



“Hello, I Am a Healthcare Chatbot”

The Effects of Identity Disclosure and UI Branding on Trust, Privacy Concerns and Behavioral Intention to Use a Healthcare Chatbot for Medication Reconciliation

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Abstract

A prospective legal obligation to reveal the identity of a chatbot to its users is expected to pose a threat to users' intention to use healthcare chatbots, as previous research into other types of chatbots has indicated that identity disclosure leads to less trust and more privacy concerns among users. This study tested to what extent identity disclosure of a healthcare chatbot influenced users' trust, privacy concerns and intention to use the chatbot.

Additionally, this study explored if branding the user interface (UI) of a chatbot can mitigate the potential negative effects of identity disclosure. This was examined using an experiment with a 2 x 2 factorial between-subjects design with identity disclosure and UI branding as independent variables. The participants ($N = 158$) received a survey with screenshots of a prototype of a healthcare chatbot that was developed for medication reconciliation by the Elisabeth-Tweesteden hospital. The results showed that revealing the healthcare chatbot's identity did not influence users' trust, privacy concerns and, subsequent, their intention to use the chatbot. Moreover, UI branding did not mitigate the effects of identity disclosure.

However, UI branding showed to reduce users' privacy concerns. Additionally, this study provided the valuable insight that users' intention to use healthcare chatbots is influenced by their trust in the chatbot and their privacy concerns. Moreover, the participants indicated that the chatbot is a convenient alternative for medication reconciliation conversations in person. In conclusion, disclosing a chatbot's identity does not seem to hinder users' intention to use task-driven healthcare chatbots.

Keywords: chatbots, healthcare technology, trust, privacy concern, technology acceptance model, branding

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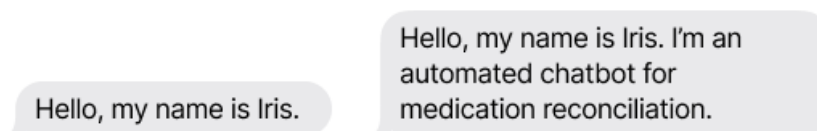
“Hello, I Am a Healthcare Chatbot”

Chatbots are a promising technology that is being adopted for assistance in more and more domains (Følstad & Brandtzaeg, 2017). A chatbot is a computer program that can interact with humans through natural language based on artificial intelligence (Reis et al., 2020). One of the domains that is adopting chatbots for assistance is the healthcare domain (Reis et al., 2020). Healthcare systems have recently been dealing with an increasing demand in care along with a staff shortage (Reis et al., 2020; Centraal Bureau Statistiek, 2022). Therefore, chatbots were for instance developed to answer frequently asked questions of patients and to prepare an overview of patients' health complaints, to eventually reduce the workload of healthcare workers (Mittal et al., 2021; Ni et al., 2017).

Probable changes in the law in the near future might however pose a threat to the application of chatbots. The European Commission is currently considering a legal obligation to reveal the identity of a chatbot, to create higher transparency for users (European Commission, 2020). Due to the increasing capability of chatbots to imitate human conversations, users of chatbots are now often misled thinking that their conversational partner is another human (Mozafari et al., 2021a). Users are misled because businesses and organizations behind chatbots often do not communicate the true identity of the chatbot to their users (Mozafari et al., 2021a). The European Commission wants to enable ethical use of chatbots by obligating an identity disclosure. The identity disclosure involves an introduction message that contains an explicit identity disclosure, for example “I am a chatbot” (Van Hooijdonk et al., 2022; see Figure 1 for an example) .

Figure 1

Example of a chatbot introduction message without identity disclosure (left) and with identity disclosure (right)



However, users have shown more negative psychological and behavioral reactions to chatbots that disclose their identity compared to chatbots that do not disclose their identity and appear more humanlike (see, e.g., Mozafari et al., 2021a; Hendriks et al., 2020; Mozafari et al., 2020; Murgia et al., 2016; Ishowo-Oloko et al., 2019). Due to the legal obligation, it has become relevant to research whether users are still willing to use chatbots that disclose their identity. If users are no longer willing to use chatbots that disclose their identity, the benefits of chatbots taking over certain tasks will be lost (Mozafari et al., 2021a).

The obligatory identity disclosure of chatbots will probably have negative consequences for the usage of healthcare chatbots, because it is expected to negatively influence patients' trust and privacy concerns. Research by Dhagarra et al. (2020) into technology acceptance in healthcare showed that trust and privacy concerns of patients are crucial factors that determine their intention to use healthcare technologies. This is because these technologies request highly personal information (Dhagarra et al., 2020). In the context of a healthcare chatbot, trust can be described as the willingness of patients to make themselves vulnerable by providing confidential information, based on positive beliefs about the chatbot's intentions or actions (Rousseau et al., 1998). Mozafari et al. (2021a) studied the effect of chatbot identity disclosure on trust in the e-commerce domain. They found that users had significantly lower trust in a chatbot that disclosed its identity compared to a chatbot that did not disclose its identity, even though its performance was identical. In the same context,

privacy concerns can be understood as the concerns of patients about the loss of their right to protect their personal information and the inability to control their personal information (Ischen et al., 2020). The study by Ischen et al. (2020) on privacy concerns towards chatbots showed that lower perceived humanness leads to more privacy concerns. Identity disclosure showed to reduce perceived humanness (Hendriks et al., 2020). Consequently, when identity disclosure becomes obligatory, patients might not trust a healthcare chatbot and have privacy concerns, which can withhold them from using it (Dhagarra et al., 2020)

As identity disclosure will become obligatory, the question arises how the negative effects of identity disclosure can be mitigated. Only the study by Mozafari et al. (2021a) has addressed this question so far. Mozafari et al. (2021a) found that the negative effect of identity disclosure can be mitigated by providing information on the chatbot's expertise. They suggest that providing the user with any kind of further information on the chatbot could mitigate the negative effect of disclosure. This can be explained by the cues-filtered-out perspective on computer-mediated-communication (CMC) (Mozafari et al., 2021a; Walther, 1992). Due to the lack of cues available in CMC, chatbots can actively shape their users' perception of them by selectively presenting information about themselves (Walther, 1992).

Information that could possibly shape users' perception of a chatbot and subsequently mitigate the negative effect of identity disclosure, is the brand that the chatbot belongs to. A brand is a set of tangible or intangible attributes (i.e., a logo, colors and associations) that are designed to create awareness and to build a reputation for a product or organization (Sammut-Bonnici, 2015). Nordheim et al. (2019) conducted a questionnaire study to investigate factors that are relevant for trust in customer service chatbots. They found that brand perception was an important factor for trust; the participants mentioned that their trust in the chatbot was due to their established trust in the provider. This can be explained by categorization theory, which states that people transfer information from a brand to a new target object (Aaker &

Keller, 1990). Therefore, adding the brand of a trusted hospital to the user interface of a healthcare chatbot could potentially address the negative effect of identity disclosure. Additionally, trust in the provider of a healthcare chatbot has shown to reduce the privacy risk expectancy of patients (Laumer et al., 2019). Hence, branding the user interface of a healthcare chatbot that discloses its identity could potentially increase trust and reduce privacy concerns, leading to a higher intention to use the chatbot (Mozafari et al., 2021a; Laumer et al., 2019; Dhagarra et al., 2020; Nordheim et al., 2019).

In short, obligated identity disclosure is expected to affect the use of healthcare chatbots, because it will likely lead to lower trust and possibly more privacy concerns among patients (Mozafari et al., 2021a; Ischen et al., 2020; Dhagarra et al., 2020). The effect of identity disclosure on trust has not been researched for healthcare chatbots. Moreover, the effect of chatbot identity disclosure on privacy concerns has not been researched yet. The expected negative effect of identity disclosure on trust and privacy concerns can potentially be mitigated by adding a hospital brand to the user interface of a healthcare chatbot (Nordheim et al., 2019). The moderating effect of branding in a chatbot interface has also not been tested yet. Therefore, the research questions of this study are: (RQ1) *To what extent does identity disclosure of a healthcare chatbot influence users' trust in the chatbot, their privacy concerns and, subsequent, their intention to use the chatbot?* And (RQ2): *To what extent can branding the user interface of a healthcare chatbot mitigate the expected negative effects of identity disclosure?* The research questions will be studied through an experiment in which participants will view screenshots of a prototype of a healthcare chatbot that is currently being developed by the Elisabeth-TweeSteden hospital for medication reconciliation. Medication reconciliation is the process of determining the actual medication that patients are using, which requires highly structured conversations with patients that are admitted to the hospital (VMS, 2017). In the screenshots, the identity disclosure and branding will be manipulated.

The goal of this study is to provide new insights into the effects of identity disclosure on the behavioral intention to use healthcare chatbots. Moreover, this study can provide insights in whether the user interface design can buffer the expected negative effect of identity disclosure.

Theoretical Framework

A healthcare chatbot for medication reconciliation conversations

Chatbots have so far been applied in the healthcare domain for various tasks. Mittal et al. (2021) for instance developed a chatbot to answer frequently asked questions to healthcare workers. The chatbot used natural language processing to provide patients with accurate information, to decrease the demand on healthcare workers. Ni et al. (2017) developed a primary care chatbot called Mandy that was designed to assist healthcare workers by automating the intake process of patients. The chatbot carried out interviews with the patients to create an overview of their health complaints. After the interviews, the chatbot submitted the information to the patients' doctors for further analysis. Similarly, a chatbot can be used to gather information for medication reconciliation, which is an important but time-consuming and labor-intensive task for healthcare workers (Elisabeth-TweeSteden Ziekenhuis, n.d.). A chatbot for medication reconciliation has not been developed before yet.

Medication reconciliation is a process by which a patient's medication list is checked and updated when a patient is admitted to the hospital to have an accurate medication overview (VMS, 2017). Medication reconciliation is done to prevent medication errors (VMS, 2017). Medication reconciliation is therefore essential for patient safety and is considered an important procedure in healthcare (VMS, 2017). The medication reconciliation process involves checking patients' medication lists provided by the pharmacist and conversations with patients. The conversations with patients are necessary, because the list of prescribed medications does not necessarily reflect what medications patients are actually using (VMS,

2017). In the conversations, nurses or pharmacists ask a standardized set of questions to patients regarding their medication usage (VMS, 2017). Due to the highly structural nature of the patient conversations, chatbots have potential to assist healthcare workers with the medication reconciliation process.

Chatbot identity disclosure

Advances in machine learning and natural language processing have made chatbots able to respond naturally to users with cohesive answers (Mozafari et al., 2021a).

Additionally, the use of social cues in the design of the chat interface has made chatbots appear more humanlike (Van Hooijdonk et al., 2022). Social cues are verbal or nonverbal cues from an interaction partner (i.e., a name or an avatar) that are used to form an impression of a conversational partner (Go & Sundar, 2019). The increasing ability of chatbots to imitate human conversations due to advances in machine learning, natural language processing and design has made it challenging for users to correctly identify whether they are interacting with a machine or a human (Mozafari et al., 2021a).

The identity of a chatbot can be communicated to users in different ways. Van Hooijdonk et al. (2022) defined a framework for different types of social cues that can be used to communicate a chatbot's identity to users. One of these types are identity cues, which are cues that can either mask or mark the identity of a chatbot. The identity of a chatbot is now often masked by using humanizing social cues, such as a human name and a humanlike avatar (Van Hooijdonk et al., 2022; Mozafari et al., 2021a). Using these social cues makes people unconsciously assign human characteristics to computers or robots (Go & Sundar, 2019). The cognitive process of linking human traits to non-human objects is also known as anthropomorphism (Araujo, 2018). It is however questionable whether anthropomorphizing chatbots is ethical, because it can be misleading for users (Mozafari et al., 2021a).

To be more transparent to users, the European Commission wants the owners of chatbots to explicitly mention the true identity of their chatbot (European Commission, 2020). For this, chatbot owners will have to use identity cues that mark the identity of a chatbot (Van Hooijdonk et al., 2022). An identity cue that explicitly marks the identity of a chatbot is an identity disclosure, for example: “I am a chatbot” (Van Hooijdonk et al., 2022). An identity disclosure instantly reduces the perceived level of humanness of a chatbot and thus counters anthropomorphism (Hendriks et al., 2020).

Research has shown that disclosing the identity of chatbots significantly influences user reactions (see, e.g., Van Hooijdonk et al., 2022; Mozafari et al., 2021a; Murgia et al., 2016; Hendriks et al., 2020). Luo et al. (2019) did a study on the reactions of customers to a chatbot for outbound sales. Their research included the comparison of a chatbot that disclosed its identity (“Dear, customer, I am the AI voice chatbot of company XYZ”) to a chatbot that did not disclose its identity (“Dear customer, I am the service agent of the company XYZ”). The results showed that the identity disclosure reduced the call length and the purchases rates with more than 79.7%. Murgia et al. (2016) researched the reactions of users of Stack Overflow (a question and answers website for developers) to a chatbot that did or did not disclose its identity before answering questions. The results showed that disclosing the chatbot’s identity led to less user acceptance compared to not disclosing the chatbots identity. Hendriks et al. (2020) studied the effect of identity disclosure on the user experience of a customer care chatbot. They compared three methods of identity disclosure: as a chatbot (“Hello, you are talking with a customer care chatbot”), as a human being (“Hello, you are talking with a customer care employee”) and no disclosure (“Hello”). The results showed that a chatbot that discloses its identity leads to a significantly poorer user experience, measured by social presence, perceived humanness and satisfaction, compared to the other methods.

The studies by Luo et al. (2019), Murgia et al. (2016) and Hendriks et al. (2020) show that identity disclosure evokes negative user reactions. Consequently, the question arises if users still want to use chatbots that disclose their identity when this becomes obligatory. The aforementioned studies included e-commerce chatbots and a question-and-answer chatbot. The reactions of users to identity disclosure of a healthcare chatbot have not been researched yet. Healthcare chatbots differ from the aforementioned chatbots as they request more personal and sensitive information from users, regarding their well-being and medication usage (Reis et al., 2020). Consequently, the data sensitivity is higher for healthcare chatbots compared to the aforementioned chatbots, and miscommunication or misuse of data can have far-reaching consequences (Reis et al., 2020). Considering the high data-sensitivity of healthcare chatbots and the studies by Luo et al. (2019), Murgia et al. (2016) and Hendriks et al. (2020), it is expected that a healthcare chatbot that discloses its identity will negatively influence users' reactions compared to a chatbot that does not disclose its identity. Negative user reactions, such as a low satisfaction and a poor user experience, have shown to negatively influence users' intentions to use technologies (Deng et al., 2010). As a result, it is expected that chatbot identity disclosure will influence the intention to use a healthcare chatbot. Therefore, to answer RQ1, the following hypothesis was set up:

H1: Disclosing a healthcare chatbot's identity reduces the intention to use the chatbot compared to not disclosing a healthcare chatbot's identity.

Technology Acceptance Model (TAM) for healthcare technology

Users' intention to use technology can be explained using various established theories and models, including the Technology Acceptance Model (TAM) (Davis, 1989), the Theory of Planned Behavior (TPB) (Ajzen, 1985), the Innovation Diffusion Theory (IDT) (Rajagopal, 2002) and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003). Among these theories, the TAM is the most widely explored model in information

sciences, because of its simplicity and understandability (Hwang, 2005; King & He, 2006). Originally, the TAM states that people's intention to use technology depends on the perceived usefulness (i.e., the degree to which users believe that the technology would enhance their performance) and the perceived ease of use (i.e., the degree to which users believe that using a technology would be effortless) of a technology (Davis, 1989). The TAM is based on the assumption of the Theory of Reasoned Action (TRA) that users' behavioral intention is closely linked to users' actual behavior (Fishbein & Ajzen, 1975).

The TAM has been modified frequently to fit specific technologies or a specific context of use (King & He, 2006). Dhagarra et al. (2020) augmented the TAM to predict users' usage of an electronic healthcare system that stores patients' medical information. They validated a variation of the TAM for this healthcare technology in which, besides perceived usefulness and perceived ease of use, trust and privacy concerns directly influence users' intention to use healthcare technology. In the case of a healthcare chatbot, trust and privacy concerns could thus be factors that explain users' behavioral intention to use this technology, as healthcare chatbots also require personal health information. Drawing on the research by Dhagarra et al. (2020), this study will solely focus on trust and privacy concerns as explaining factors for users' behavioral intention to use a healthcare chatbot, because these factors are expected to be influenced by identity disclosure. Perceived usefulness and perceived ease of use will be left out of the scope of this study, because identity disclosure is not expected to influence these factors. This is because identity disclosure does not directly affect a chatbot's purpose or functionality. By using the validated model by Dhagarra et al. (2020), this study can test whether the augmented TAM for healthcare technologies also holds for chatbots.

Trust in healthcare chatbots

Users' intention to use a healthcare chatbot can be attributed to their trust in the chatbot, due to the high data-sensitivity that is associated with the use of healthcare chatbots

(Dhagarra et al., 2020; Reis et al., 2020). Trust can be defined as the users' belief that a technology has the capability to do what the user needs to be done (i.e., competence), the belief that a technology provides adequate help (i.e., benevolence) and the belief that a technology will consistently operate properly (i.e., integrity) (McKnight et al., 2011). In the study by Mozafari et al. (2021a), identity disclosure showed a negative influence on trust in an e-commerce chatbot, that was measured through competence, benevolence and integrity. In their study, participants were instructed to imagine that they were contacting an insurance company via an online chat to take out a new insurance. The study included an experimental condition in which there was no identity disclosure ("Hello, my name is Micheal. how can I help you?") and a condition with identity disclosure ("Hello, my name is Micheal, how can I help you? I am a chatbot."). The results showed that the participants had significantly lower trust in the chatbot that disclosed its identity compared to the chatbot that did not disclose its identity, despite identical performance levels. Mozafari et al. (2021a) suggest that solely the information that users are interacting with an algorithm instead of another human causes a biased reaction. This can be explained by the inherent aversion of people towards algorithms. People often have an aversion towards algorithms because they lack transparency and are seen as a 'black box' of which people are struggling to understand what happens inside (Jussapow et al., 2020). This causes people to trust humans over algorithms (Jussupow et al., 2020; Mozafari et al. 2021a).

The effect of an identity disclosing healthcare chatbot on trust has not been researched yet. Based on the study of Mozafari et al. (2021a) in the e-commerce domain, it is expected that chatbot identity disclosure will also negatively influence the trust in a healthcare chatbot, which requests even more sensitive information from users (Reis et al., 2020). To answer RQ1 and to test to what extent the effect found in the study by Mozafari et al. (2021a) occurs in the healthcare domain, the following hypothesis was formulated:

H2: Disclosing a healthcare chatbot's identity reduces trust in a healthcare chatbot compared to not disclosing chatbot identity.

Trust is a prerequisite in the interactions with healthcare technologies, because these technologies request access to users' personal information, according to the aforementioned study by Dhagarra et al., 2020). The augmented TAM by Dhagarra et al. (2020) has not been tested yet for interactive technologies like healthcare chatbots. However, both the technology used in the study by Dhagarra et al. (2020) and the healthcare chatbot for medication reconciliation request personal health information from users. Therefore, it is expected that trust mediates the relationship between chatbot identity disclosure and the intention to use a healthcare chatbot. To answer RQ1 and to test whether trust also determines users' intention to use an identity disclosing healthcare chatbot, the following hypothesis was formulated:

H3: Disclosing a healthcare chatbot's identity reduces trust in a healthcare chatbot and therefore decreases the intention to use the chatbot compared to not disclosing a healthcare chatbot's identity.

Privacy concerns towards healthcare chatbots

Due to the far-reaching consequences of data misuse, users' privacy concerns towards a healthcare chatbot could be a factor that explains their intention to use a healthcare chatbot (Dhagarra et al., 2020; Reis et al., 2020). Privacy concerns can be understood as the concerns of patients about the loss of their right to protect their personal information and the inability to control their personal information (Ischen et al., 2020). In previous research, users have shown a concern for privacy when interacting with chatbots that request personal information (Følstad et al., 2018). Users of chatbots are more aware of a chatbot's requests for personal information, because interacting with chatbots is a relatively new phenomenon. This awareness induces privacy concerns (Følstad et al., 2018).

Disclosing the identity of a healthcare chatbot will likely increase users' privacy concerns towards the chatbot. Ischen et al. (2020) studied the influence of the presented identity of a chatbot on anthropomorphism, privacy concerns and information disclosure. The study used two versions of a chatbot (i.e., a computerlike chatbot and a humanlike chatbot) that gave recommendations for a health insurance. In the first condition, the chatbot was introduced as Sam and had an avatar of a cartoon-like customer service agent. In the second condition, the chatbot was introduced as "ChatbotX" and had a dialog bubble as avatar. The results showed that a computerlike chatbot leads to lower anthropomorphism, which leads to more privacy concerns and less comfort with sharing information, compared to a humanlike chatbot. In the previously mentioned study by Hendriks et al. (2020) it was found that an identity disclosure reduces anthropomorphism. Thus, an identity disclosure of a healthcare chatbot reduces anthropomorphism which can increase users' privacy concerns (Hendriks et al., 2020; Ischen et al., 2020). The effect of identity disclosure on privacy concerns towards chatbots has not been researched yet. Considering the results of the studies by Ischen et al. (2020) and Hendriks et al. (2020), it is expected that disclosing the identity of a healthcare chatbot will increase users' privacy concerns towards the chatbot. To answer RQ1, the following hypothesis was formulated:

H4: Disclosing a healthcare chatbot's identity increases privacy concerns towards a healthcare chatbot compared to not disclosing a healthcare chatbot's identity.

When technology requires sensitive information, privacy concerns can refrain users from using certain technologies (Dhagarra et al., 2020). Users do not want to share their personal information if they feel like they cannot rely on the service provider to keep their personal data secure (Dhagarra et al., 2020). As healthcare technologies often request personal information from users, privacy concerns can influence users' intention to use the technology (Dhagarra et al., 2020). The previously mentioned study by Dhagarra et al. (2020) showed

that privacy concerns directly influence the intention to use healthcare system that stores patients' medical records. In addition, an interview study by Laumer et al. (2019) on the adoption of healthcare chatbots for disease diagnosis, showed that the risk of impairment of personal privacy influences users' intention to use a healthcare chatbot (Laumer et al., 2019). On the other hand, previous research by Mozafari et al. (2021b) has shown that disclosing a chatbot's identity can increase the intention to use a chatbot when sharing sensitive information. In the study by Mozafari et al. (2021b) participants had a higher intention to use a chatbot that disclosed its identity when they had to ask for information about a sensitive product (i.e., hemorrhoid cream) compared to a chatbot that did not disclose its identity. This preference is due to the non-judgmental nature of chatbots, which reduces users' evaluation apprehension (i.e., the fear of being judged by others) (see, e.g., Zamora, 2017; Mozafari et al., 2021b; Tsai et al., 2020; Lucas et al., 2014). Nevertheless, in the case of a healthcare chatbot for medication reconciliation, it is still expected that identity disclosure will increase users' privacy concerns and decrease their intention to use the chatbot, as these users are not anonymous. In contrast to the study by Mozafari et al. (2021b), the users of the chatbot for medication reconciliation have to share their name along with the sensitive information, and their data is stored and used by the hospital.

Privacy concerns have not been tested yet as a factor that influences the intention to use healthcare chatbots through an experiment, as the study by Dhagarra et al. (2020) focused on a different healthcare technology and the study by Laumer et al. (2019) consisted of interviews. However, the current study and both the studies by Dhagarra et al. (2020) and Laumer involved technologies that request sensitive healthcare information from users. Therefore, it is expected that privacy concerns mediate the relationship between chatbot identity disclosure and the intention to use a healthcare chatbot. To answer RQ1 and to test

whether privacy concerns also determine users' intention to use an identity disclosing healthcare chatbot, the following hypothesis was formulated:

H5: Disclosing a healthcare chatbot's identity increases privacy concerns towards a healthcare chatbot and therefore decreases the intention to use the chatbot compared to not disclosing a healthcare chatbot's identity.

Mitigating the negative effects of chatbot identity disclosure with branding

As chatbot identity disclosure will become obligatory, the question arises how the expected negative effects on trust, privacy concerns and intention to use can be mitigated. In their study on the negative effect of identity disclosure on trust, Mozafari et al. (2021a) were the first to explore a way to buffer this effect. Mozafari et al. (2021a) explored if selective presentation of the chatbot's capabilities can mitigate the detrimental effect of chatbot identity disclosure on trust. Their idea was based on the cues-filtered-out perspective on computer-mediated-communication (CMC) by Walther (1992). CMC takes places through electronic devices. Therefore, there are fewer social cues available that enable impression forming on an interaction partner compared to face-to-face interactions (Walther, 1992). As a consequence, users of CMC, including chatbots, can actively shape their perception by selectively presenting information about themselves (Mozafari et al., 2021a; Van Hooijdonk et al., 2022; Walther, 1992). In the study by Mozafari et al. (2021a) the presentation of the chatbot's capabilities was tested by using an identity disclosure with a communication of expertise ("I am a chatbot. Due to my high efficiency I am able to find the best offer for you") and a communication of weakness ("I am a chatbot. Please note that I'm only in use for a year now and am still learning"). The results showed that trust in a disclosed chatbot is corresponding to the levels of trust in an undisclosed chatbot when the chatbot provides information on its capabilities. Based on this finding, Mozafari et al. (2021a) suggest that pairing chatbot

disclosure with any kind of further information on the chatbot might be sufficient to mitigate the negative effect of the identity disclosure.

Information that might also buffer the negative effect of identity disclosure is the brand that the chatbot represents. A brand comprises of tangible and intangible qualities such as logos, colors, and associations, all of which are designed to increase recognition and establish a reputation for a product or organization (Sammut-Bonnici, 2015). The perception of a brand was found to be one of the most important factors in trusting a customer care chatbot in the study by Nordheim et al (2019). Nordheim et al. (2019) conducted a questionnaire study to assess factors that are important for trust in chatbots identified from the literature and factors that were not identified in the literature yet, through qualitative exploration. In the qualitative exploration, the reports of the participants strongly suggested that their trust in chatbots depended on their trust in the service provider, thus their brand perception. Based on their study, Nordheim et al. (2019) suggested that it is potentially beneficial to clearly associate a customer care service chatbot with a trusted brand. The findings by Nordheim et al. (2019) can be explained by categorization theory, which originates from the field of cognitive psychology (Aaker & Keller, 1990). According to categorization theory, people transfer information between related entities: an affect about an entity (i.e., a brand) is retrieved from memory and matched with a new object (i.e., a new product by the brand) through a categorization process (Aaker & Keller, 1990). If the match between these entities is successful, a transfer of affect will likely take place. If the match is unsuccessful, the new object will be assessed based on its own attributes. In general, the trust of Dutch citizens in hospitals is high (Nivel, 2023). Research by the Nivel institute in 2023 showed that 77% of the Dutch citizens has a lot of trust in Dutch hospitals. Therefore, the trust in a hospital could be transferred to a healthcare chatbot by adding the hospital brand to the user interface of a healthcare chatbot.

The potentially moderating effect of user interface branding on the relationship between identity disclosure and trust has not been tested yet in an experiment, as the results of Nordheim et al. (2019) were based on interviews. Moreover, the effect of selectively presented information that was found in the study of Mozafari et al. (2021a) has not been researched yet in the context of healthcare chatbots. Considering the studies by Mozafari et al. (2021a) and Nordheim et al. (2019), the high trust in Dutch hospitals and categorization theory (Aaker & Keller, 1990), it is expected that adding a brand of a trusted hospital to the user interface of a healthcare chatbot can mitigate the negative effect of chatbot identity disclosure on trust. To answer RQ2, the following hypothesis was formulated:

H6: Branding the user interface of a healthcare chatbot moderates the relationship between chatbot identity disclosure and trust, such that a branded user interface increases trust in an identity disclosing healthcare chatbot compared to a non-branded user interface.

Branding could potentially also mitigate the expected negative effect of identity disclosure on privacy concerns. The previously mentioned study by Laumer et al. (2019) on factors that explain the adoption of healthcare chatbots, revealed that users' privacy risk expectancies depend on their trust in the provider of the chatbot. Higher trust in the provider of a healthcare leads to lower privacy risk expectations, according to Laumer et al. (2019).

The potentially moderating effect of user interface branding on the relationship between identity disclosure and privacy concerns has not been explored in the literature yet. Considering the study by Laumer et al. (2019) and following the same reasoning based on the high trust in Dutch hospitals and categorization theory, adding the brand of a trusted hospital to the user interface of a healthcare chatbot could potentially buffer the expected negative effect of chatbot identity disclosure on privacy concerns. Therefore, to answer RQ2, the following hypothesis was formulated:

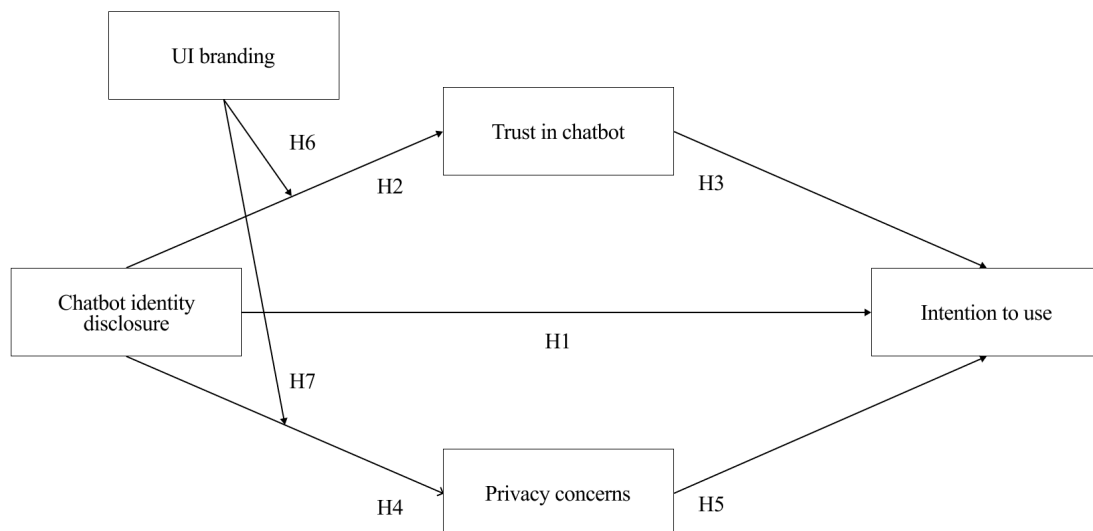
H7: Branding the user interface of a healthcare chatbot moderates the relationship between chatbot identity disclosure and privacy concerns, such that a branded user interface reduces privacy concerns towards an identity disclosing healthcare chatbot compared to a non-branded user interface.

Conceptual model

The conceptual model of the study including all hypotheses is presented in Figure 2. To explore how identity disclosure influences users' intention to use a healthcare chatbot, this study will draw on the augmented TAM for healthcare technology by Dhagarra et al. (2020), which validated trust and privacy concerns as influencing factors for intentional behavior. Trust and privacy concerns are thus mediators in the conceptual model of this study. To explore if user interface (UI) branding can mitigate the expected negative effect of chatbot identity disclosure, UI branding is included in the conceptual model as a moderator.

Figure 2

The conceptual model of the study



Method

Research design

This study used a 2 x 2 factorial between-subjects design. Here, the independent variables were the identity disclosure (disclosure or no disclosure) and the presence of branding in the user interface of the chatbot (branding or no branding). The dependent variables were participants' trust in and privacy concerns towards the medication reconciliation chatbot and the intention to use it. Trust and privacy concerns were measured as mediators in the relationship between identity disclosure and participants' intention to use the chatbot. UI branding was measured as a moderator in the relationship between identity disclosure and trust. Moreover, UI branding was measured as a moderator in the relationship between chatbot identity disclosure and privacy concerns. Additionally, the following variables were measured as control variables: participants' prior experience with chatbots and their negative attitudes towards chatbots. Furthermore, perceived humanness of the chatbot was measured as a manipulation check of identity disclosure.

Participants

A total of 214 participants participated in this study. The participants were recruited through convenience sampling using the researcher's social network. After removing invalid or incomplete responses, 158 participants remained. An invalid response occurred when a participant did not meet the condition for participating in the study, which was mastery of the Dutch language. Among the participants, there were 59 men and 96 women. 3 participants identified as non-binary. The mean age of the participants was 31.77 years ($SD = 14.02$). The age of the participants ranged between 20 and 79 years old. Most of the participants ($N = 125$) were highly educated (university or university of applied sciences). The remaining participants either completed secondary vocational education ($N = 18$), high school ($N = 14$) or primary school ($N = 1$). 93.0% of the participants had used a chatbot before. Most of these

participants mentioned that they sometimes used a chatbot ($N = 66$). The remaining participants mentioned using a chatbot a single time ($N = 49$) or frequently ($N = 32$). Participants' trust in the Elisabeth-TweeSteden hospital was measured using the brand trust scale by Koschate-Fischer and Gärtner (2015). On average, the participants scored 5.51 ($SD = 0.92$) on a scale of 1 to 7, meaning that their attitude towards the hospital was relatively high. 48.7% of the participants that noticed the hospital brand was familiar with the Elisabeth TweeSteden hospital. Moreover, 29.3% of the participants was familiar with the medication that was mentioned in the conversation. 61.2% of the participants was not familiar with the medication and 9.5% did not remember the medication.

Materials

The participants were asked to look at a scenario that consisted of multiple screenshots of a conversation with the medication reconciliation chatbot. By using the scenario style with screenshots, participants could only infer the identity of their interaction partner if there was an explicit identity disclosure (Mozafari et al., 2021a). Therefore, the scenario style allowed solely testing the effect of the identity disclosure. This would not have been the case for a real interaction with the chatbot, as other influences such as the availability of the interaction partner and the response times could also reveal the identity of the interaction partner (Gnewuch et al., 2018). Additionally, the scenario style allowed to keep the conditions identical, except for the manipulations of identity disclosure and branding. The scenario style came at the cost of the ecological validity of the study, which would have been higher using a real chatbot interaction. However, the scenario style method enabled control for confounding influences and high internal validity.

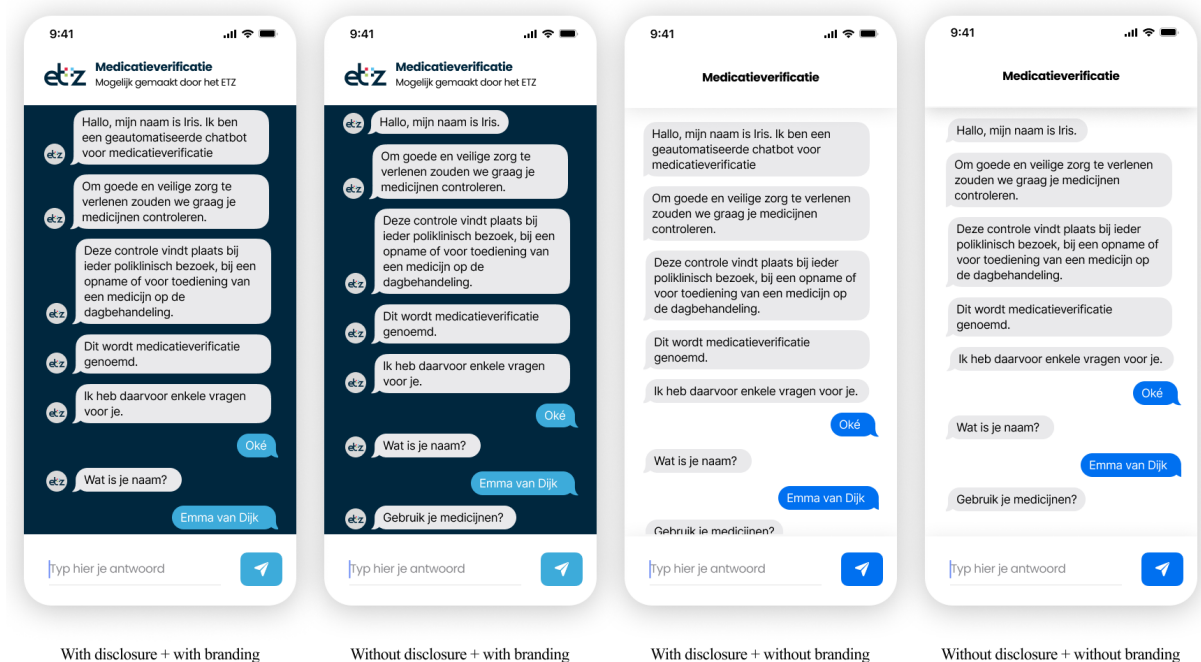
The prototypes that were used for the scenario required two design choices: the topic of the conversation and the introduction message. The conversation in the scenario was based on the existing script of real conversations with patients for medication reconciliation that was

provided by the Elisabeth-TweeSteden hospital. The full conversation is presented in Appendix A. In the scenario, antidepressants were mentioned as the drugs that were used by the patient in the medication reconciliation conversation. This stigmatized and well-known drug that is used to treat depression, was chosen to show that the medication reconciliation chatbot can request information that is considered private (Castaldelli-Maia et al., 2011). Hendriks et al. (2020) found that the introduction to an interaction partner determines people's perception of the identity of their interaction partner. Therefore, similarly to the study by Mozafari et al. (2021a), the introduction message varied for the chatbot identity disclosure conditions. In the condition with disclosure, the chatbot explicitly mentioned its identity when opening the conversation ("Hello, my name is Iris. I am an automated chatbot for medication reconciliation"). In the condition without disclosure, the chatbot did not mention its identity when opening the conversation ("Hello, my name is Iris").

The user interface that was presented in the scenario was based on the interfaces of existing chatbots to increase the ecological validity of the study. The design of the user interface varied for the branding conditions (see Figure 3). In the user interface of the condition with branding, the logo of the Elisabeth-TweeSteden hospital and their corporate identity colors were used. A logo and colors were chosen because these are attributes that are commonly used to communicate a brand (Aaker & Keller, 1990). Moreover, the Elisabeth-TweeSteden hospital was explicitly mentioned as the provider of the chat interface. The participants in the study by Nordheim et al. (2019) reported that their trust in a chatbot was due to their established trust in chatbot provider. In the user interface of the condition without branding, the logo of the Elisabeth-TweeSteden hospital was not presented. Moreover, the user interface was white instead of in the colors of the Elisabeth-TweeSteden hospital.

Figure 3

The screenshots of four different versions of the chatbot



Measures

The original scales and the modified scales that were used in the study are included in Appendix B. The modified scales were translated from English to Dutch by a Dutch native speaker, because the experiment was conducted with Dutch participants to enable a large sample size for the study. The translations were checked by translating the items back to English by another native speaker. The Dutch translations of the items are also included in Appendix B.

Measurement of trust

Trust in the chatbot was measured using the scale by Nordheim et al. (2019). The scale consisted of five items that were measured on a seven-point Likert scale (1 = *totally disagree* – 7 = *totally agree*). The items of the scale by Nordheim et al. (2019) were modified to fit the design of the experiment. ‘Chatbot’ in the items was changed to ‘conversational partner’ to keep the identity of the chatbot unrevealed for the participants in the conditions without

identity disclosure. For instance, “I experience this chatbot as trustworthy” was changed to “I experience this conversational partner as trustworthy”. The Cronbach’s Alpha of the items was good ($\alpha = .80$).

Measurement of privacy concerns

Participants’ privacy concerns towards the chatbot were measured using the scale by Ischen et al. (2020). The scale consisted of four items that were measured on a seven-point Likert scale (1 = *totally disagree* – 7 = *totally agree*). The items were modified to fit the design of the experiment. ‘Chatbot’ in the items was again changed to ‘conversational partner’. An example of a statement is “I am concerned that this conversational partner is collecting too much personal information about me”. The Cronbach’s Alpha of the items was excellent ($\alpha = .90$).

Measurement of intention to use

Participants’ intention to use the chatbot was measured using the scale by Dhagarra et al. (2020) which was based on the Technology Acceptance Model. The scale by Dhagarra et al. (2020) consisted of three items which were originally measured on a five-point Likert scale. However, to keep the survey questions consistent, the scale was transformed into a seven-point Likert scale (1 = *totally disagree* – 7 = *totally agree*). Moreover, the items were modified to fit the experiment’s design. “I plan to interact with this conversational partner for medication reconciliation” is an example of one of the items. The Cronbach’s Alpha of the items was excellent ($\alpha = .92$).

Measurement of humanlikeness

The perceived humanlikeness of the chatbot was included in the study as a manipulation check for identity disclosure. It was expected that the perceived humanlikeness of the chatbot with identity disclosure would be significantly lower than the perceived humanlikeness of the chatbot without disclosure. Humanlikeness was measured using the

scale by Nordheim et al. (2019), which consisted of five items that were measured on a seven-point Likert scale (1 = *totally disagree* – 7 = *totally agree*). “Chatbot” in the items was again changed to “conversational partner”. Moreover, the items were adjusted to the scenario style of the study in which the participants did not interact with the conversational partner. This resulted in for example “The conversational partner seems authentic” instead of “The conversational partner is authentic”. The Cronbach’s Alpha of the items was excellent ($\alpha = .93$).

Measurement of brand trust

Brand trust was measured to get an idea of the brand trust of the participants in the Elisabeth-TweeSteden hospital. Brand trust was measured using the scale by Koschate-Fischer and Gärtner (2015), which consisted of five items that were measured on a seven-point Likert scale (1 = *totally disagree* – 7 = *totally agree*). An example of an item is “I am confident in the Elisabeth-TweeSteden hospital to perform well “. The Cronbach’s Alpha of the items was excellent ($\alpha = .92$).

Measurement of negative attitudes towards chatbots

Participants’ negative attitudes towards chatbots were included in the study as a control variable. The scale was based on the Negative Attitudes towards Robots Scale (NARS) by Syrdal et al. (2009). The scale was modified to fit the design of the study (see Appendix B). The modified scale consisted of twelve items that were measured on a seven-point Likert scale (1 = *totally disagree* – 7 = *totally agree*). The item “I would feel nervous operating a robot in front of other people” was for example modified to “I would feel nervous interacting with a chatbot in front of other people”. Two items of the original scale (“I would feel very nervous just standing in front of a robot” and “Something bad might happen if robots developed into living beings”) because they did not fit the non-physical nature of

chatbots. Therefore, these items were removed. The Cronbach's Alpha of the items was good ($\alpha = .80$).

Open-ended questions

To get qualitative insights in the participants' intention to use a healthcare chatbot for medication reconciliation, four open-ended questions were added to the survey. Firstly, the participants were asked to answer the question "Is there medical information that you would rather not share with the online interaction partner that you saw in the screenshots?".

Secondly, if the participants answered with yes, they were asked what kind of information that would be and why. If the participants answered with no, they were asked why they would share all their medical information with the interaction partner. Lastly, the participants were asked the following questions: "Imagine that you would be admitted to the hospital for a medical treatment. What would be reasons for you to use the chat for medication reconciliation?" and "What would be reasons for you to not use the chatbot for medication reconciliation?".

Procedure

The experiment was conducted online through the Qualtrics survey program. The participants could read information about the experiment in Qualtrics and give their consent to participate. Information about the actual purpose of the study was omitted here. Moreover, to protect the internal validity of the study, the Elisabeth-TweeSteden hospital was not mentioned. Next, the participants were asked to fill out their demographic information (i.e., gender, age and education). This was followed by information on the medication reconciliation process. It was explained what medication reconciliation is, why it is necessary and how it is done (see Appendix C). For the participants in the conditions with branding, this was followed by information about the Elisabeth-TweeSteden Hospital (see Appendix C). Information about the Elisabeth-TweeSteden Hospital was included, because not all the

participants came from the region in which the hospital operates. By adding this information, every participant in the conditions with branding became somewhat familiar with the hospital. Subsequently, the task instruction followed. The participants were instructed to attentively view a scenario of a medication reconciliation conversation that was presented using multiple screenshots of a chat interface. The participants were randomly assigned to one of the four experimental conditions. Then the screenshots of the chat interfaces with the scenarios were presented to them. There was a timer of 30 seconds set on this screen to ensure that the participants saw the presented chat interface and read the scenario. Depending on the assigned condition, the identity of the chatbot was or was not disclosed in the first message and the chat interface was branded or not branded (see Figure 3). When the time had passed and the participants were done viewing the screenshots, they were asked to fill out the survey items on trust, privacy concerns and their intention to use the chat for medication reconciliation. In addition, the participants were asked to fill out survey items on humanlikeness. If the participants were assigned to the branded condition, they were also asked whether they had seen a brand in the chat interface to check the branding manipulation. Moreover, they were asked whether they knew the brand. Additionally, these participants were asked to complete survey items on brand trust. Subsequently, the previously mentioned open-ended questions were asked to the participants. Then, the participants were asked to indicate if the statement ‘Iris from the medication reconciliation conversation was a human’ was true or false. This statement functioned as an additional manipulation check of identity disclosure. Thereafter, the participants were asked whether they had experience with chatbots. Lastly, the participants were asked to fill out survey items on their negative attitudes towards chatbots. When they had answered all of the questions, the participants were informed on the purpose of the study. The participants also received information on the collaboration with the

Elisabeth-TweeSteden hospital (see Appendix C). Finally, the participants were thanked for their participation in the study.

Analysis

First, the manipulation check for identity disclosure was tested using an independent sample t-test. Here, chatbot identity disclosure was the independent variable and humanlikeness was the dependent variable. Subsequently, a simple mediation analysis using Hayes' (2022) PROCESS extension was used to test the effect of identity disclosure on trust (H2) and to test the mediating effect of trust in the relationship between identity disclosure and intention to use (H3). A second simple mediation analysis using the PROCESS extension was used to test the effect of identity disclosure on privacy concerns (H4) and the mediating effect of privacy concerns in the relationship between identity disclosure and intention to use (H5). Thereafter, the moderated mediation analysis using Hayes' (2017) PROCESS extension was conducted to test whether UI branding moderated the relationship between identity disclosure and trust (H6), and privacy concerns (H7). These analyses also tested the direct effect of identity disclosure on the intention to use the chatbot (H1). Chatbot identity disclosure was the independent variable and the intention to use the chatbot was the dependent variable. Trust and privacy concerns were the mediating variables and UI branding was the moderating variable. Participants' negative attitudes towards artificial intelligence and their prior experience with chatbots were included as covariates. The answers to the open-ended question were analyzed by dividing them into categories. Subsequently, the number of times each category was mentioned per condition was calculated and compared to the different experimental conditions.

Results

Manipulation checks

An independent sample t-test was performed to test the manipulation check for identity disclosure. The independent variable was identity disclosure and the dependent variable was the perceived humanlikeness of the conversational partner in the screenshots. The data for the manipulation checks were homogeneous and normally distributed (see Appendix D). The participants on average reported less humanlikeness for the conditions with identity disclosure ($M = 3.59$, $SD = 1.56$) compared to the conditions without identity disclosure ($M = 4.04$, $SD = 1.45$). This difference was significant, ($Mdif = 0.44$, $t(156) = 1.83$, $p = .034$). Thus, identity disclosure significantly reduced the humanlikeness of the healthcare chatbot. This difference had a small-sized effect, $d = 0.30$. However, the second manipulation check for identity disclosure showed that only 38.4% of the participants in the conditions without disclosure believed that the interaction partner in the medication reconciliation conversation was human. Therefore, 61.6% of the participants in the conditions without identity disclosure assumed that the interaction partner was a chatbot instead of a human. This indicates that the manipulation of identity disclosure was not successful, despite the significant difference in humanlikeness. The unsuccessful manipulation of identity disclosure should be considered when interpreting the effects of identity disclosure on trust, privacy concerns and behavioral intention.

To test the manipulation of branding, the participants were asked if they saw a brand in the presented screenshots. 50.0% of the participants in the conditions with branding reported seeing a brand. Of these participants, 48.7% reported being familiar with the Elisabeth-TweeSteden hospital. The participants ($N = 39$) that did not notice the brand in the conditions with branding were not removed from the dataset considering the sample size of the different conditions. The unsuccessful manipulation of branding should be considered when interpreting the following results regarding the moderating effect of branding.

Mediation and moderation analyses

The mean scores for trust, privacy concerns and the intention to use the chatbot are presented for each experimental condition in Table 1.

Table 1

Mean trust, privacy concerns and intention to use the chatbot for conditions of identity disclosure and branding on a 7-point Likert scale (standard deviations between brackets)

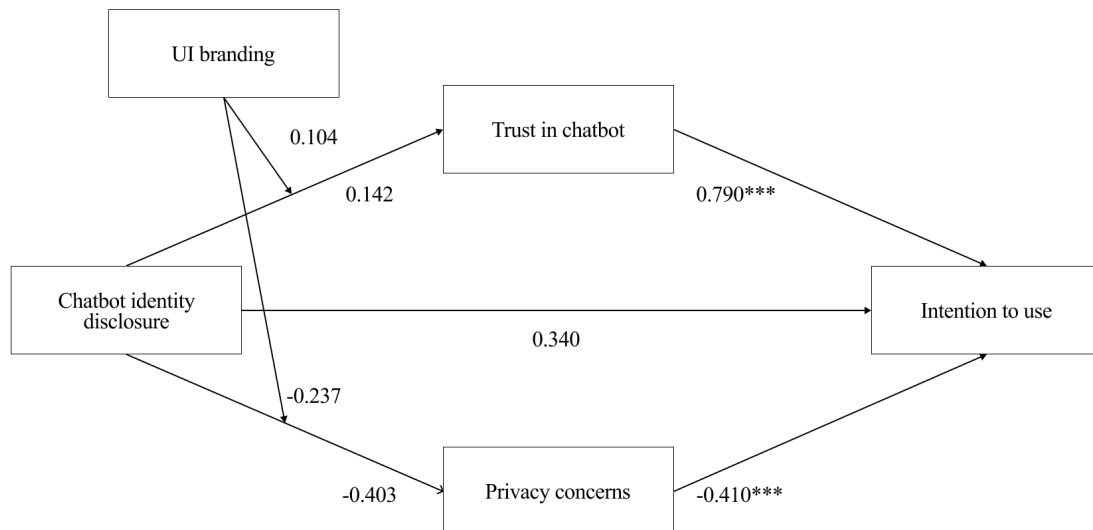
		Without disclosure	With disclosure	Total
Trust	Without branding	4.90 (0.99)	4.89 (1.02)	4.90 (1.00)
	With branding	4.95 (1.32)	5.34 (0.99)	5.10 (1.16)
	Total	4.93 (1.08)	5.07 (1.01)	
Privacy concerns	Without branding	4.39 (1.54)	3.56 (1.53)	4.00 (1.58)
	With branding	3.39 (1.56)	3.47 (1.53)	3.43 (1.54)
	Total	3.92 (1.62)	3.52 (1.52)	
Intention to use	Without branding	3.83 (1.56)	4.30 (1.48)	4.05 (1.53)
	With branding	4.41 (1.53)	4.58 (1.60)	4.50 (1.55)
	Total	4.12 (1.57)	4.44 (1.53)	

Two simple mediation analyses and a moderated mediation analysis using Hayes' (2022) PROCESS extension were conducted to answer the research questions of the study. In these analyses, identity disclosure was the independent variable and the intention to use the chatbot was the dependent variable. Trust and privacy concerns were the mediating variables and branding was the moderating variable.

The assumption checks for normality and homogeneity are presented in Appendix D. Some of the data used in the analyses deviated from normality. The assumption of homogeneity was met. Scatterplots showed that the assumption of linearity was met. Analysis of collinearity statistics showed that the assumption of no multicollinearity was met, as VIF-scores were well below 10 (trust = 0.715, privacy concerns = 0.705), and tolerance scores above 0.2 (trust = 1.398, privacy concerns = 1.418). The Durbin-Watson statistic showed that the assumption of independent residuals was met, as the value was close to 2 (Durbin-Watson = 1.96). The plot of standardized residuals compared to standardized predicted values showed no signs of funneling, which suggests that the assumption of homoscedasticity was met. Cook's Distance values were all under 1, suggesting that individual cases were not influencing the model. The P-Plot for the model suggested that the assumption of normality of the residuals may have been violated. However, there were no extreme deviations from normality. Only the most severe violations of this assumption substantially affect the validity of the statistical inferences in the PROCESS analysis (Hayes, 2022). A visualization of the results of the analyses is presented in Figure 4.

Figure 4

*The coefficients and significance of the results of the moderated mediation analyses, *** $p < .001$*



Direct effect of identity disclosure on intention to use

The results showed no significant direct effect of identity disclosure on the intention to use the chatbot, $b = 0.340$, $se = 0.196$, $p = .084$, 95% CI[-.047, 0.727]. Therefore, disclosing the identity of a chatbot did not reduce the intention to use a healthcare chatbot. Thus, the results provide no support for H1.

Effect of identity disclosure on trust and intention to use

Furthermore, the simple mediation analysis for trust showed that there was no significant effect of identity disclosure on trust, $b = 0.142$, $se = 0.172$, $t = 0.822$, $p = .412$, 95% CI[-0.199, 0.482]. Therefore, disclosing the identity of chatbot did not reduce participants' trust in the healthcare chatbot. Thus, H2 is not supported by the data. Additionally, the mediation analysis showed no significant indirect effect of identity disclosure on intention to use via trust, $b = 0.112$, $se = 0.134$, 95% CI[-0.167, 0.367].

However, trust in the chatbot showed a significant positive effect on the intention to use the healthcare chatbot, $b = 0.790$, $se = 0.096$, $t = 8.228$, $p < .001$, 95% CI[0.600, 0.979]. Thus, H3: *Disclosing a healthcare chatbot's identity reduces trust in a healthcare chatbot and therefore decreases the intention to use the chatbot compared to not disclosing a healthcare chatbot's identity*, is partially supported by the data.

Effect of identity disclosure on privacy concerns and intention to use

The simple mediation analysis for privacy showed that there was no significant effect of identity disclosure on privacy concerns, $b = -0.403$, $se = 0.250$, $t = -1.610$, $p = .110$, 95% CI[-0.897, 0.092]. Disclosing the identity of a healthcare chatbot did not increase participant's privacy concerns towards the chatbot. Therefore, H4 is not supported by the data. Moreover, the analysis showed no significant indirect effect of identity disclosure on intention to use the chatbot via privacy concerns, $b = 0.165$, $se = 0.107$, 95% CI[-0.036, 0.386]. However, privacy concerns showed a significant negative effect on the intention to use the healthcare chatbot, $b = -0.410$, $se = 0.072$, $t = -5.693$, $p < .001$, 95% CI[-0.553, -0.268]. Therefore, H5: *Disclosing a healthcare chatbot's identity increases privacy concerns towards a healthcare chatbot and therefore decreases the intention to use the chatbot compared to not disclosing a healthcare chatbot's identity*, is partially supported by the data.

Moderation effects of branding

Overall, the moderated mediation analysis showed no significant moderating effect of branding in the relationship between identity disclosure and trust, *moderation index* = 0.104, $se = 0.212$, 95% CI[-0.310, 0.538]. Therefore, H6 is not supported by the data. There was also no significant moderating effect of branding in the relationship between identity disclosure and privacy concerns, *moderation index* = -0.237, $se = 0.154$, 95% CI[-0.599, 0.007].

Therefore, H7 is not supported by the data.

Effects of covariates

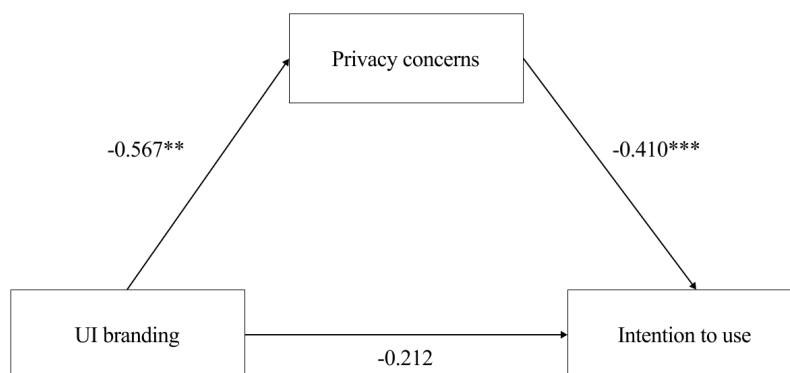
The participants' prior experience with chatbots and their negative attitudes towards chatbots were added to the moderated mediation analysis as covariates. The participants' prior experience with chatbots had no significant influence on trust ($b = -0.188$, $se = 0.104$, $t = -1.807$, $p = .073$), privacy concerns ($b = 0.012$, $se = 0.142$, $t = -0.082$, $p = .935$) and intention to use ($b = -0.231$, $se = 0.127$, $t = -1.816$, $p = .071$). Participants' negative attitudes towards chatbots showed a significant negative effect on trust ($b = -0.361$, $se = 0.100$, $t = -3.603$, $p < .001$) and a significant positive effect on privacy concerns ($b = 0.693$, $se = 0.136$, $t = 5.09$, $p < .001$). This means that participants' negative attitudes towards chatbots influenced their trust in the healthcare chatbot and their privacy concerns towards the healthcare chatbot, such that negative attitudes led to less trust and more privacy concerns. However, no significant effect of the negative attitudes towards chatbots was found on the intention to use the healthcare chatbot ($b = -0.075$, $se = 0.131$, $t = -0.576$, $p = .566$).

Explorative analysis

The mean scores for privacy concerns in the branding conditions indicated that there could be a main effect of branding on privacy concerns, and potentially the intention to use a healthcare chatbot. Therefore, another simple mediation analysis was conducted with branding as independent variable, privacy concerns as mediator and the intention to use the healthcare chatbot as dependent variable. The results of this analysis are visualized in Figure 5.

Figure 5

The coefficients and significance of the results of explorative mediation analysis, *** $p < .001$, ** $p < .05$.



The analysis showed that there was a significant negative effect of branding on privacy concerns, $b = -0.567$, $se = 0.248$, $t = -2.286$, $p = .024$, 95% CI[-1.057, -0.077]. Thus, participants had less privacy concerns towards a healthcare chatbot that had a branded user interface compared to a healthcare chatbot that did not have a branded user interface. Moreover, the analysis showed a significant indirect effect of UI branding on the intention to use the healthcare chatbot via privacy concerns, $b = 0.230$, $se = 0.116$, 95% CI[0.027, 0.478]. This indicates that branding the user interface of a healthcare chatbot decreases privacy concerns, leading to a higher intention to use a healthcare chatbot. The analysis showed no significant direct effect of branding on the intention to use the healthcare chatbot, $b = 0.212$, $se = 0.229$, $t = 0.927$, $p = .356$, 95% CI[-0.240, 0.664].

To explore the influence of the participants' different perceptions of the healthcare chatbot (i.e., as human or as chatbot) in the condition without identity disclosure, three independent t-tests were conducted. In these tests, the mean scores for trust, privacy concerns and the intention to use the healthcare chatbot of the participants who assumed that the conversational partner was a chatbot were compared to the means scores of the participants

who believed that the conversational partner was human. 10 participants who did not remember the identity of the conversational partner were removed from this dataset. The results of the first t-test showed that the participants who assumed that the conversational partner in the condition without identity disclosure was a chatbot had less trust ($M = 4.70$, $SD = 1.19$) compared to the participants who believed it was a human ($M = 5.35$, $SD = .93$). This difference was significant ($Mdif = 0.65$, $t(68) = 2.26$, $p = .013$) and had a medium-sized effect, $d = 0.61$. The results of the second t-test showed that the mean scores for privacy concerns were higher for the participants who assumed that the conversational partner was a chatbot ($M = 4.09$, $SD = 1.66$) compared to the mean scores of the participants who believed that the conversational partner was human ($M = 3.66$, $SD = 1.69$). However, this difference was not significant, $Mdif = -0.43$, $t(68) = -1.00$, $p = .160$). The results of the third t-test showed that the mean scores for participants' intention to use the chatbot were lower for the participants who assumed that the conversational partner was a chatbot ($M = 3.85$, $SD = 1.67$) compared to the mean scores of the participants who believed that the conversational partner was human ($M = 4.48$, $SD = 1.45$). However, this difference was not significant, $Mdif = 0.63$, $t(68) = 1.52$, $p = .066$. These results indicate that the different perception of the chatbot in the scenario without identity disclosure influenced participants' trust in the chatbot and potentially their intention to use the chatbot.

Summary

A summary of the results regarding the hypotheses of the study is presented in Table 2.

Table 2

Results of hypotheses testing

Hypotheses	Path	Coefficient	<i>p</i> -value/CI	Supported
H1	DIS → ITO	.340	.084	No

H2	DIS → TRU	.142	.412	No
H3	DIS → TRU → ITO	.112	[-0.167, 0.367]	Partially
H4	DIS → PC	-.403	.110	No
H5	DIS → PC → ITO	.165	[-0.036, 0.386]	Partially
H6	BRA moderates: DIS → TRU	.104	[-0.310, 0.538]	No
H7	BRA moderates: DIS → PC	-.237	[-0.599, 0.007]	No

Categorical analyses of open questions

Information sharing

63.9% of the participants indicated that they would share all their medical information with the conversational partner that was presented in the screenshots. The reasons why they would share their medical information are presented in Table 3. Five categories were identified from the answers. The category that was mentioned most often ($N = 36$) is that participants would share their medical information because it would be beneficial to themselves (“So they can help me as best as they can.”). This category was mentioned more often in the conditions with branding ($N = 21$) compared to the conditions without branding ($N = 15$). Moreover, some participants ($N = 27$) would share their medical information because they thought it was necessary for their treatment (“Surely the idea is to share your information so they have an overview.”). Trust was also mentioned as a reason to share medical information ($N = 15$) (“I trust that the hospital will keep my information confidential.”). Additionally, a few participants ($N = 9$) mentioned that they would share their medical information because they have nothing to hide (“I have no medical secrets.”). Lastly, convenience was mentioned as a reason to share medical information ($N = 9$) (“Because it is an easy, and effective way to communicate. And so you can clearly pass on the correct data yourself.”).

36.1% of the participants indicated that they would not share all their medical information with the conversational partner that was presented in the screenshots. The reasons why the participants would not share their medical information are also presented in Table 3. Most of the participants ($N = 10$) mentioned that they would not share their medical information, because they would prefer interacting with a real person or face-to-face (FtF) (“I would rather talk to a person about this in real life than through an app.”). Furthermore, some participants ($N = 8$) mentioned that they would not share their medical information because of privacy concerns (“I have the feeling that this could be hacked.”). Moreover, a few participants ($N = 3$) would not share their medical information because they were uncertain about who the conversational partner was (“Confidential information requires validation of the conversational partner and I have seen none of that.”). Lastly, a few participants ($N = 2$) would not share their medical information because they had no trust (“It doesn't feel reliable because it's on the phone.”).

Table 3

Participants' reason to share or not to share their medical information and the frequency per experimental condition

Reasons to share medical information	Without disclosure	With disclosure	Without branding	With Branding	Total
Beneficial to myself	18	18	15	21	36
Necessary for treatment	11	16	16	11	27
Trust	3	12	5	10	15
No secrets	4	5	3	6	9
Convenience	4	5	3	6	9

Reasons not to share medical information	Without disclosure	With disclosure	Without branding	With branding	Total
Preference for a real person/FtF	6	4	7	3	10
Privacy concerns	4	4	5	3	8
Uncertainty about conversational partner	2	1	2	1	3
No trust	0	2	1	1	2

The information that the participants would not share is presented in Table 4. Most participants ($N=17$) mentioned that they would not share personal information (“BSN, date of birth, address and financial information.”) or any medical information ($N=16$). This was especially the case for the participants in the condition without identity disclosure. Moreover, some participants ($N=6$) mentioned information about specific diseases (e.g., information about medication for mental disorders, hormonal medication and medication for STDs). Lastly, a few participants ($N=3$) mentioned that they would not share details of their medication usage (e.g., the frequency of use and the time of use) and irrelevant information ($N=1$).

Table 4

The information that participants would not share with the chatbot and the frequency per experimental condition

Reasons to share medical information	Without disclosure	With disclosure	Without branding	With Branding	Total
Personal information	11	6	11	6	17

Any medical information	13	3	11	5	16
Specific diseases	3	3	4	2	6
Details of medication (use)	3	0	2	1	3
Irrelevant information	0	1	1	0	1

Reasons to use and not to use the chatbot for medication reconciliation

The reasons that the participants mentioned to use the chatbot for medication reconciliation are presented in Table 5. Convenience was mentioned most often by the participants ($N = 61$) as a reason to use the chatbot for medication reconciliation (“It is easy and fast.”). Moreover, participants ($N = 22$) mentioned that they would use the chatbot because it would be beneficial to themselves to receive better care (“So that all agencies are informed. Information is quite often missing. You hear and see that things often go wrong.”). This category was again mentioned more often by the participants in the conditions with branding ($N = 14$) compared to the conditions without branding ($N = 8$). Participants ($N = 19$) also mentioned having no alternative or usage being obligated as a reason to use the chatbot (“If I really have to then I will use it.”). Furthermore, participants ($N = 14$) mentioned that they would use the chatbot because they think it would be necessary for their treatment (“Because it can be part of monitoring my medication use.”). Lastly, a few participants ($N = 3$) in the condition with disclosure and with branding mentioned trust as a reason to use the chatbot (“It seems safe enough for me to share my medication usage.”).

The reasons that were mentioned by the participants to refrain from using the chatbot for medication reconciliation are presented in Table 5. Privacy concerns were mentioned most often by the participants ($N = 46$) to not use the chatbot for medication reconciliation (“Fear

of privacy violations by hackers and similar information leaks.”). Remarkably, this reason was mentioned more often by the participants in the conditions without identity disclosure ($N = 27$) compared to the conditions with identity disclosure ($N = 19$). The impersonal nature of the chatbot was another reason not to use the chatbot according to participants ($N = 36$) (“Being hospitalized is pretty intense. I would be more comfortable talking to someone in person.”). This reason was mentioned more often by the participants in the conditions without branding ($N = 22$) compared to the participants in the conditions with branding ($N = 14$). Moreover, participants ($N = 21$) mentioned inconvenience as a reason (“I have quite a few medications that I use and this chat conversation would be very inefficient and irritating because of the constant repetitive questions.”). Some participants ($N = 20$) mentioned that they had no reason not to use the chatbot. Participants ($N = 18$) also mentioned the storage of personal data as a reason not to use the chatbot (“The amount of data that is being stored about me.”). In addition, fear of making mistakes both by the conversational partner and the user were mentioned as a reason not to use the chatbot ($N = 12$) (“Data could be processed incorrectly in systems.”). A few participants ($N = 9$) mentioned having no trust as a reason (“I don't know how reliable it is to share this online.”). Lastly, a few participants ($N = 8$) mentioned that uncertainty about the conversational partner would refrain them from using the chatbot (“It is not clear, that I am actually dealing with a chat or employee of the hospital.”). This reason was only mentioned by the participants in the conditions without branding.

Table 5

Participants’ reasons to use and not to use the chatbot for medication verification per experimental condition

Reasons to use the chatbot	Without disclosure	With disclosure	Without branding	With Branding	Total

Convenience	33	28	32	29	61
Beneficial to myself	12	10	8	14	22
No alternative/obligatory	6	13	11	8	19
Necessary for treatment	9	5	10	4	14
Trust	0	3	0	3	3
Reasons not to use the chatbot	Without disclosure	With disclosure	Without branding	With branding	Total
Privacy concerns	27	19	23	23	46
Impersonal	18	18	22	14	36
Inconvenience	8	13	12	9	21
No reasons	10	10	6	14	20
Personal data storage	8	10	7	11	18
Fear of mistakes	6	6	7	5	12
No trust	2	7	3	6	9
Uncertainty about conversational partner	5	3	8	0	8

Discussion

The purpose of this study was to provide new insights into the behavioral intention of users to use a healthcare chatbot when this chatbot discloses its identity. Furthermore, this study aimed to gain further insight into how such a healthcare chatbot could be best designed. This was examined using an experiment that consisted of a survey with screenshots of a

medication reconciliation conversation in which the chatbot either did or did not disclose its identity, in a user interface that was or was not branded.

The effects of identity disclosure

Based on previous research, it was expected that identity disclosure would lead to a lower intention to use a healthcare chatbot compared to not disclosing the chatbot's identity, because identity disclosure would lead to less trust and more privacy concerns among users (Mozafari et al. 2021a; Ischen et al., 2020; Dhagarra et al., 2020). The results of the current study showed that identity disclosure did not reduce the intention to use a healthcare chatbot. Therefore, H1 was not supported. This result is not in line with the expectation based on previous studies that found several negative user reactions to an identity disclosing chatbot compared to a chatbot that does not disclose its identity (Luo et al., 2019; Murgia et al., 2016; Hendriks et al., 2020). This finding can be caused by the majority of the participants in this study assuming that the conversational partner in the scenario without identity disclosure was a chatbot, even though this was not mentioned. It is likely that the conversational partner was perceived as a chatbot without identity disclosure, because of the computerlike, task-driven language that was used in the medication reconciliation conversation. Computerlike language is a cue that is attributed to chatbots (Araujo, 2018). On top of that, 93.0% of the participants had experience with chatbots. Therefore, they could associate the computerlike language use in the conversation with a chatbot. Remarkably, the perceived humanlikeness of the chatbot was still significantly higher for the experimental conditions without identity disclosure compared to the conditions with identity disclosure. Thus, even though the conversational partner was perceived as a chatbot in both of the conditions, participants perceived the chatbot without identity disclosure to be more humanlike than the chatbot with identity disclosure. This can be explained by the phenomenon called mindful anthropomorphism, which refers to mindfully attributing anthropomorphic qualities to computers (Araujo, 2018). Mindful

anthropomorphism can be triggered by anthropomorphic design cues, such as the human name 'Iris' which was used in the study (Araujo, 2018). This would also suggest that identity disclosure can prevent mindful anthropomorphism.

Moreover, the results of the current study showed that identity disclosure did not reduce users' trust in a healthcare chatbot. Consequently, H2 was not supported. This result is not in line with the study by Mozafari et al. (2021a) in which users had significantly lower trust in an identity disclosing e-commerce chatbot compared to when this chatbot did not disclose its identity. In contrast to the current study, the participants in the study by Mozafari et al. (2021a) assumed that the chatbot was a human when there was no identity disclosure provided in the scenario. The participants in the study by Mozafari et al. (2021a) probably assumed that the conversational partner in the scenario without a disclosure was human, because the conversational style was less computerlike compared to the conversation in the current study. The conversational partner in the scenario by Mozafari et al. (2021a) for instance used less task-driven utterances such as "nice to meet you". An explorative analysis showed that participants who assumed that the conversational partner was a chatbot in the conversation without identity disclosure had less trust in the chatbot compared to the participants who believed it was a human. Therefore, the difference in results compared to the study by Mozafari et al. (2021a) can be attributed to the different perception of the chatbot that did not disclose its identity. Another factor that could explain the difference in results is the relatively low score of the participants on the adjusted Negative Attitudes Towards Robots scale (NARS). According to Mozafari et al. (2021a), the negative effect of identity disclosure on trust is caused by people's aversion towards algorithms. However, considering the NARS score, the participants in the current study might not have this aversion towards algorithms. Thus, in the current study, identity disclosure might have had no negative effect on trust, because the participants had no such aversion towards algorithms or chatbots.

Additionally, the results of the current study showed that identity disclosure did not increase users' privacy concerns towards a healthcare chatbot. Therefore H4 was not supported. This result is not in line with the study by Ischen et al. (2020) who showed that a computerlike chatbot leads to lower anthropomorphism, leading to more privacy concerns. In the current study, the identity disclosure resulted in lower anthropomorphism, as the chatbot that disclosed its identity was perceived as less humanlike compared to the chatbot that did not mention its identity. Nevertheless, the reduced humanlikeness caused by the disclosure did not lead to more privacy concerns as in the study by Ischen et al. (2020). Remarkably, the results indicate the opposite effect; privacy concerns were higher for the chatbot that did not disclose its identity compared to the chatbot that did disclose its identity. Privacy concerns were also mentioned more often in the open questions as a reason not to use the healthcare chatbot by participants that saw the conversation without identity disclosure. This suggests that there was another reason than identity disclosure that caused privacy concerns among these participants. The participants that did not receive an identity disclosure might have experienced the chatbot as creepy. In their research into the drivers of privacy concerns when interacting with e-commerce chatbots, Bouhia et al. (2022) found that creepiness is a key antecedent of privacy concerns towards chatbots. Creepiness is caused by ambiguity during interactions with chatbots (Bouhia et al., 2022). In the current study, the lack of an identity disclosure in combination with the computerlike language in the conversation could have led to ambiguity regarding the identity of the chatbot. This ambiguity was noticeable in participants' answers to the open questions (e.g., "I would not share very personal information because I don't know exactly who or what I'm talking to", "I want to be sure I'm not dealing with a chatbot"). Subsequently, this ambiguity could have induced privacy concerns towards the healthcare chatbot that did not disclose its identity (Bouhia et al., 2022). Another reason for the different results compared to the study by Ischen et al. (2020) could be the

participants' prior experience with chatbots. According to Ischen et al. (2020), users have privacy concerns towards chatbots, because interacting with chatbots is a new phenomenon and consequently users are more aware of chatbots' requests for personal information. However, in the current study, the majority of the participants had prior experience with chatbots. Therefore, the identity disclosure might have had no influence on the participants' privacy concerns, as interacting with chatbots is possibly no new phenomenon anymore.

The effects of branding

Based on the cues-filtered-out perspective on CMC by Walther (1992), the study by Nordheim et al. (2019), Laumer et al. (2019) and categorization theory (Aaker & Keller, 1990), it was expected that branding the user interface of a healthcare chatbot would mitigate the negative effect of identity disclosure on trust and privacy concerns. However, the results showed no moderating effect of UI branding on the relationship between identity disclosure and trust, and privacy concerns. Therefore, H6 and H7 were not supported. The mean scores for trust were as expected higher for the branded user interface than for the non-branded user interface, but this difference was not significant. Similarly, the mean scores for privacy concerns were lower for the branded user interface than for the non-branded user interface. These differences might not be significant because the branding was only noticed by 50% of the participants. This could indicate that the branding in the user interface was too subtle to have a significant moderating effect. Moreover, participants might not have noticed the brand because they were not familiar with the Elisabeth-Tweesteden hospital.

An additional explorative analysis showed that branding the user interface of a healthcare chatbot led to less privacy concerns, compared to a non-branded user interface, leading to a higher intention to use a healthcare chatbot. This direct effect of branding on privacy concerns can be explained by trust in the provider. Laumer et al. (2019) who researched factors that explain the adoption of healthcare chatbots found that users' trust in

the provider of the chatbot determines their privacy risk expectancies. The participants in the current study had relatively high trust in the hospital. Adding a brand to the user interface of a healthcare chatbot can remind users of the provider of the chatbot. Subsequently, if users trust this provider, they have less privacy concerns towards the chatbot (Laumer et al., 2019).

The effects of trust and privacy concerns on intention to use

Based on the augmented Technology Acceptance Model (TAM) by Dhagarra et al. (2020) it was expected that trust and privacy concerns would mediate the relationship between identity disclosure and the intention to use a healthcare chatbot. The results of the current study showed no significant mediating effects of trust and privacy concerns. These results can again be explained by the majority of the participants in the condition without identity disclosure assuming that the conversational partner in the scenario was a chatbot, while this was not mentioned.

Nevertheless, the results showed that both trust and privacy concerns significantly influenced the intention to use a healthcare chatbot. Therefore, H3 and H5 were partially supported. These results are in line with the study by Dhagarra et al. (2020) in which was found that trust and privacy concerns are important factors that determine the intention to use a healthcare system that stores medical information. Thus, the results of the current study suggest that the augmented TAM by Dhagarra et al. (2020) also holds for healthcare chatbots, meaning that trust and privacy concerns are factors that explain users' intention to use healthcare chatbots.

Limitations and suggestions for future research

The sample of this study can be seen as a limitation, because the participants in this study were relatively young. Consequently, the majority of the participants did probably not have experience with medication reconciliation conversations or medication usage in general. This reduces the ecological validity of the study, as the average age of users of a healthcare

chatbot for medication reconciliation would be higher in practice. The average age of the participants was relatively young because of the convenience sampling method that was used for this study, to get a large sample size within a limited timeframe. The intention to use a healthcare chatbot that discloses its identity could differ for elderly, because recent research found that humanlikeness makes it easier for them to become familiar with and use chatbots (Cheng et al., 2023). The current study showed that identity disclosure reduces humanlikeness. Therefore, in future research, researchers should focus on an older sample to increase the ecological validity of the study.

Another limitation of this study is the unsuccessful manipulation of branding in the user interface, as only half of the participants noticed the hospital brand. As mentioned before, participants might not have noticed the brand because it was too subtle or because they were not familiar with the Elisabeth Tweesteden hospital. This reduces the internal validity of the study. In the current study, people that did not know the hospital brand prior to participating were recruited to have a large sample size. However, in future research, researchers should try to only recruit people that are familiar with a certain brand and have existing brand affect. Moreover, in future research, the user interface of a chatbot could be branded differently, by for example adding a branded avatar besides the logo and brand colors. An avatar is an extra social cue that can help to shape the perception of a chatbot and possibly increase trust or reduce privacy concerns towards a chatbot (see, e.g., Van Hooijdonk et al., 2022; Walther, 1992, Nordheim et al., 2019; Laumer et al., 2019).

Lastly, a limitation of this study is that the identity disclosure did not lead to a different perception of the chatbot (i.e., either as a chatbot or human), because the chatbot in the conversation without disclosure was also perceived as a chatbot by the majority of the participants. This could be seen as a violation of the internal validity of the study, as in contrast to previous research, the disclosure did not lead to a different perception of the

chatbot. As mentioned before, the unsuccessful manipulation of identity disclosure is likely to be caused by the computerlike language of the medication reconciliation conversation. The script of the conversation was based on a real script used by the Elisabeth-Tweesteden hospital for medication reconciliation and was therefore ecologically valid. Therefore, this study provided valuable insights on identity disclosure, as identity disclosure might not have a negative effect on the intention to use a healthcare chatbot when computerlike language is used. In future research, the influence of identity disclosure should be researched for chatbots that operate in other healthcare domains, such as mental healthcare, in which usually a more humanlike conversational style is used.

Practical implications

This study has shown that healthcare chatbots can still be used as an assistive technology to reduce the work of healthcare workers when identity disclosure becomes obligatory in the future. This holds for a healthcare chatbot for medication reconciliation conversations and procedures with similar task-driven scripts. A healthcare chatbot for medication reconciliation is seen as a convenient alternative for medication reconciliation conversations in person. Based on this study, the intention to use healthcare chatbots could be increased by making it more personal and user-friendly. Additionally, it could be beneficial to provide users with information about how their personal data is stored and how the chatbot operates. On top of that, changing users' negative attitudes towards chatbots could increase their trust in and privacy concerns towards healthcare chatbots. Furthermore, this study showed that increasing users' trust towards a healthcare chatbot and reducing their privacy concerns will lead to a higher intention to use the chatbot. According to the results of this study, the latter could be done by branding the user interface of a healthcare chatbot with a trusted hospital brand.

Conclusion

The research questions of this study were: *To what extent does identity disclosure of a healthcare chatbot influence users' trust in the chatbot, their privacy concerns and, subsequent, their intention to use the chatbot?* and: *To what extent can branding the user interface of a healthcare chatbot mitigate the expected negative effects of identity disclosure?*

The results showed that identity disclosure did not influence users' trust, privacy concerns and, subsequent, their intention to use a healthcare chatbot. Moreover, UI branding did not significantly mitigate the effects of identity disclosure on users' trust in the chatbot and their privacy concerns towards the chatbot. However, trust and privacy concerns showed to influence the intention to use a healthcare chatbot. Additionally, branding the user interface showed to reduce users' privacy concerns towards a healthcare chatbot and subsequently increase their intention to use a healthcare chatbot. Overall, this study showed that the obligation to disclose a chatbot's identity does not seem to be an obstacle for users to use a healthcare chatbot for medication reconciliation. Moreover, a healthcare chatbot is seen as a convenient alternative for medication reconciliation conversations with patients in person. Therefore, identity disclosing chatbots can be applied in the healthcare domain to have task-driven conversations with patients to eventually reduce the workload of healthcare workers.

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Appendix A

Chatbot script

	<i>Dutch script</i>	<i>English translation</i>
Chatbot	<i>Met disclosure:</i> Hallo, mijn naam is Iris. Ik ben een geautomatiseerde medicatieverificatie chatbot.	<i>With disclosure:</i> Hello, my name is Iris. I'm an automated chatbot for medication reconciliation.
	<i>Zonder disclosure:</i> Hallo, mijn naam is Iris.	<i>Without disclosure:</i> Hello, my name is iris.
	Om goede en veilige zorg te verlenen zouden we graag je medicijnen controleren.	To provide good and safe care, we would like to check your medication.
	Deze controle vindt plaats bij ieder poliklinisch bezoek, bij een opname of voor toediening van een medicijn op de dagbehandeling.	This check takes place at each outpatient visit, on admission, or before administration of a medication in the day care unit.
	Dit wordt medicatieverificatie genoemd.	This is called medication reconciliation.
	Ik heb daarvoor enkele vragen voor je.	I have some questions for you for that.
Patiënt	Oké	Okay
Chatbot	Wat is je naam?	What is your name?
Patiënt	Emma van Dijk	Emma van Dijk
Chatbot	Gebruik je medicijnen?	Do you use medication?
Patiënt	Ja	Yes
Chatbot	Wat voor medicijn gebruik je?	What medication do you use?

Patiënt	Amitriptyline antidepressiva	Amitriptyline antidepressiva
Chatbot	Hoe neem je het medicijn?	How do you take your medication?
Patiënt	Via de mond	Through the mouth
Chatbot	Wat is de sterkte van het medicijn dat je gebruikt?	What is the strength of the medication you are taking?
Patiënt	25 mg	25 mg
Chatbot	Hoe vaak gebruik je het medicijn?	How often do you use the medication?
Patiënt	3 keer per dag	3 times a day
Chatbot	Hoeveel van het medicijn gebruik je per keer?	How much of the medication do you use at a time?
Patiënt	1 tablet	1 tablet
Chatbot	Hoe laat neem je het medicijn?	At what time do you take the medication?
Patiënt	9.00, 15.00 en 21.00	9.00, 15.00 and 21.00
Chatbot	Hoe lang gebruik je het medicijn al ongeveer?	How long have you been using the medication approximately?
Patiënt	5 maanden	5 months
Chatbot	Gebruik je het medicijn tijdelijk?	Do you use the medication temporarily?
Patiënt	Ja	Yes
Chatbot	Heb je nog opmerkingen of extra informatie?	Do you have any comments or additional information?
Patiënt	Nee	No
Chatbot	Gebruik je nog andere medicijnen?	Do you use any other medication?
Patiënt	Nee	No

Chatbot	Oké, bedankt voor je antwoorden.	Okay, thank you for your responses.
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Appendix B

Scale items used in the study

Variable	Original items and their source	Items used in the study	Dutch translation of items used in the study	
Trust	I experience this chatbot as trustworthy (Nordheim et al., 2019)	I experience this conversational partner as trustworthy	Ik ervaar deze gesprekspartner als betrouwbaar	
	I do not think this chatbot will act in a way that is disadvantageous for me (Nordheim et al., 2019)	I do not think this conversational partner will act in a way that is disadvantageous for me	Ik denk niet dat deze gesprekspartner zich op een voor mij nadelige manier zal gedragen	
	I'm suspicious of this chatbot (Nordheim et al., 2019)	I'm suspicious of this conversational partner	Ik wantrouw deze gesprekspartner	
	The chatbot appears deceptive (Nordheim et al. 2019)	The conversational partner appears deceptive	De gesprekspartner lijkt misleidend	
	I trust this chatbot (Norheim et al., 2019)	I trust this conversational partner	Ik vertrouw deze gesprekspartner	
	Privacy concerns	It bothers me that this chatbot asks me for this	It would bother me that this conversational partner asks me for this	Het zou me storen dat deze gesprekspartner me

	much personal information (Ischen et al., 2020)	much personal information	om zoveel persoonlijke informatie vraagt
	I am concerned that this chatbot is collecting too much personal information about me (Ischen et al., 2020)	I would be concerned that this conversational partner is collecting too much personal information about me	Ik zou me zorgen maken dat deze gesprekspartner te veel persoonlijke informatie over mij verzamelt
	I am concerned that unauthorized people may access my personal information (Ischen et al., 2020)	I would be concerned that unauthorized people may access my personal information	Ik maak me zorgen dat onbevoegden toegang krijgen tot mijn persoonlijke informatie
	I am concerned about submitting information to this chatbot (Ischen et al., 2020)	I would be concerned about submitting information to this conversational partner	Ik zou me zorgen maken over het verstrekken van informatie aan deze gesprekspartner
Behavioral intention	I intend to use this healthcare service in the future (Dhagarra et al., 2020)	I intend to interact with this conversational partner for medication reconciliation in the future	Ik heb de intentie om in de toekomst met deze gesprekspartner te praten voor medicatieverificatie

	I plan to use this healthcare service (Dhagarra et al., 2020)	I plan to interact with this conversational partner for medication reconciliation	Ik ben van plan met deze gesprekspartner te praten voor medicatieverificatie
	I expect to use this healthcare service in the future (Dhagarra et al., 2020)	I expect to interact with this conversational partner for medication reconciliation in the future	Ik verwacht in de toekomst met deze gesprekspartner te praten voor medicatieverificatie
Human-likeness	The chatbot is natural (Nordheim et al., 2019)	The conversational partner is natural	De gesprekspartner leek natuurlijk
	The chatbot is humanlike (Nordheim et al., 2019)	The conversational partner is humanlike	De gesprekspartner leek menselijk
	The chatbot is realistic (Nordheim et al., 2019)	The conversational partner is realistic	De gesprekspartner leek echt
	The chatbot is present (Nordheim et al., 2019)	The conversational partner is present	De gesprekspartner leek aanwezig
	The chatbot is authentic (Nordheim et al., 2019)	The conversational partner is authentic	De gesprekspartner leek authentiek
Brand trust	I am confident in [brand's] ability to perform well (Koschate-Fischer & Gärtner, 2015)	I am confident in the Elisabeth-TweeSteden hospital to perform well	Ik heb er vertrouwen in dat het Elisabeth-TweeSteden ziekenhuis goed presteert

	I trust [brand] (Koschate-Fischer & Gärtner, 2015)	I trust the Elisabeth-TweeSteden hospital	Ik heb vertrouwen in het Elisabeth-TweeSteden ziekenhuis
	I rely on [brand] (Koschate-Fischer & Gärtner, 2015)	I rely on the Elisabeth-TweeSteden hospital	Ik vertrouw op het Elisabeth-TweeSteden ziekenhuis
	[Brand] is safe (Koschate-Fischer & Gärtner, 2015)	The Elisabeth-TweeSteden hospital is safe	Het Elisabeth-TweeSteden ziekenhuis is veilig
	I expect [brand] to deliver on its promise (Koschate-Fischer & Gärtner, 2015)	I expect the Elisabeth-TweeSteden hospital to deliver on its promise	Ik verwacht dat het Elisabeth-TweeSteden ziekenhuis haar belofte nakomt
Negative attitudes towards chatbots	I would feel uneasy if robots really had emotions (Syrdal et al., 2009)	I would feel uneasy if chatbots really had emotions	Ik zou me ongemakkelijk voelen als chatbots echt emoties hadden
	Something bad might happen if robots developed into living beings (Syrdal et al., 2009)	<i>Removed</i>	

I would feel relaxed talking with robots (Syrdal et al., 2009)	I would feel relaxed talking with chatbots	Ik zou me ontspannen voelen als ik met chatbots zou praten
I would feel uneasy if I was given a job where I had to use robots (Syrdal et al., 2009)	I would feel uneasy if I was given a job where I had to use chatbots	Ik zou me ongemakkelijk voelen als ik een baan kreeg waarbij ik chatbots moest gebruiken
If robots had emotions, I would be able to make friends with them (Syrdal et al., 2009)	If chatbots had emotions I would be able to make friends with them	Als chatbots emoties hadden, zou ik vrienden met ze kunnen worden
I feel comforted being with robots that have emotions (Syrdal et al., 2009)	I feel comforted being with chatbots that have emotions	Ik voel me op mijn gemak bij chatbots die emoties hebben.
The word “robot” means nothing to me (Syrdal et al., 2009)	The word “chatbot” means nothing to me	Het woord "chatbot" zegt me niets
I would feel nervous operating a robot in front of other people (Syrdal et al., 2009)	I would feel nervous interacting with a chatbot in front of other people	Ik zou me nerveus voelen om met een chatbot om te gaan

		in het bijzijn van andere mensen
I would hate the idea that robots or artificial intelligences were making judgements about things (Syrdal et al., 2009)	I would hate the idea that chatbots or artificial intelligences were making judgements about things	Het idee dat chatbots of kunstmatige intelligenties over dingen oordelen zou ik haten.
I would feel very nervous just standing in front of a robot (Syrdal et al., 2009)	<i>Removed</i>	
I feel that if I depend on robots too much, something bad might happen (Syrdal et al., 2009)	I feel that if I depend on chatbots too much, something bad might happen	Ik heb het gevoel dat er iets ergs kan gebeuren als ik te afhankelijk ben van chatbots
I would feel paranoid talking with a robot (Syrdal et al., 2009)	I would feel paranoid talking with a chatbot	Ik zou me paranoïde voelen als ik met een chatbot zou praten
I am concerned that robots would be a bad influence on children (Syrdal et al., 2009)	I am concerned that chatbots would be a bad influence on children	Ik ben bang dat chatbots een slechte invloed hebben op kinderen.

I feel that in the future	I feel that in the future	Ik denk dat de
society will be dominated	society will be	maatschappij in de
by robots (Syrdal et al.,	dominated by chatbots	toekomst
2009)		gedomineerd zal
		worden door
		chatbots.

Appendix C

Information on medication reconciliation

English: Medication reconciliation is the process of determining the actual medication that patients are using, in order to have an up-to-date and truthful medication overview. This can prevent medical errors during a hospital stay. Medication reconciliation involves comparing pharmacy records with patient information. Medication reconciliation therefore requires pharmacists or nurses to have structural conversations with patients who are admitted to the hospital. In these conversations patients have to provide information on their medications. We are currently exploring how this can be done online.

Dutch: Medicatieverificatie is het proces waarbij vastgesteld wordt welke medicatie patiënten gebruiken, om een actueel en accuraat medicatieoverzicht te hebben. Zo kunnen medische fouten bij een ziekenhuisopname voorkomen worden. Bij medicatieverificatie worden de gegevens van de apotheek vergeleken met informatie van de patiënten. Medicatieverificatie vereist daarom dat apothekers of verpleegkundigen structurele gesprekken voeren met patiënten die worden opgenomen in het ziekenhuis. In deze gesprekken moeten patiënten informatie geven over hun medicatiegebruik. Wij onderzoeken momenteel hoe dit online kan plaatsvinden.

Information on the Elisabeth-TweeSteden hospital

English: The Elisabeth-TweeSteden-TweeSteden Hospital, also known as ETZ, is a regional, top clinical teaching hospital and trauma center in the Central Brabant region. The hospital has three locations in Tilburg and Waalwijk, making it the hospital for all residents of this region.

Dutch: Het Elisabeth-TweeSteden-TweeSteden Ziekenhuis, ook wel bekend als het ETZ, is een regionaal, topklinisch opleidingsziekenhuis en traumacentrum in de regio Midden-Brabant. Het ziekenhuis heeft drie locaties in Tilburg en Waalwijk en is daarmee het ziekenhuis voor alle inwoners van deze regio.

Debriefing

English: Thank you for your participation in the survey. This study contributes to the We Care research program. We Care is a collaboration between the Elisabeth-TweeSteden hospital and Tilburg University that aims to improve patient care using research results. Part of the program is the development and evaluation of a digital assistant that supports patients in monitoring and replenishing their medication use. The specific goal of this thesis is to investigate whether identity disclosure of a chatbot affects trust in the chatbot, users' privacy concerns and users' intentions to use the chatbot. In addition, it was investigated whether adding a brand to the chatbot's design plays a role in this regard.

Dutch: Bedankt voor je deelname aan het onderzoek. Dit onderzoek draagt bij aan het We Care onderzoeksprogramma. We Care is een samenwerking tussen het Elisabeth-TweeSteden ziekenhuis en Tilburg University dat het doel heeft om de patiëntenzorg te verbeteren aan de hand van onderzoeksresultaten. Een onderdeel van het programma is het ontwikkelen en evalueren van een digitale assistent die patiënten ondersteunt bij het controleren en aanvullen van hun medicatiegebruik. Het specifieke doel van deze scriptie is om te onderzoeken of identiteit onthulling van een chatbot invloed heeft op het vertrouwen in de chatbot, de privacy bezorgdheid van gebruikers en de intentie van gebruikers om de chatbot te gebruiken. Daarnaast werd onderzocht of het toevoegen van een merk aan het design van de chatbot hierbij een rol speelt.

Appendix D

Normality and homogeneity

Assumption checks for the conditions of identity disclosure and branding. Normality is determined using Z-scores for Skewness and Kurtosis. Homogeneity is tested using the *Levene's Test of Equality of Error Variances*. * = assumption violated (Z-scores that are not between -1.96 and 1.96, Levene's test $p < .05$).

	Normality				Homogeneity
	Without disclosure		With disclosure		
	Skewness	Kurtosis	Skewness	Kurtosis	
Trust	-1.85	-1.04	-2.57*	-0.15	$p = .170$
Privacy concerns	-0.17	-2.40*	0.76	-1.91	$p = .410$
Intention to use	-1.10	-2.00*	2.59*	-1.18	$p = .596$
Humanlikeness	-1.03	-1.95	0.37	-1.92	$p = .573$
Brand trust	-0.78	-0.99	-2.00*	0.11	$p = .769$
NARS	0.04	-0.69	0.41	-1.20	$p = .293$

	Normality				Homogeneity
	Without branding		With branding		
	Skewness	Kurtosis	Skewness	Kurtosis	
Trust	-1.43	-1.03	-3.01*	-0.19	$p = .265$
Privacy concerns	-0.01	-2.24*	0.63	-2.27*	$p = .593$
Intention to use	-1.81	-1.73	-1.97*	-1.80	$p = .661$
Humanlikeness	0.00	-2.22*	-0.75	-1.75	$p = .802$
NARS	1.87	-0.07	-0.86	-1.72	$p = .089$