

The effect of anthropomorphism of virtual voice assistants on perceived safety as an antecedent to voice shopping

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Abstract

This paper delves into the realm of virtual assistants (VAs) and their pivotal role in shaping user acceptance of voice shopping. VAs, initially tailored for voice interactions on smartphones, have permeated diverse consumer devices, revolutionizing user experience through conversational interfaces. However, the reluctance to embrace voice shopping persists due to safety apprehensions stemming from users' lack of confidence in VAs. The paper centers on anthropomorphism, emphasizing the human-like attributes of VAs, and its direct correlation with users' sense of safety. The study explores user perceptions of VAs in voice shopping, particularly focusing on anthropomorphic aspects like social presence, human-like voice, and friendliness. The investigation highlights their impact on perceived safety, word-of-mouth, and voice shopping acceptance. Analyzing prominent VAs—Alexa, Google Home, and Siri—the

study identifies two fundamental factors influencing voice shopping acceptance: the humanity embedded in the VA's voice and the perceived safety it offers. Feeling secure during VA interactions significantly increases safety perception, fostering greater acceptance of VAs for shopping purposes. Additionally, the human-like qualities in the VA's voice positively influence users' perceived friendliness and safety, augmenting trust and overall acceptance of this technology.

Keywords: *virtual assistant, anthropomorphism, voice shopping, safety, humanity, friendliness*

1. Introduction

The initial purpose of virtual assistants (VAs) was to serve as a voice-based interactive function enabling consumers to utilize their smartphones in an innovative manner. Current digital assistants are being integrated into a wide range of consumer devices, including speakers, vehicles, televisions, and wearables (Fowler, 2018; Vimalkumar et al., 2021). The conversational interface of a VA stands out as one of its most notable advantages. By engaging in natural language interactions, it offers a more intuitive and user-friendly alternative to web and mobile interfaces reliant on manual input via keyboards (Zhong & Yang, 2018). Leveraging advanced artificial intelligence (AI) technologies, VAs are capable of dynamically observing and analyzing complex data in real time to facilitate information retrieval based on user queries. Furthermore, they can perform a wide range of tasks on behalf of the user, including playing music, booking appointments, and ordering products and services. By incorporating feedback from past interactions, VAs continuously refine their responses and progressively enhance their performance, thus enabling extensive personalization (McLean & Osei-Frimpong, 2019).

Users have the ability to make purchases of products or services exclusively through voice interactions with their VA. Brands like Starbucks, Dunkin' Donuts, and Domino's Pizza have incorporated VAs within their establishments to streamline the process of placing orders for customers. Similarly, Urgent.ly has utilized Amazon's Alexa to empower motorists requiring roadside assistance to initiate calls and make payments. Robust e-commerce platforms such as Amazon and Alibaba have incorporated voice shopping capabilities into their devices (Klaus & Zaichkowsky, 2020). While their popularity and usage for everyday tasks are on the rise, the utilization of VAs for voice shopping is still in its early stages. Only 15% of smart-speaker users in the US regularly make purchases through voice commands (Voicebot.ai, 2021). Although the current usage of VAs for purchasing is limited, there has been a notable surge in the sales of smart speakers during the last years, with a 72% increase in North America alone (Astound Commerce, 2023). The impact of events organized by large companies suggests that voice shopping is a phenomenon yet to be explored (Liao et al., 2019; Vimalkumar et al., 2021). During Alibaba's 24-hour 11.11 shopping festival in China, over one million orders were placed and paid for using Alibaba's Genie voice shopping feature (Li, 2019).

Numerous studies suggest that voice shopping is still in its nascent stage, primarily due to concerns about the technology's ability to ensure user safety, which in turn hinders the development of a trusting relationship between the VA and the user (Bolton et al., 2021; Burns

& Igou, 2019). This safety gap introduces an imbalance into the symbolic connection between humans and virtual devices (Ha et al., 2021). However, in comparison to other electronic devices and AI, VAs are known for their unique ability to engage in voice-only conversations and exhibit a somewhat human-like nature. The transmission of voice with human characteristics is a key element of what we refer to as anthropomorphism, and its presence significantly enhances the perception of safety for humans, as demonstrated by the research of Blut et al. (2021) and Liu & Tao (2022). Consequently, a range of studies suggests exploring the influence of anthropomorphism on users' sense of safety when using VAs, particularly in the context of voice shopping.

The literature highlights that users can perceive social emotions when interacting with robots and AI that possess anthropomorphic and human-like attributes, such as VAs capable of speaking and listening (Pelau et al., 2021). However, the concept of anthropomorphism remains fluid, evolving with the state of technology, and definitive studies are yet to provide a precise definition. Notably, when users hear the voice of a computer, they tend to treat it as if it were another person, as evidenced by Nass et al. (1994). Lee & Nass (2003) also showed that their study participants felt compelled to treat the computer as they would any other human being, even while being aware that the computer's voice was synthetic. These studies indicate that interactions between users and VAs, where voice plays a central role, can amplify the effects of anthropomorphism and, potentially, enhance the perceived safety of the device, contributing to a safer voice shopping experience.

Therefore, given these concepts, it becomes imperative to assess the role of anthropomorphism in users' perception of safety associated with this technology, especially as VAs become more sophisticated and acquire more human-like characteristics (Curran & Meuter, 2007; Liu & Tao, 2022). Nevertheless, the impact of anthropomorphism on safety matters remains largely unexplored from an empirical standpoint (Ha et al., 2021; Liu & Tao, 2022). The preceding arguments underscore a critical consideration: certain conditions can either encourage or discourage users from addressing safety-related concerns (Hasan et al., 2021), including their willingness to accept specific trade-offs in exchange for efficient and effective task performance. The extent to which the perception of anthropomorphism influences perceived safety when using virtual voice assistants to promote voice shopping remains unclear.

This research seeks to expand the existing literature by exploring the concept of anthropomorphism within the realm of VA studies, with a specific focus on safety considerations, alongside the traditional factors of utility and ease. The study delves into two

primary dimensions. First, it investigates how anthropomorphic factors, which arise from the human-like qualities of the assistant's voice, impact the perception of safety when using VAs. Second, it aims to quantify the influence of perceived safety on the acceptance of these devices as a viable tool for voice shopping. To precisely define the components of anthropomorphic and human-like characteristics, we have chosen to segment human perception into three distinct aspects: social presence, human-like voice, and friendliness.

The main objective of the study is to investigate the degree to which the assurance of safety when using VAs influences the intention to use them for voice shopping and how this relationship is impacted by the presence of anthropomorphic characteristics in the assistant's voice. In order to validate our proposed theoretical framework and assess the influence of anthropomorphism, we conducted the analysis using three distinct VAs: Alexa, Google Home, and Siri.

2. Literature review

2.1. Anthropomorphism

Prior studies have consistently emphasized the significance of anthropomorphic characteristics, assessing the extent to which humans interact with non-human technological entities as if they were human, employing human-human interactions as a benchmark (Aggarwal & McGill, 2012; Patrizi et al., 2021). Anthropomorphized cues, such as perceiving a brand as an entity, have been identified as instrumental in understanding anthropomorphism within the realm of consumer research (Aggarwal & McGill, 2012; Patrizi et al., 2021). These insights have created a valuable avenue for researchers exploring VAs (Gao et al., 2007). Additionally, there have been concerted efforts to personalize artificial intelligence (AI) on a more intricate level (Epley, 2018; Festerling & Siraj, 2022), providing a strong foundation for the integration of anthropomorphism in the context of VAs.

Anthropomorphism, as defined by the Cambridge Dictionary (2023), is the attribution of human-like appearance, character, or behavior to animals, gods, or objects. However, there is currently no unanimous consensus on a singular definition of anthropomorphism, as variations are evident in the literature (Epley, 2018; Festerling & Siraj, 2022).

Early investigations by Nass et al. (1994) revealed that humans tend to treat computers as if they were human beings when they hear a computer-generated voice. Subsequent studies by Lee & Nass (2003) expanded on this, finding that participants treated a computer as they would any other human being, even when aware that the voice was synthetic and generated by

voice creation software. Furthermore, these studies underscore the potent role of anthropomorphism, especially in interactions where voice takes center stage. With the advancement of AI, VAs have gained the capability to process voice commands and respond in a manner akin to human beings (Russell & Norvig, 2010). Present-day VAs personalize their interactions, allowing for natural conversations that resemble human-to-human exchanges. Unlike other technologies, VAs are progressively evolving toward heightened anthropomorphism, engaging directly with users through voice, as opposed to text and images. This distinctive characteristic of VAs points to an ongoing advancement in which they not only carry out more complex tasks but also interact with other VAs, highlighting the necessity of understanding the safety implications for users and fostering a secure environment in their utilization (Chung et al., 2017; Ha et al., 2021).

It has been observed that a VA's voice exerts a more profound influence on individuals compared to other forms of communication, fostering the relationship between the user and the device (Nass & Yen, 2010). The concept of developing relationships with non-human devices aligns with the theory of parasocial interaction (Horton & Richard Wohl, 1956), which was initially introduced to explain how users could form connections through interactions with various media personas, even when the other participant is not human. This theory has since been extended to describe social relationships between individuals and non-human entities, such as chatbots, robots (Mou & Xu, 2017), and avatars (Fox et al., 2009). The crux of this theory hinges on the perceived humanity of the non-human entity, a fundamental precondition for parasocial interaction, enabling individuals to view the entity as real (Banks & Bowman, 2016).

In the context of VAs, Ha et al. (2021) incorporated the safety aspect into the assistant–user relationship using the Communication privacy management (CPM) theory, particularly focusing on the high anthropomorphic nature of the interaction in which individuals consider their private information as something they own and control, building barriers around these elements of privacy, which can gradually be deconstructed as the level of safety increases in the relationship with the interlocutor. However, their measurement of anthropomorphism did not include voice-only social presence variables as it was based on a messaging service. While the study established an inverse relationship between risk and anthropomorphism, indicating that greater perceived human presence in the assistant led to reduced risk perception when sharing confidential information, it did not provide a specific conceptualization of anthropomorphism using measurable variables.

To establish a comprehensive framework for defining and quantifying anthropomorphism in the context of VAs, this study identifies, through a literature review, three dimensional constructs that allow defining anthropomorphic presence: Social Presence, Perceived Social Interactions, and Perceived Humanity.

Social Presence: Originating from studies of individuals' subjective perceptions of others in mediated communication, the concept of "social presence" centers on the degree to which a communication medium is perceived as sociable, warm, sensitive, personal, or intimate when used for interaction (Short et al., 1976). While social presence research traditionally focused on human connections mediated by technology, recent studies indicate its applicability to interactions with technological artifacts, such as VAs (McLean & Osei-Frimpong, 2019). Experiments by Reeves & Nass (1997) have demonstrated that individuals unconsciously apply social rules and expectations to computers, with cues related to human characteristics automatically eliciting social responses. This effect has been observed in VA contexts (Chérif & Lemoine, 2019). Furthermore, research has underscored the role of social presence in the adoption of new technologies, especially in building trust in technology. For example, Lu et al. (2016) highlighted the significance of social presence factors in establishing trustworthy and friendly relationships with technology. Verbal communication by robots has been shown to facilitate and enhance perceptions of friendship in interactions with humans (Hildt, 2019).

Social Interactivity: The concept of "social interactivity" revolves around the VA's ability to display appropriate emotions and actions in accordance with social norms. This aspect is particularly crucial when considering the use of a human-like voice in VAs, as it has been extensively studied in contrast to more artificial or robotic voices. The use of a human-like voice plays a pivotal role in enhancing the VA's trustworthiness and social intelligence. Studies examining the impact of human-like voice on user interactions have predominantly taken place within the domain of human-computer interaction, involving experimental investigations that compare it with more artificial or robotic voices. Notable research conducted by Chattaraman et al. (2019) and Cobos-Guzman et al. (2021) sheds light on the significance of voice in user perceptions. Their findings underscore that the voice of the VA serves as a primary cue for users, influencing their belief that they can interact with the VA in a manner similar to how they would interact with a person. Furthermore, these studies align with broader findings indicating that consumers tend to attribute more anthropomorphic traits to agents equipped with human-like voices. This observation highlights that a human-like voice serves as a precursor to the establishment of social presence, ultimately enhancing the VA's ability to engage users

in a more socially interactive and relatable manner. Thus, the use of a human-like voice is a pivotal element in shaping the social interactivity and user perception of virtual assistants.

Perceived Humanity: It is a crucial aspect of user interactions with VAs. It involves the emotions users experience when using a product, often tied to the product's ability to display human-like characteristics such as emotions and gestures. This concept becomes particularly important in the context of friendliness, as VAs are designed to interact in a manner that mimics human behavior (Holzwarth et al., 2006). Friendliness in a VA, influenced by anthropomorphic factors, plays a pivotal role in cultivating friendships and enhancing user interactions. Research studies, such as those conducted by MacInnis & Folkes (2017) and van Doorn et al. (2017), have shown that perceived humanity is a key determinant of VA-user interactions. In situations where consumers are faced with decision-making amid uncertainty, the element of friendliness takes on particular significance. This is especially relevant when individuals must take risks without having complete control over the outcome, as highlighted by Luhmann (2000). As feelings of friendliness increase, consumers tend to perceive a heightened sense of safety in their interactions with VAs, as demonstrated by research conducted by Rousseau et al. (1998). According to Communication Privacy Management (CPM) theory, the presence of signs of friendship and trust between two parties plays a pivotal role in expanding privacy boundaries. This, in turn, fosters a closer relationship, promoting trust and information sharing between the two actors. This concept has been supported by various studies, including those conducted by Kennedy-Lightsey et al. (2012), McBride & Bergen (2008), and Petronio et al. (2021). Overall, the perceived humanity and friendliness of VAs are critical factors in shaping user experiences and the depth of their interactions with these virtual entities.

2.2. Safety

The adoption and use of VAs raise unique safety concerns due to the exchange of personal information between users and the assistants. Perceived safety and trust are integral to consumer behavior and become particularly critical in the context of information technology, where sensitive personal data is shared. Given that VAs are a relatively recent, complex, and evolving technology, users may not possess a deep understanding of their inner workings, placing them in a position where they need to trust the technology provider without a comprehensive understanding. This issue has been supported by recent studies that have identified how a lack of trust and understanding can hinder the adoption of new technologies (Hasan et al., 2021). Thus, the adoption of VAs for voice shopping should be examined in light of these insights.

The integration of VAs into everyday life has transformed the way individuals interact with technology. Traditional anonymous interactions with electronic devices no longer apply when using a VA via a smartphone or smart speaker, as these VAs typically possess the user's name and, in many cases, additional personal details due to registration requirements. Moreover, the increasing capabilities of artificial intelligence allow VAs to learn from previous interactions and build comprehensive user profiles. These advancements have given rise to a unique type of safety-based relationship between users and VAs, even when no prior interaction has occurred. This dynamic sets the stage for an interaction quite different from those between individuals (Ha et al., 2021).

Over time, concerns related to safety have escalated, primarily due to data breaches and mismanagement. Various studies have proposed theories to elucidate user behavior in such situations. Trust, information disclosure, and safety concerns have been explored in the context of these new technologies (Christofides et al., 2009; Bright et al., 2021). Cultural factors and mindset variations across domains have been examined through theories such as the construal level theory (Liberian & Trope, 1998, Cowan et al., 2021; Krasnova et al., 2012) and regulatory focus theory (Lwin et al., 2016; Mosteller & Poddar, 2017) in the context of safety concerns and communication.

While these theories are broadly applicable to various technologies, they often lack consideration for a fundamental component characteristic of VAs: their continuous presence in a user's life, whether on a smartphone or a smart speaker. This constant presence establishes a unique personal relationship between users and their VAs. Drawing from Petronio's (2002) theoretical framework that addresses user safety concerns in contexts involving a relationship between electronic devices and users, the Communication Privacy Management (CPM) theory offers a valuable framework for understanding privacy concerns in user-technology interactions. CPM theory suggests that individuals consider certain information as confidential and, as owners of this private information, seek to maintain control over it. This information encompasses personal thoughts, feelings, experiences, or any other data individuals wish to keep confidential. The theory further posits that individuals set boundaries around their private information to assert control over it (Petronio, 2010).

CPM theory has been applied in various technological contexts, including user disclosure on social media and online forums, where personal information is shared among users and new technology features involving internet connectivity are introduced (Lankton et al., 2017; Osatuyi et al., 2018; Waters & Ackerman, 2011; McNealy & Mullis, 2019; Eastin et al., 2016; Bal et al., 2015). In the context of user-VAs relationships, certain information may

be considered confidential, such as credit card numbers, mailing addresses, or purchase histories, while less sensitive requests, like checking the weather or traffic conditions, may be viewed as less privacy-sensitive. The strength of the relationship between the user and the VA influences the user's willingness to share such information. Weaker boundaries may result in the sharing of private information, while stronger boundaries may lead to hesitation in sharing.

Additionally, the Communication Privacy Management theory provides insights into users' intentions to use VAs and their willingness to share information with these entities. When users opt to share information with a VA, they establish what can be termed a "border link." For highly sensitive data, such as purchase history, user addresses, or credit card numbers, users tend to be more willing to share such information with a VA when they perceive a stronger relationship with it (Petronio, 2002). In contrast, when the information's sensitivity is low, as in the case of weather or traffic inquiries, users are generally more open to interacting with any VA, irrespective of the perceived strength of their relationship with the technology (Kim & Kramer, 2015). Thus, this study contends that VAs requesting highly sensitive information may evoke heightened safety-related concerns in users who feel less closely connected to the VA, in contrast to those who have a stronger sense of familiarity with the technology. Specifically concerning purchases, where the shared information is of a highly sensitive nature, it becomes imperative to fortify the user's connections with the technology. The incorporation of a human-like voice by the assistant emerges as a potential key in reinforcing these connections.

2.3. Voice shopping

The retail landscape has witnessed the rise of a novel shopping trend known as voice shopping, facilitated by voice-controlled devices like smart speakers and smartphones equipped with voice interfaces. These voice interfaces can be found in devices with screens, such as smartphones, as well as in screenless devices like Amazon's Echo Dot or Apple's HomePod. It's worth noting that while prior studies have delved into the adoption of VAs, merely owning a VA does not guarantee its utilization for shopping purposes.

Research reveals that many VA owners predominantly employ these devices for non-commercial activities, such as checking the weather or enjoying music (Hu et al., 2022). As a result, theories and empirical insights solely centered on VA adoption might not provide a comprehensive understanding of the emerging and distinctive phenomenon of voice shopping. This highlights the necessity for further exploration into this evolving trend.

Given the growing popularity of voice shopping, numerous theoretical investigations have delved into the factors that propel consumer involvement in this novel retail phenomenon. Simms (2019) shed light on the potential of voice shopping, emphasizing its speed, seamlessness, and the efficient conversion of leads into successful sales when compared to traditional shopping methods. Likewise, Klaus & Zaichkowsky (2020) stressed the pivotal role of convenience and the positive emotions associated with voice assistants as primary drivers of voice shopping. These academic perspectives signify an optimistic outlook for the future of voice shopping, particularly due to rapid technological advancements in this domain.

However, despite these positive perspectives, there remains a lack of clarity regarding the factors that influence the intention to engage in voice shopping. Further research is imperative to unravel the underlying determinants and mechanisms that shape consumer attitudes and behaviors within the context of voice shopping. The existing research gap underscores the importance of bridging insights from anthropomorphic theories to gain a deeper understanding of user motivations in voice shopping. Addressing this gap can provide valuable insights into the complex relationship between VA users and the driving forces behind their active participation in voice shopping.

Notably, researchers have explored the connection between established theories of social psychology and the effectiveness of specific configurations in virtual assistants (VAs). Several theories, including the similarity attraction theory (Byrne & Griffitt, 1969), the emotional contagion theory (Hennig-Thurau et al., 2006), and the dress code theory (Cardon & Okoro, 2009), have been employed to shed light on the relationship between the anthropomorphism of robots and computers and their acceptance by users. Nevertheless, it is the CASA (Computers Are Social Actors) paradigm that underscores that consumers engage with VAs as naturally as they would with other individuals, forming the foundation for contemporary VA research and its acceptance (Nass et al., 1994).

In exploring the impact of anthropomorphism in online shopping, various studies have contributed valuable insights. Song & Kim (2022) focused on investigating the impact of human-robot interaction on consumers' acceptance of humanoid retail service robots, particularly within retail settings. This research aimed to provide insights into the factors influencing consumer acceptance, emphasizing the role played by the interaction between humans and humanoid robots in the realm of retail services. Hu et al. (2022) delved into the relationship between consumers' perceptions of power and their desire for power within the context of voice shopping experiences mediated by AI-powered voice assistants. Their findings

unveiled how consumers' perceived power and their desire for power shape choices and preferences during voice shopping interactions, exploring the "fit effect" of these factors.

Additionally, Jang et al. (2022) focused on the concept of smart retailing, with a specific emphasis on anthropomorphism in voice shopping conducted through smart speakers. Their research probed how users attribute human-like characteristics and emotions to AI-driven smart speakers during voice-based shopping interactions and its implications on user behavior and preferences within the context of smart retailing.

In line with these studies, Whang & Im (2021) embarked on an investigation into the influence of human likeness and parasocial relationships on website and voice shoppers' perceptions of product recommendations, guided by the parasocial interaction theory. Their research scrutinized how users' perceptions of human-like characteristics in AI-driven recommendation systems and their parasocial relationships with these systems affect their responses to product suggestions, across different shopping channels. Rhee & Choi (2020) navigated the territory of personalization and social roles in voice shopping experiences, leveraging the CASA paradigm. Through experiments, they unraveled how product recommendations from a conversational voice agent are influenced by personalization and the assignment of distinct social roles to the agent, shedding light on the significance of these factors in enhancing the effectiveness of voice shopping interactions.

Lastly, Aw et al. (2022) explored the transformative impact of digital voice assistants on customer experiences in voice shopping, anchored in the parasocial theory. Their study highlighted the convenience, personalization, and efficiency that digital voice assistants bring to the voice shopping process, effectively shaping the future of customer experiences.

In conclusion, while existing theories and empirical findings in VA adoption research have made significant contributions, they may not fully encompass the dynamic realm of voice shopping. While convenience and positive emotions have been recognized as key drivers of voice shopping, the precise factors influencing the intention to engage in this shopping method using VAs remain uncertain. Further investigation is required to better grasp the complex relationship between users and the forces that motivate their active participation in voice shopping.

3. Conceptual framework and hypotheses development

3.1. Anthropomorphic variables

In recent years, VAs have made significant strides in personalizing their interactions with users, allowing for more natural and engaging robot-human conversations. Given that the

voice is the defining human characteristic of VAs, the model incorporates three key anthropomorphic variables: Human-Like Voice, social presence, and friendliness. This anthropomorphic aspect of VAs has garnered substantial attention, especially with the proliferation of home-based VAs (Patrizi et al., 2021; Vernuccio et al., 2021).

While some studies have delved into exploring anthropomorphic perceptions of VAs, particularly differentiating human-like voice from robotic voices (Chérif & Lemoine, 2019), the existing literature in this domain appears fragmented. Variables like human-like voice occasionally feature in experimental studies as stimuli without a clear conceptual framework. Despite the growing interest in anthropomorphism within the VA context, the literature lacks a comprehensive integration of these variables, hindering a holistic understanding of the relationships between users and VAs.

Research on human-like voice in human-computer interaction consistently reveals that users tend to attribute human-like qualities more to computerized agents with human-like voice compared to those using synthetic voices (Schroeder & Epley, 2016). This notion was further supported by Chérif & Lemoine (2019) in VA interactions, emphasizing that human-like voice amplifies users' perception of social presence. Consequently, human-like voice is regarded as a precursor to social presence (Kim et al., 2022; Vilaro et al., 2021).

Research emphasizes the crucial role of social presence in technology adoption and trust-building. Lu et al. (2016) emphasized its importance in fostering trustworthy and amicable relationships with technology, while Hildt (2019) discovered that robots' verbal communication enhances perceptions of friendship in human interactions. Thus, Social Presence is seen as a precursor to friendliness in technology relationships.

Notably, some studies have sought to link the anthropomorphic component with user-perceived safety, primarily within the framework of CPM theory (Chung et al., 2017; Gao et al., 2007; Ha et al., 2021; Waters & Ackerman, 2011). However, these studies have yielded contradictory results. Ha et al. (2021) argued that anthropomorphism does not significantly affect the user's perception of safety, while Gao et al. (2007) and Waters & Ackerman (2011) presented arguments to the contrary. Hence, there is a pressing need to establish a clearer foundation within the VA-related literature to ascertain the precise impact of voice anthropomorphism on user privacy boundaries.

In light of the above discussion, we propose the following hypotheses to guide our investigation:

Hypothesis 1 (H1): A stronger human perception of the VA's voice is positively related to a heightened sense of social presence.

Hypothesis 2 (H2): Greater social presence of the VA positively related with the development of friendliness towards the VA.

Hypothesis 3 (H3): A more profound feeling of friendship with the VA is directly linked to an increased sense of safety in the interactions with the VA.

3.2. Safety perception

User-perception variables, as highlighted by Tang & Chen (2011), play a pivotal role in shaping user attitudes towards employing voice shopping with VAs, unencumbered by external influences from organizations or companies. Over the years, technology acceptance models have undergone revisions, with certain variables assuming evolving conceptual definitions. These variables serve as instrumental tools for comprehending individuals' proclivity to embrace technology, whether propelled by external or internal factors, such as their inherent disposition to express positivity towards a particular technology (Kaur & Kaur, 2023).

In the realm of VAs, CPM theory, as elucidated in section 2.1, underlines the paramount importance of the safety transmitted by an individual as the foundational key that engenders the requisite confidence to engage in subsequent information exchanges (Petronio, 2002). It's noteworthy that the perception of safety is inherently subjective and varies among individuals, given the variability in their privacy boundaries (Petronio, 2010). For instance, one user might deem it sufficient to entrust their VA, say Alexa, with a username and password to access their events calendar, while another user may extend their trust to the VA to manage their PayPal account for making purchases through the device. Once the privacy boundaries are established and expanded, partly attributed to the perceived humanity of the VA, it results in the fortification of boundary linkages within the assistant-user relationship (Petronio, 2002, 2010). This strengthened union, characterized by an elevated sense of safety, plays a pivotal role in the adoption and endorsement of technology that garners favor due to the human-like attributes of the VA (Chang & Chen, 2014).

Certainly, the research by Arndt (1967) suggests that the perceived safeness, or safety, experienced by consumers can significantly influence their behavior when seeking Word-of-Mouth (WOM) information and making purchase decisions. When individuals feel safe, they are more likely to engage in WOM activities. This indicates that a sense of safety encourages

people to seek and share information, participate in discussions about their choices, and express their preferences. Moreover, WOM activity serves not only as a way for individuals to seek information but also as a means for them to distribute information, contributing to the sharing of opinions and recommendations.

The acronym WOM denotes the exchange of information among customers related to a product, service, or business, with the source of information perceived as unaffected by commercial influence (Litvin et al., 2008). WOM involves a two-way flow of information, where the provider sends information to the seeker (Allsop et al., 2007). Previous studies (Ajzen, 1991; Venkatesh et al., 2003) have established the positive impact of WOM on purchase intention. Given the current low level of technology development, it becomes crucial for those who have already engaged with it to share their experiences.

As previously discussed, safety stands out as a pivotal factor in the adoption of artificial intelligence devices. Hence, a heightened perception of safety among users is essential, as it influences a greater intention to generate positive WOM that can shape the perceptions of potential future users. The sense of safety derived from the humanization of the assistant fosters a feeling of peace of mind in individuals. Research has indicated that when individuals achieve an optimal state in their interaction with technology, the resultant response is an intention to share positive experiences, manifesting as positive WOM (O'Cass and Carlson, 2010; Herrando et al., 2018, 2019). The sense of safety not only enhances the positive perception among current users but also acts as a catalyst for them to actively propagate their favorable experiences with the technology (Lien and Cao, 2019; Agag and El-Masry, 2016).

Based on the above, we propose the following hypotheses:

Hypothesis 4 (H4). A greater perception of safety in the VA is positively related to the spread of positive WOM.

Hypothesis 5 (H5). A greater perception of safety in the VA implies a greater intention to voice shopping.

Figure 1 illustrates the proposed model examined here.

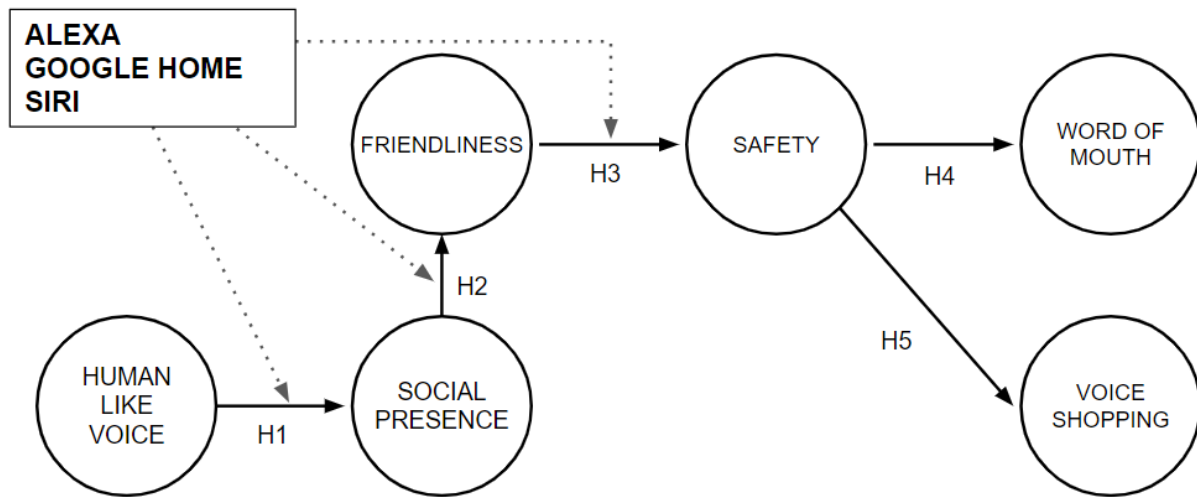


Figure 1. Proposed model.

4. Methodology

The data collection process took place in Spain in June 2022 and involved an online survey conducted by a market research company. The participants were selected based on their familiarity with VA technology and the concept of "voice shopping". All of them had had some experience with VAs and knew of their existence. The sample was divided into three equal and representative groups, with each group randomly assigned one of the popular VAs available in the market, namely, Alexa, Google Home, or Siri (Table 1). Participants were directed through a web platform specifically designed for this study, where they interacted with audio clips featuring the VAs reading product reviews obtained from the internet. These reviews covered various product categories, including restaurants, books, and cleaning robots.

To ensure exposure to the provided stimuli, all participants began by listening to an introductory audio clip featuring the respective VA discussing their preferred music genre. Subsequently, participants were questioned about the VA's musical preference, and all correctly identified the favorite music genre, indicating their engagement with the stimuli.

Each participant group was then exposed to four audio clips containing current product reviews, narrated in the voice of the VA corresponding to their group. Importantly, respondents were unaware of which assistant's voice they were hearing. These audio clips, lasting approximately 15 to 20 seconds each, were strategically interspersed throughout the survey. To maintain engagement, participants were unable to progress through the survey without listening to these audio clips, as the platform restricted further navigation until the audio had been played. Additionally, after each audio clip, participants were explicitly asked if they had heard the message clearly, ensuring their attention and comprehension.

To ensure the homogeneity of the groups, the difference in means of the three scenarios

(Alexa, Google, and Siri) was analyzed, focusing on variables from the technology acceptance model. Recent research has suggested that the conventional associations between utility and ease of use may have evolved as users become more adept at embracing new technologies (Wu & Wang, 2005). Given the increasing simplicity and ubiquity of voice technologies, particularly in comparison to emerging systems like virtual reality and the metaverse, correlations with user intention to adopt such technologies might have diminished. Consequently, these factors were employed as control variables in the study, with the assumption that participants, considering their sample profiles, should have a consistent level of perception regarding the usefulness and ease of use of VAs.

The subsequent ANOVA analysis confirmed that there were no mean differences among the samples of each of the three scenarios. The reliability of the constructs was analyzed by calculating Cronbach's alpha (Perceived Usefulness: 0.866; Perceived Ease of Use: 0.785). The analysis of ease of use showed no significant group differences (M_{Alexa} : 4.13; M_{Google} : 4.23; M_{Siri} : 4.12; F : 0.409, sig. = 0.664), suggesting that participants perceived the VA technology as equally user-friendly, irrespective of their assigned group. Furthermore, the examination of perceived usefulness did not yield any significant variations between groups (M_{Alexa} : 4.15; M_{Google} : 4.12; M_{Siri} : 4.03; F : 0.446, sig. = 0.640), indicating consistent perceptions of the technology's utility across all participant groups.

These findings instill confidence in the homogeneity of the groups, suggesting that any subsequent differences observed in the study are more likely attributable to the experimental conditions rather than variations in the control variables.

It is important to note that throughout the study, participants remained unaware of which specific VA they were interacting with, thus preserving the study's integrity. The content validity of the survey was ensured by conducting a comprehensive literature review to adapt the variables within the model to the VA context. The survey underwent rigorous scrutiny and validation by multiple experts. All variables in the survey were assessed on a seven-point Likert scale, with responses ranging from 1, indicating strong disagreement, to 7, indicating strong agreement. Prior to the main survey, a pilot study was conducted to confirm respondents' understanding of the survey items.

Table 1

Age, gender and VA distribution

Age distribution	Data collected (%)	Gender distribution	Data collected (%)	Virtual assistant distribution	Data collected (%)
18–21 (α)	6.4%	Female	51%	Alexa	33.26%
22–31 (Z)	29%	Male	49%	Google	33.26%
32–41 (Y)	34%	Total	100%	Siri	33.48%
42–50 (X)	31%			Total	100%
Total	100%				

5. Results

5.1. Testing the measurement model

To examine the proposed hypotheses, we analyzed the collected data via SEM, a sophisticated statistical technique combining multiple regression with confirmatory factor analysis to estimate a series of interrelated dependence relationships simultaneously. In recent years, the number of studies in information systems using SEM to test proposed models has increased (Sarstedt et al., 2022). To ensure the dimensionality, reliability, and validity of the scales, we conducted an exploratory factor and a confirmatory factor analysis using the statistical software SPSS (version 24) and Smart PLS 4. For internal reliability, we measured Cronbach's alpha of all variables exceeding the required minimum value of 0.70, indicating that our variables had satisfactory levels of reliability (Henseler et al., 2016). For convergent validity, item loadings were checked, exceeding the ideal value of 0.70 (Hair, 2009). The composite reliability values of all variables were greater than 0.70, indicating appropriate internal consistency of the variables (Aguirre-Urreta et al., 2013), while the average variance extracted (AVE) showed consistency with values higher or equal to 0.50, indicating that each of the variables captured enough variance over the amount of variance from measurement errors (Fornell & Larcker, 1981). We can conclude that the scales met the requirements of reliability. The results of these analyses are shown in Table 2.

Table 2

Measurement model results

Variable	Item	Mean	SD	λ	t-value	CA	CR	AVE
HLV	HLV1	3.77	1.77	0.500	174.698***	0.902	0.907	0.910

	HLV2	3.96	1.76	0.548	279.408***			
	SPRES1	3.75	1.77	0.338	98.571***			
SPRES	SPRES2	3.50	1.76	0.365	239.022***	0.927	0.930	0.873
	SPRES3	3.70	1.79	0.367	215.598***			
	FRIEND1	4.37	1.49	0.349	153.441***			
FRIEND	FRIEND2	4.22	1.53	0.382	176.890***	0.916	0.919	0.856
	FRIEND3	4.60	1.53	0.349	120.489***			
	SAF1	4.18	1.69	0.257	66.989***			
	SAF2	4.16	1.66	0.266	68.748***			
SAF	SAF3	4.43	1.54	0.354	74.108***	0.844	0.850	0.679
	SAF4	3.15	1.86	0.342	54.885***			
	WOM1	3.77	1.81	0.363	203.962***			
WOM	WOM2	3.65	1.82	0.349	145.754***	0.923	0.924	0.867
	WOM3	4.07	1.73	0.362	122.128***			
	VS1	3.39	1.77	0.389	193.672***			
VS	VS2	3.28	1.86	0.406	201.013***	0.879	0.898	0.806
	VS3	3.35	1.76	0.313	51.982***			

Notes: CA: Cronbach's alpha; CR: composite reliability; AVE: average variance extracted.

***sig. < 0.01.

HLV: Human-Like Voice; SPRES: Social Presence; FRIEND: Friendliness; SAF: Safety; WOM: Word-of-Mouth; VS: Voice Shopping

We placed a strong emphasis on ensuring discriminant validity, which is vital to confirm that the scales employed in the study effectively represent distinct concepts. To achieve this, we leveraged AVE values (Table 2) and conducted a thorough examination of the squared correlation coefficients in the corresponding rows and columns (Table 3). This meticulous

comparison adhered to the recommended criteria established by Fornell & Larcker (1981) and Hair (2009). Our efforts in this regard yielded compelling evidence in support of discriminant validity.

Table 3

Correlations among factors

	FRIEND	HLV	SAF	SPRES	VS	WOM
FRIEND	0.925					
HLV	0.738	0.954				
SAF	0.663	0.504	0.824			
SPRES	0.766	0.843	0.610	0.934		
VS	0.555	0.453	0.726	0.576	0.898	
WOM	0.693	0.538	0.772	0.665	0.767	0.931

HLV: Human-Like Voice; SPRES: Social Presence; FRIEND: Friendliness; SAF: Safety; WOM: Word-of-Mouth; VS: Voice Shopping

Additionally, we scrutinized the HTMT values, as recommended by Henseler et al. (2016). These values are instrumental in determining the appropriateness of the measurement model, with HTMT values below 0.95 considered suitable primarily for concepts with a high degree of similarity. Our comprehensive assessment, presented in Table 4, indicated that all HTMT values remained below the threshold of 0.95, affirming the robustness and validity of our measurement model.

Table 4

Heterotrait-monotrait ratio (HTMT)

	FRIEND	HLV	SAF	SPRES	VS	WOM
FRIEND						
HLV	0.81					
SAF	0.730	0.553				

SPRES	0.831	0.919	0.665		
VS	0.608	0.499	0.822	0.629	
WOM	0.752	0.588	0.850	0.720	0.839

HLV: Human-Like Voice; SPRES: Social Presence; FRIEND: Friendliness; SAF: Safety; WOM: Word-of-Mouth; VS: Voice Shopping

5.2. Testing the structural model

We evaluated the structural model's path analysis using a bootstrapping method with 5,000 re-samples. The current structural model explained 52.6% of the voice shopping variance. The results indicate a satisfactory model as all of the structural model's variance percentages explained were higher than 10% (Falk & Miller, 1992).



Note: Significance of all relationships $p < 0.01$.

Figure 2. Estimated model.

As anticipated, the contextual variables' hypotheses are all supported (Table 5). The study's findings reveal a significant positive relationship between human-like voice and Social Presence (H1), Social Presence and Friendliness (H2), and Friendliness with Safety (H3). These outcomes align with the propositions made by Chérif & Lemoine (2019). Concerning the external variables to technology, all connections are statistically significant. H4, H5, and H6, which assessed the relationship between perceived safety and WOM (H4) and perceived safety with voice shopping, (H5) are supported, corroborating the results of Chang & Chen (2014) and Hogan et al. (2004).

Table 5

Proposed hypotheses

Hypothesis	Dependent variable	Proposed effect	Result
H1	Social presence	Higher with human perception	Supported
H2	Friendliness	Higher with social presence	Supported
H3	Perceived safety	Higher with friendliness	Supported
H4	Word-of-mouth	Higher with perceived safety	Supported
H5	Voice shopping	Higher with perceived safety	Supported

By including the three most popular VAs in the market as moderators of the relationships derived from humanity transmitted through the voice of the assistant (Alexa, Google Home, and Siri), we could analyze the consistency of anthropomorphic relationships while controlling for the type of VA. Table 6 provides a detailed comparison through a bootstrap multigroup analysis of these differences among the VAs. No significant differences were found in the relationships between the three models.

Table 6

Bootstrap multigroup analysis results						
Variables	Alexa and Google		Google and Siri		Alexa and Siri	
	2-tailed p-value	Diff	2-tailed p-value	Diff	2-tailed p-value	Diff
Human-Like Voice → Social Presence	0.784	No	0.759	No	0.986	No
Social Presence → Friendliness	0.318	No	0.335	No	0.982	No
Friendliness → Safety	0.198	No	0.244	No	0.876	No

6. Conclusions and discussion

Our study's primary aim was to develop a theoretical framework that could identify essential anthropomorphic factors influencing the perceived safety in adopting voice shopping through VAs. Specifically, our focus was on the anthropomorphism of VA voices and how these variables align with the CPM theory, offering insights into user behavior when interacting with electronic devices that require the sharing of private and personal information.

Previous research has emphasized the link between anthropomorphism and its influence on safety perception, particularly in technologies handling users' private data. Our research aimed to clarify the role of anthropomorphism in shaping users' safety perceptions during voice shopping interactions, whether through recommendations or transactions. To investigate this, we examined the three predominant VA voices in today's market—Alexa, Google Home, and Siri—to test our hypotheses. The key anthropomorphic variables integrated into our model encompassed the human-like voice, social presence, and friendliness displayed by these VAs. Our study's findings revealed a substantial impact of anthropomorphism on safety perception, not only promoting the acceptance of voice shopping but also its dissemination through word-of-mouth recommendations.

As technology advances, particularly in the realm of voice shopping adoption, the complexity of interactions between users and AI devices intensifies. This increased complexity can potentially harm the user-device relationship by undermining safety perceptions (Gao et al., 2007; Ha et al., 2021). However, when users feel a sense of safety while interacting with VAs, their concerns about personal information exploitation diminish. In line with CPM theory, this strengthened sense of safety weakens privacy boundaries, enabling individuals to share more information and build trust in their interactions with VAs.

Furthermore, the utilization of anthropomorphic variables related to voice also aids in explaining the intention to make favorable recommendations about voice shopping, driven by their ability to assess their satisfaction with the device. Our study's results indicate that the trust conveyed by VAs' voice, which strengthens safety boundaries, facilitates the dissemination of positive information about them. This positive endorsement, coupled with the VAs themselves, results in a heightened intention to recommend voice shopping and potentially engage in voice shopping with them.

As expected, the results supported all hypotheses related to anthropomorphic variables. The results in Table 4 and Figure 2 show the importance and weight of the anthropomorphic variables related to the assistant's voice, making it possible to analyze the need to continue using human characteristics in these devices. Specifically, the study found that the presence of human-like features in the VA's voice and its mere existence were positive and significantly associated with each other, as well as with users' perceived friendliness towards the VA (H1 and H2, respectively). Additionally, the study found a significant association between users' perceived friendliness and safety towards the VA (H3). These results agree with the three-factor theory of anthropomorphism proposed by Epley (2018), in which they suggested that anthropomorphism can increase the sense of perceived safety by generating feelings of

predictability about AI devices. These results also coincide with a study by Pfeuffer et al. (2019), in which the authors showed that the feeling of safety increased in household appliances when they possessed certain human characteristics. The moderating effect of voice type (Alexa, Google and Siri) was analyzed, with no significant differences found. Therefore, we can conclude that the model remains stable for the three analyzed assistants, suggesting that the type of assistant does not influence individuals' perceptions of safety. In all cases, the effect of the perception of humanity in the assistant remains consistent. Thus, we can conclude that the presence of a voice in the assistant already makes it more human and positively influences the user's perceptions.

Finally, the results show that the perception of security explains the intention to participate in voice shopping and generate active word-of-mouth (H4 and H5). Therefore, a higher perceived security (preceded by an anthropomorphic effect of the voice) is crucial for enabling the adoption of voice shopping and its positive spread. These results align with previous literature (O'Cass and Carlson, 2010; Agag and El-Masry, 2016), suggesting that the intention to express positive word-of-mouth is triggered by a greater sense of security in technology.

6.1. Implications for theory

We believe this study makes a valuable contribution to the existing literature on CPM theory, which has been previously applied to various electronic devices and social networks (Lankton et al., 2017; Osatuyi et al., 2018; Waters & Ackerman, 2011). However, studies applying this theory specifically to VAs are limited (Ha et al., 2021). The study can contribute to the literature on CPM theory applied to VAs in a field yet to be exploited—voice shopping. The unique nature of VAs presents a potential risk to many users concerning privacy issues (see Section 2.1). Therefore, we deemed it necessary to explore the factors that could enhance the perceived safety of VAs, aiming to alleviate concerns arising from users' lack of awareness about this technology.

This study contributes significantly to the existing literature on the analysis of anthropomorphism in devices with artificial intelligence. By elucidating the concept of anthropomorphism, this research identifies three variables specifically related to the voice, considering it as the singular human element that VAs possess. The results affirm a positive relationship between human voice perception and social presence, aligning with previous literature support (Kim et al., 2022; Vilaro et al., 2021). The study demonstrates that a heightened perception of the human voice induces a greater sense of social presence,

characterized by qualities such as sociability, warmth, and even intimacy, as previously discussed in literature (Short et al., 1976).

These identified characteristics, including sociability and warmth, are deemed essential when establishing and nurturing relationships of trust within the context of the AI–human connection (Lu et al., 2016). The findings emphasize the importance of these qualities as fundamental pillars in fostering a secure and friendly environment, key elements for a successful AI–human relationship. Therefore, this study not only advances our understanding of anthropomorphism in AI devices but also sheds light on the pivotal role that the human voice plays in shaping perceptions and interactions within the evolving landscape of human-AI relationships.

Unlike studies on CPM theory, the interest that anthropomorphism has aroused in the literature on robots and AI (Li & Sung, 2021; Pelau et al., 2021). Although there has been growing interest in VAs and machine learning in the literature, there is limited knowledge about the nature of interactions and engagement between VAs and consumers. In particular, there is currently no consensus on which anthropomorphic characteristics, particularly those associated with the VA’s voice, contribute to generating a stronger sense of friendliness towards the VA.

This approach served two purposes. Firstly, it allowed us to construct a streamlined and focused model, providing a clear and direct path for examining the relationships between other key factors without the potential influence of these two well-established variables. Secondly, by treating Perceived Usefulness and Perceived Ease of Use as control variables, we aimed to control for their impact and verify the homogeneity of our sample. This methodological choice enhances the robustness of our study and ensures that the observed effects are not unduly influenced by these variables.

6.2. Implications for practice

The results of this study have practical implications for AI-related research, voice-based software developers, and advertising specialists. Following the recommendations of the previous literature about the perceived risks associated with AI devices, it is essential to be aware of the risks involved in using VAs and how important safety and confidence in the device are considered (Ha et al., 2021). As the relationship with these devices increases, developers and programmers should be aware of how safety can be transmitted to users so that they agree to use them. This study aligns with previous literature, highlighting the fundamental role of VAs in conveying positive messages about their usage. It emphasizes that the humanization of VAs is a crucial aspect in instilling the necessary confidence among users. As such, it is

recommended to integrate the use of voice in the communication tools employed by companies when interacting with their customers. Whether the purpose is to seek information, address inquiries or complaints, or facilitate online purchases, incorporating a humanized voice enhances the overall user experience. By incorporating this human element into communication channels, companies can establish a more trustworthy and engaging connection with their customers, fostering a positive perception of the interactions involving VAs.

The results of this study highlight the importance of perceived security in new technologies. As Petronio (2010) suggested, the removal of barriers between the user and technological devices enables the former to be more inclined to trust personal information to, in this case, the virtual assistant. Consequently, sharing personal information between the user and assistant fosters a greater sense of security in their relationship, thereby facilitating the development of new technologies, such as using virtual assistants for voice shopping.

Given the numerous daily interactions between users and various platforms, providing information about the benefits of using VAs for voice purchases will be crucial for their development. However, the use of VAs for voice purchases is still limited. The main change this technology brings to e-commerce is the ability for consumers to make purchases using voice commands. Therefore, based on the results of this study, we can deduce that the presence of anthropomorphic factors that generate human sensations to the user will allow greater confidence towards the VA, which eventually triggers a more positive attitude about purchasing with these devices. The challenge is to find the right voice that can connect with the user and convey emotions of friendliness, ultimately creating a positive user experience.

6.3. Limitations and future research

This research, akin to many other studies, possesses specific limitations. The primary focus of the study centered on general information and purchase searches. To enhance the empirical model's robustness, it would be advantageous to subject it to specific testing for various product or information search categories. One anticipates that the significance of localization could exhibit variance contingent upon the nature of the search task, such as distinguishing between hedonic and utilitarian product searches.

Furthermore, another limitation of the study is its cross-sectional nature. Given the rapid development of technologies and their diverse applications, it is advisable to monitor the variables examined in this study over time. This longitudinal approach would allow for a more comprehensive understanding of the evolving dynamics and trends in the relationship between the variables, considering the changing landscape of technology and its applications.

As previously highlighted, incorporating social interactivity into a VA acceptance model requires examining the emotions evoked by the perception of the assistant's anthropomorphism. Notably, the type of voice used does not appear to impact the perception of safety. Building on this, a supplementary proposal from the Marketing Science Institute (2022) recommends a thorough investigation of emotions using variables with single or double dimensions. Such an exploration could provide insights into the role that emotions play in the process of voice shopping with VAs. As a prospective avenue for future research, we suggest analyzing how the emotions conveyed by each type of voice influence both purchase intention and perceived safety. This analysis can be tailored to consider the type of information required in the transaction, distinguishing between high and low sensitivity contexts.

Rooted in the theoretical framework of Communication Privacy Management, this research endeavor seeks to elucidate the mechanisms by which individuals delineate and regulate boundaries around their private information when interacting with voice-activated shopping assistants. By closely examining how safety factors interact with voice shopping behavior, researchers can uncover valuable insights into how users navigate this complex environment. This inquiry may provide scholarly perspectives on the determinants that mold individuals' propensities to partake in voice shopping, all while taking into account their safety. These findings could carry implications of significant import for both commercial enterprises and the formulation of relevant policies in the continually evolving domain of digital commerce.

7. Acknowledgments

8. Appendix

Table 7

Item list			
HLV	HLV1	The assistant's voice sounds human	Patrizi et al. (2021)
	HLV2	The quality of his voice seems human	
SPRES	SPRES1	I would interact with this VA as if I were human	McLean & Osei-Frimpong (2019); Patrizi et al. (2021)
	SPRES2	When I hear the voice of this VA I feel like I am listening to a person	

	SPRES3	I feel a human presence in their voice	
	FRIEND1	The assistant's voice makes me feel comfortable	
FRIEND	FRIEND2	The assistant's voice would make me trust them	Charalambous et al. (2015)
	FRIEND3	I would feel comfortable interacting with this VA	
	SAF1	I feel safe using VAs	
SAF	SAF2	I feel that VAs are a safe technology	Lallmahamood (2007)
	SAF3	I would feel safe using this VA	
	SAF4	I would trust personal information to this VA	
	WOM1	I would recommend friends and family to buy with this VA	
WOM	WOM2	I would encourage my close circle to voice shopping by using a VA with this voice	Mourichi (2019)
	WOM3	I would speak well to my close circle of an VA with this voice	
	PU1	Using a VA would make it easier to search information about a product	
PU	PU2	Using a VA saves time when searching for information about a product	Mourichi (2019)
	PU3	I believe that the use of VAs is useful to buy online	
PEOU	PEOU1	VAs are easy to use	Mourichi (2019)
	PEOU2	VA technology is intuitive	
	VS1	In the future, I will use VA to shop on the internet	
VS	VS2	It is probable that I will use this VA to buy online in the near future	Pavlou (2003)
	VS3	I would use this VA to buy online in the near future	

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