism) and other important constructs (user ethical perceptions and user ethical beliefs) in a new model to examine the determinants of users' satisfaction, loyalty, and ethical usage concerns of the AI chatbot.

Second, we have demonstrated that the multidimensional construct of IQ positively impacts perceived usefulness and satisfaction. While the link between IQ, perceived usefulness, and satisfaction has been widely discussed in the literature on chatbots, most research has adopted a holistic approach to IQ without explaining how the underlying mechanisms of IQ impact the outcome variables (e.g., [Ashfaq et al., 2020](#); [Ruan and Mezei, 2022](#); [Tisland et al., 2022](#)). [Ge et al. \(2011\)](#) stressed that IQ is a complex phenomenon that encompasses important relationships among multiple factors. By demonstrating that relevance, reliability, conciseness, and quickness impact perceived usefulness and satisfaction, this research sheds light on the key aspects of IQ that are important to customers, providing a framework for companies to develop effective

Table 4

Direct effects.

Hypothesized relationships		Std. Beta	Std. Error
H1a	Relevance→Perceived usefulness	0.291**	0.049
H1b	Reliability→Perceived usefulness	0.299**	0.042
H1c	Conciseness→Perceived usefulness	0.186***	0.042
H1d	Quickness→Perceived usefulness	0.135***	0.033
H2a	Relevance→Perceived coolness	0.300***	0.043
H2b	Reliability→Perceived coolness	0.295**	0.038
H2c	Conciseness→Perceived coolness	0.128**	0.037
H2d	Quickness→Perceived coolness	0.156***	0.030
H3a	Relevance→Satisfaction	0.104*	0.041
H3b	Reliability→Satisfaction	0.093*	0.042
H3c	Conciseness→Satisfaction	0.097*	0.045
H3d	Quickness→Satisfaction	0.126*	0.050
H4	Perceived usefulness→Satisfaction	0.136**	0.051
H5	Technology affinity→Satisfaction	0.169**	0.060
H6	Perceived coolness→Satisfaction	0.093*	0.045
H7	Posthuman ability→Satisfaction	0.106*	0.047
H8	Satisfaction→Loyalty	0.597**	0.027

Table 5

Interaction effect.

Hypothesized relationships		Std. Beta	Std. Error
H9	InterSATxUEP	−0.216***	0.029
H10	InterSATxUE	−0.168**	0.028

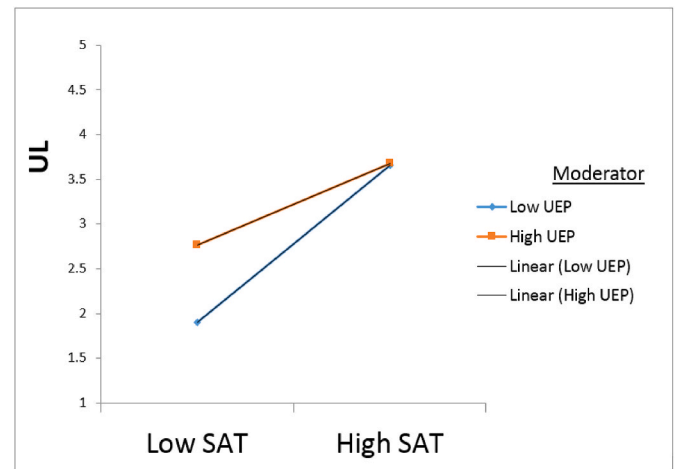


Fig. 2. Interaction effect SATxUEP→UL.

Table 3

Discriminant validity analysis.

Constructs	1	2	3	4	5	6	7	8	9	10	11
Relevance of Information	<b>0.843</b>	0.555	0.557	0.479	0.596	0.593	0.541	0.534	0.632	0.096	0.104
Reliability of Information	0.556	<b>0.858</b>	0.52	0.415	0.587	0.578	0.517	0.51	0.553	0.155	0.104
Conciseness of Information	0.562	0.518	<b>0.865</b>	0.39	0.54	0.508	0.501	0.501	0.577	0.163	0.083
Quickness of information	0.473	0.412	0.39	<b>0.891</b>	0.454	0.462	0.467	0.423	0.452	0.181	0.178
Perceived usefulness	0.598	0.587	0.54	0.456	<b>0.854</b>	0.59	0.553	0.558	0.628	0.164	0.11
perceived coolness	0.593	0.578	0.509	0.465	0.591	<b>0.852</b>	0.534	0.544	0.616	0.135	0.158
Satisfaction	0.539	0.517	0.5	0.463	0.554	0.537	<b>0.869</b>	0.534	0.541	0.136	0.05
Technology affinity	0.534	0.51	0.501	0.423	0.56	0.543	0.534	<b>0.844</b>	0.557	0.09	0.141
User loyalty	0.631	0.553	0.578	0.453	0.627	0.618	0.54	0.558	<b>0.844</b>	0.138	0.167
User ethical perceptions	0.094	0.153	0.162	−0.182	0.165	0.135	−0.137	0.093	0.139	<b>0.786</b>	0.117
User ethical beliefs	0.101	0.098	0.082	0.182	0.107	0.156	−0.05	0.14	0.168	−0.116	<b>0.779</b>

Note: SD = standard deviation; bold values = square root of the average variance extracted (AVE); off-diagonals = correlations.



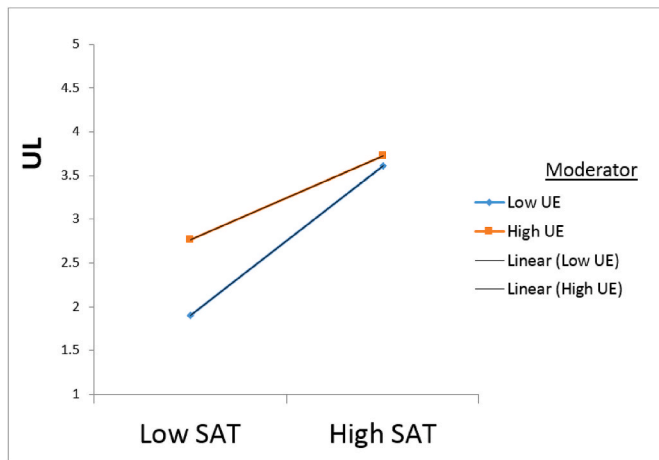


Fig. 3. Interaction effect SATxUEB→UL.

strategies for improving the quality of information.

Third, despite the extensive research conducted on chatbots in recent years, the predictors of user satisfaction and loyalty are still limited. This study brings coolness theory to the forefront of research on chatbots by demonstrating that the quality of the information delivered by chatbots can be perceived as cool by users when the information is quick, relevant, reliable, and concise. Additionally, we have confirmed that perceived coolness positively impacts user satisfaction. This finding aligns with earlier research suggesting that perceived coolness is a critical predictor of user satisfaction with a technological device (Liu and Mattila, 2019; Nan et al., 2022b).

Fourth, we have found that technology affinity is a significant factor in determining user satisfaction. Previous studies have already investigated the association between technology affinity and satisfaction. For example, Xu and Du (2018) examined the impact of digital libraries' affinity on enhancing user satisfaction. What sets our research apart is that we demonstrate that users can develop an affinity for chatbots, which ultimately influences their satisfaction.

Fifth, we have shown that ChatGPT's posthuman ability positively impacts users' satisfaction, suggesting that digital devices that significantly outperform humans or assist them in completing tasks efficiently can be perceived as posthuman and satisfy users' needs. Previous research on posthuman ability has primarily focused on investigating its association with technology acceptance (e.g., Gambino and Sundar, 2019). Thus, our study is unique in establishing a relationship between posthuman ability and satisfaction, adding to the existing literature on this topic.

Finally, we have confirmed that user ethical perceptions and beliefs moderate the association between user satisfaction and loyalty. To the best of our knowledge, no previous research has explored the logical possibility of user ethical perceptions and user ethical beliefs moderating the satisfaction-loyalty relationship. Therefore, our study's findings are noteworthy as they provide evidence for this possibility.

## 8.2. Managerial implications

The present study highlights several key implications for programmers and brand managers seeking to promote the healthy development of chatbots, including ChatGPT specifically.

First, based on our findings, we recommend that brand managers focus on the four factors of IQ (i.e., relevance, reliability, conciseness, and quickness) to enhance users' perceptions of usefulness, coolness, and satisfaction with ChatGPT. Relevance—the chatbot must be able to understand the user's needs and provide accurate and useful responses. To ensure relevance, brand managers should conduct regular assessments of user needs and feedback to ensure the chatbot is providing

relevant information. Reliability—the AI chatbot should be accurate and consistent in its responses. To ensure reliability, the chatbot should be trained on high-quality data sources and regularly tested for accuracy and consistency. Conciseness—the virtual agent should provide the necessary information in a clear and concise manner, without unnecessary detail. To ensure conciseness, programmers should conduct regular assessments of the chatbot's language and tone to ensure it is clear and concise. Quickness—the chatbot should respond quickly to user queries without unnecessary delay. To ensure quickness, programmers should monitor chatbot response times to identify areas where the chatbot is slow and take steps to address these issues. Additionally, they should optimize the chatbot's infrastructure and backend processes to ensure fast and efficient responses. In sum, brand managers should monitor chatbot performance metrics to identify areas where the chatbot is not providing relevant, reliable, and concise information and take steps to address these issues.

Second, although we found that IQ is one of the most important determinants of users' satisfaction and loyalty toward ChatGPT, the strong association between perceived coolness and users' satisfaction also provides a strong impetus for ChatGPT's parent company, OpenAI, and other companies building chatbots based on transformer technology to design cool chatbots and develop a cool image around them. As the use of these types of chatbots increases, brands may find it challenging to retain customer loyalty. Therefore, they could successfully design unique chatbots equipped with cool features and functions using the coolness framework, enhancing users' satisfaction and loyalty. As noted by Sundar et al. (2014), what is cool today may not be cool tomorrow. This implies that these types of chatbots may not be considered cool when they are fully adopted. Thus, brands should strive to develop new features regularly to make their virtual agents stand apart from other chatbots, create new stimuli, or leverage existing ones while building communication strategies.

Third, as evidenced by the findings, ChatGPT's posthuman ability also influences user satisfaction and loyalty. This suggests an important consideration for designers of these technologies: they should not use human abilities as the benchmark for their features and functions. Instead, they should strive to explore ways in which technology can exceed human capabilities. Describing these technologies solely in terms of human roles can be limiting for users. For instance, just as calculators and computers are not marketed as approximating the function of a human accountant, the capabilities of ChatGPT, such as "proofreading and editing," should not be overemphasized. Rather, the focus should be on the overall usefulness of the technology in meeting users' needs.

One of the key findings of this research is that user ethical perceptions of ChatGPT and user ethical beliefs have a negative moderating effect on the association between satisfaction and loyalty. Therefore, chatbot brands need to recognize the crucial role of users' ethical perceptions and beliefs while interacting with chatbots. They should assure users of their privacy and implement robust data protection measures to help build trust and alleviate concerns about the ethical implications of using AI chatbots. Demonstrating a commitment to user data privacy and security can encourage users to continue using the system and increase their loyalty. Additionally, they should establish and publicize ethical guidelines and policies to demonstrate the organization's commitment to responsible AI use. These guidelines should address concerns such as bias, stereotypes, discrimination, and the potential impact of AI on society. By proactively addressing ethical concerns, managers can mitigate negative perceptions and enhance user loyalty.

## 8.3. Limitations and future research lines

Like any other study, this research has several limitations that warrant scholarly attention. First, we employed a non-probability purposive sampling method, which raises concerns regarding the sample's representativeness. Furthermore, the utilization of self-administered online questionnaires excludes certain demographic groups, particularly older

individuals and those with lower academic qualifications. This exclusion may affect the overall representativeness of the sample. Future studies could employ a random sampling technique to investigate the theoretical framework of this study on a more diverse and inclusive sample of users.

Secondly, it is important to acknowledge that our data was exclusively collected from participants in the US. As a result, the study provides a relatively narrow perspective on the global phenomenon of ChatGPT, lacking international, cross-cultural, and global viewpoints that could enhance our understanding in a more comprehensive manner. Future research could conduct cross-country studies or validate the proposed model in other countries, such as China, to further broaden the scope of our investigation.

Third, we solely focused on satisfaction as a mediator in our model. Future studies could enhance the model by incorporating an emotional attitude, such as affective commitment, to ascertain the degree to which both emotional and cognitive attitudes amplify the influence of the predictor variables on the outcome variable. Fourth, this research did not consider the age categories and genders of the respondents. Future research could investigate whether different age groups and genders hold different attitudes toward ChatGPT, which may potentially influence their behaviors.

Finally, a recent study on 1000 US students found that one-third had used ChatGPT to complete their academic assignments (Intelligent, 2023), raising concerns about academic dishonesty in the use of AI chatbots. Future studies could explore the factors that could assist academic institutions in preventing students' unethical use of AI chatbots.

## 9. Conclusion

In conclusion, this research provides valuable insights into the factors influencing users' satisfaction and loyalty towards ChatGPT. The findings highlight the significance of several factors, including IQ, perceived usefulness, technology affinity, perceived coolness, and posthuman ability, in shaping users' attitudes and behaviors. The study emphasizes the importance of delivering relevant, reliable, concise, and prompt information to enhance users' perception of usefulness, coolness, and satisfaction. Furthermore, factors such as perceived usefulness, technology affinity, perceived coolness, and the perception of advanced capabilities (posthuman ability) all contribute to users' satisfaction and loyalty. However, it is crucial to address users' ethical concerns as they can have a negative impact on their loyalty toward AI chatbots. Overall, these findings provide valuable guidance for programmers and AI firms aiming to enhance user satisfaction, foster loyalty, and address ethical considerations in the development and deployment of generative conversational AI agents like ChatGPT.

## Funding

The study is supported by Key Program of National Natural Science Foundation of China (Nos.72334004), General Program of National Natural Science Foundation of China (Nos.71971143, 72374143), Guangdong Provincial Philosophy and Social Sciences Planning Project (No. GD22CGL35), Special Projects in Key Fields of Ordinary Colleges and Universities in Guangdong Province (No. 2022ZDZX2054), and University Innovation Team Project of Guangdong Province (No. 2021WCXTD002).

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Data availability

Data will be made available on request.

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