**BuddyBot {^\_^} Your Virtual Companion: An Experimental Study Exploring the Effect of Chatbot Response Type (empathic vs. neutral) on Companionship Through the Mediation of Anthropomorphism and Trust**

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**Abstract**

Chatbots provide users with emotional well-being by providing companionship. Users experiencing loneliness are more susceptible to the negative effects of replacing human relationships with chatbots. Accordingly, it is important to understand the dynamics at play when forming relationships with chatbots that utilize human-like features. The present study explored the effects of chatbot response type (empathic vs. neutral) on perceived companionship through the mediation of perceived anthropomorphism and trust. Informed by the Computer as Social Actors Paradigm and Social Penetration Theory, participants were expected to have higher perceived companionship when exposed to the chatbot with an empathic response. This relationship was expected to be explained by the positive serial mediation of perceived anthropomorphism and trust. A companionship chatbot named BuddyBot was created where participants could interact with it using pre-determined answer options. BubbyBot responded with empathic (“I’m so sorry to hear that!”) or neutral (“Got it. Input received.”) responses. The final sample included 132 participants, of whom 77.3% were females and 22.7% were males (*M*age = 20.72, *SD*age = 1.66). Results revealed that chatbot response type did not have a direct relationship with perceived companionship however their relationship was positively mediated by anthropomorphism and trust. The findings are important for policymakers to ensure safe interactions with chatbots that elicit ‘human-like’ features like empathy.

*Keywords:* chatbot, companionship, empathy, anthropomorphism, trust

**Introduction**

“Social robots challenge our understanding of a communication partner” (Peter & Kühne, 2018, p. 74). Forming and maintaining relationships are essential for the well-being of humans and at the center of a social life (Skjuve et al., 2021). Technological developments are changing the notion of human-to-human relationships by replacing human communication partners with social robots. Communicating using various modalities social robots are automated to relate to humans by building meaningful relationships (Broadbent, 2017; Dautenhahn, 2007). Social robots have slowly become part of human life as pets, assistants, and companions. Replacing roles previously filled by other humans’ social robots raises questions on how well they can fill these roles and what effects they have. Chatbots are a social robot that communicates by imitating human dialogue using words or voice as output (Strohmann et al., 2022). Accessible online companionship chatbots are receiving increasing public demand. *Replika* an onlinecompanionship chatbot with 30 million users, accentuates this fact (Patel, 2024).

Face-to-face communication has long been named the golden standard for communication (Walther, 2011). The current rise of chatbots is challenging this idea by developing increasingly human-like chatbots. A relationship is built on many themes notably mutual trust and emotional support (Snir et al., 2020). Many chatbots have implemented empathic responses and gestures to increase emotional interaction between the chatbot and the user (De Gennaro et al., 2020). Human-computer relationship (HCR) formation shares similar features with how humans form relationships (Skjuve et al., 2021). Empathic responses are unique to humans and are essential when forming emotional bonds with humans (Brandtzaeg et al., 2022). Research by Kim and Hur (2023) has found that empathy increases the possibility of forming a relationship with a chatbot. Chatbots can elicit empathic responses by showing understanding of the users' emotions and this has been found to increase the mood and warmth felt by users (De Gennaro et al., 2020; Kim & Hur, 2023; Liu & Sundar, 2018). Thus, the following research question is proposed: *To what extent does companionship chatbot response type (empathic vs. neutral chatbot) affect the perceived companionship of users between ages 16 and 25?*

When users try to understand how chatbots communicate, they rely on their understanding of human behavior, as humans are the entities they are most familiar with (Broadbent, 2017). In their interaction with chatbots, humans tend to perceive chatbots as human-like which is called ‘anthropomorphism’. Although users are aware they are communicating with a chatbot and not a real person, this process occurs unconsciously (Nas & Moon, 2000). Many features such as gestures, visuals, and voice can affect the users' perceived anthropomorphism in a chatbot (Li & Suh, 2022). Perceived anthropomorphism is a key variable to understanding how human-like chatbots are perceived by users when they elicit empathic responses. Empathy can be displayed through these features by a smiling avatar or a change of tone in voice (Chin & Yi, 2021). Empathic written responses are one feature that should be researched that has not gained much attention by previous researchers despite its potential influence on users' perceived anthropomorphism. Although many researchers have adopted empathic features in their chatbots there is scarce research on how ‘human-like’ users perceive the chatbot to be (Croes & Antheunis, 2020; Liu &Sundar, 2018). Chatbots as companions is a phenomenon that is recently generating popularity in empirical research (Rapp et al., 2021). The goal of this research is to investigate the underlying processes of forming companionship with a chatbot with the use of empathic language.

Other dynamics alongside anthropomorphism are at play when forming companionships with chatbots. Trust is essential for users to self-disclose and form an emotional bond. Untransparent privacy policies cause users to refrain from sharing their personal information. Empathic responses and anthropomorphic features of chatbots are important factors when establishing trust as they help to mimic a natural conversation (Skjuve et al., 2021). Therefore, trust becomes an important mediator in research alongside perceived anthropomorphism. This study focuses on the age group 16 to 25, named young adults (Dovey-Pearce et al., 2005) due to their high usage, and rapid adaptation of chatbots (Faverio, 2022; Stöhr et al., 2024). Increased engagement and awareness of privacy issues surrounding the chatbot use of young adults make them an important demographic for exploring how trust affects forming companionship with a chatbot. To test the relationships between variables the following research question is posed: *To what extent is the relationship between chatbot response type (empathic vs. neutral) and perceived companionship mediated by perceived anthropomorphism and the level of trust users feel towards the companionship chatbot?*

As chatbots become increasingly involved in human life, it becomes key to understand their social and emotional impact on users. Companionships are essential for the eudaemonic well-being of humans and chatbots are a great tool to utilize when one is lacking companionship (Liu et al., 2022). However, chatbots are changing how relationships are shaped in the digital age. When used excessively and without proper guidance such chatbots can also be detrimental to the well-being of users. These findings are especially concerning for lonely individuals seeking to fulfill their need for companionship using technological advancements (Croes & Antheunis, 2020; Merrill et al., 2022). The excessive use of companionship chatbots can cause addiction by detaching the user from human-to-human communication (Marriott & Pitardi, 2023). A state of ‘interactive solitude’ can be present where the user is physically alone yet accompanied by virtual companions (Carlsson, 1995; Zhao, 2006). This may provide emotional support to lonely individuals but could also decrease the quality and need for human connections. Based on these findings it is key to explore how relationships with chatbots are formed. This study could provide policymakers such as the Organization for Economic Co-operation and Development (OECD) with valuable insights into the benefits and harms of forming companionships with chatbots (*Online safety and well-being*, n.d.). The OECD AI principles are focused on setting intergovernmental standards for ensuring a safe online environment while keeping human rights and well-being as leading principles (*A Europe Fit for the Digital Age*, n.d.). By understanding how trust affects the perceived companionship of users’ policymakers should implement privacy regulations accordingly to ensure safe interactions. Researchers should work with policymakers to understand and communicate how adding empathic responses could affect users' well-being.

Although, explored in various domains of research understanding the role of empathic responses in forming relationships remains underdeveloped. The existing research on how empathic chatbot responses are scattered across contexts. Kang and Kang (2023) research the effects of a counseling chatbot, Kim and Hur (2023) study the impact of empathy in a shopping context, whereas Brave et al. (2005) use empathic responses in a game of blackjack. Fragmented contexts make it hard to conceptualize the effects of a chatbot specifically designed for companionship. This paper aims to fill in this gap by designing a chatbot focused on forming companionships. In addition, this paper addresses a limitation identified in the paper by De Gennaro et al. (2020). They researched the effect of interacting with an empathic chatbot on the mood of socially excluded participants. In their design, they compared an empathic chatbot with a control group condition in which the participants interacted with an interactive questionnaire that did not acknowledge the participants’ responses. The researchers acknowledge that although not desired the only variable manipulated was not empathy but also the presence of a chatbot due to the design of the research. By employing empathy as an independent variable and comparing it directly to a chatbot that gives neutral responses this paper builds upon the suggestion of De Gennaro et al. (2020) by only isolating empathy.

**Theoretical Framework**

A fundamental component of human-to-human companionship is empathy (Brandtzaeg et al., 2022). Empathy refers to the ability to understand, feel, and reciprocate the emotions and thoughts of another person (Wieseke et al.,2012). Research indicates empathy is a prerequisite for companionship (Croes & Antheunis, 2020). While people are found to doubt the ability of computers capacity to understand or express emotion, they respond better to computers that display emotions like empathy (De Gennaro et al., 2020; Zumstein & Hundertmark, 2017). This can be explained by the Computers as Social Actors Paradigm (CASA) by Nass and Moon (2000). CASA suggests users mindlessly apply social rules to computers. When users detect social cues in computers, they treat the computer like a human. Companionship chatbots embody the cues such as words as output, interactivity, and filling of roles traditionally filled by humans that are the most important cues for users to perceive computers as ‘humanlike’ (Brandtzaeg et al., 2022). Empathic chatbots communicate in a way that shows an understanding of the user's emotional state through speech, gestures, and expressions (De Gennaro et al., 2020). Therefore, when computers elicit empathy, a quality unique to humans, they are predicted to be viewed as more ‘humanlike’.

Several studies surrounding chatbots highlight the influence empathy has on the emotional process of building companionship. Brave et al. (2005) studied the effects of the presence and absence of empathic facial expressions in a game of blackjack where users evaluated the perceived caring of the agent they played against. Findings indicate when the agent displayed empathic facial expressions it was perceived to be more caring. Similar conclusions are present in research by Liu and Sundar (2018) where empathic responses by a health advice chatbot were perceived to be more supportive than a chatbot that only elicited advice. Together with CASA, these studies help prove empathy plays a role in establishing an emotional relationship with chatbots, and humans possess the ability to understand and recognize the emotional expressions of a conversational agent (Brave et al., 2005). This paper highlights the distinct cue of empathic responses: empathic gestures and facial expressions have been studied in research before however not much attention has been given to written empathic responses in companionship chatbots (Brave et al., 2005; Kang & Kang, 2023). Building upon these conclusions similar results are expected where empathic companionship chatbot responses will increase perceived companionship:

**H1:** Users interacting with the empathic chatbot will have higher perceived companionship compared to users interacting with a neutral chatbot.

Anthropomorphism is the attribution of human characteristics to non-human entities (Nass & Moon, 2000). CASA helps to explain how humans can regard chatbots as companions when they elicit ‘human-like’ cues such as empathic responses. Lombard and Xu (2021) propose to systemize the role of cues. They identify primary and secondary cues where primary cues are more salient to humans’ perception of socialness whereas secondary cues are less salient to this perception. By creating meaningful interpretations of social cues people perceive social signals. The use of empathic language is part of the secondary cues. Empathic language elicited by a chatbot can include phrases such as “I’m sorry that this happened to you” (De Gennaro et al., 2020). By perceiving the cue of empathic response participants are expected to interpret the social signal of companionship. Some researchers in HCR argue that secondary cues like empathic language are insufficient for providing social support to users and may be more effective in particular circumstances (Cuadra et al., 2024: Lombard & Xu, 2021). Therefore, it is important to test it for the cue of empathic language and specifically for companionship chatbots. When users interpret the cue of empathic response as a social signal, they are more likely to anthropomorphize the chatbot since ‘human-like’ qualities are expected to increase perceived anthropomorphism. Based on the findings the following hypothesis is proposed:

**H2a:** Interacting with the empathic chatbot will lead to higher anthropomorphism compared to interacting with the neutral chatbot.

Both in human-to-human communication and HCR trust is critical in establishing emotional bonds. In human relationships, Social Penetration Theory (SPT) provides insight into how trust and emotional relationships are established. The theory suggests that interpersonal relationships develop through self-disclosure, the act of revealing information about yourself to another person. According to SPT an important component of building a relationship is trust (Altman & Taylor, 1973). The amount of self-disclosure relies on the level of trust. Established trust can allow people to disclose more information about themselves and is needed to form emotional bonds with people (Ridings et al., 2002). SPT can also be reflected in HCR. Establishing trust with technologies is harder for humans since how they operate can remain a ‘black box’ (Bélisle-Pipon et al., 2022; Strohmann et al., 2022). Users lack information on how these technologies operate as most are not transparent with their data and privacy (Boerman et al., 2017). This creates distrust towards technologies. Human cues such as empathy have an impact on the trust users feel towards chatbots (Strohmann et al., 2022).

In their qualitative analysis of customer service chatbots, Følstad et al. (2018) identify factors that affect users’ trust towards the chatbot, one factor they identify is: ‘human-likeness’. Participants in their study expressed they trusted chatbots with a conversational style similar to humans. When the interaction with a chatbot is similar to one with a person users are argued to trust the chatbot more. Ischen et al. (2020) found that when the chatbots were more human-like compared to machine-like participants had lower privacy concerns. The human-like chatbot had a face, and name that used conversational cues compared to the machine-like chatbot. This finding helps strengthen the effect of conversational cues on trust however, it calls attention to the extent of anthropomorphic attribution. The effectiveness of anthropomorphic cues on trust relies on which context the chatbot is used for and the specific questions it asks (Gu et al., 2024; Klein & Martinez, 2022).Qualitative findings revealed users trusted the companionship chatbot *Replika* since they could self-disclose without judgment, therefore the results by Følstad et al. (2018) and Ischen et al. (2020) are expected to be reflected in companionship chatbots (Skjuve et al., 2021). Accordingly, the following hypothesis is proposed:

**H2b:** Users with higher perceived anthropomorphism will have higher trust towards the companionship chatbot compared to users with lower perceived anthropomorphism.

Empathy is a human cue that can help increase trust. In a qualitative analysis by Skjuve et al. (2021), participants indicated they were able to be open toward *Replika* due to its empathic responses. Similar conclusions are made in an experiment where self-disclosure by the conversational agent increased the empathy users felt toward the agent (Tsumura & Yamada, 2023). Brave et al. (2005) found that agents displaying empathic emotion through expressions were trusted more. These findings indicate a relationship between empathy and trust however, both research studies do not employ a method where participants interact with a companionship chatbot. Therefore, it is important to investigate if such effects are present in HCR where building an emotional relationship is the goal. Based on all the information presented the following hypothesis is put forward:

**H2c:** Users with higher levels of trust towards the companionship chatbot will have higher perceived companionship towards the chatbot compared to users with lower levels of trust.

**H2:** Interacting with the empathic chatbot will lead to higher anthropomorphism compared to interacting with the neutral chatbot (a), users with higher anthropomorphism will have higher trust towards the companionship chatbot (b), and increased trust will positively affect perceived companionship towards the chatbot (c).

**Figure 1**

**A diagram of a flowchart

Description automatically generated***Conceptual Framework*

**Method**

**Design**

A single-factor two-group (chatbot response type: empathic vs. neutral) between-subjects online experiment was used to test the hypotheses. The design was selected to expose participants to one type of chatbot response, minimizing potential carryover effects. Hence, observed effects are only due to the difference between chatbot responses across conditions and not extraneous variables. Compared to a lab experiment the online nature of the experiment aims to eliminate socially desirable responses given by respondents (Treadwell & Davis, 2019). The experiment was conducted using the online survey application *Qualtrics*. Participants interacted with the chatbot at their desired time and place, allowing them to feel comfortable expressing their thoughts, increasing external validity (Brandtzaeg et al., 2022).

**Stimulus Material**

The manipulated independent variable is chatbot response type, participants were randomly assigned to the neutral or empathic condition. Two chatbots with the corresponding response types were created. Different coding languages (HTML, Python, JavaScript) were utilized when making the chatbot. Then Netlify a website deploying website was used to create a link for the chatbot. It is important to note that GPT-4 was used when coding the chatbot. A link to the GitHub with all materials can be found in Appendix B. The chatbot is named BuddyBot, which indicates the aim of companionship. A cartoon-like image was chosen since hyper-realistic avatars have been found to increase eeriness in users compared to cartoon-like avatars and chatbot gender has been found to affect users' behaviors (Kang & Kang, 2023; Song & Shin, 2022). A typing speed of 50 ms per character was added to create response latency, featured in many chatbots allowing for a natural flow of conversation (Dennis & Taylor, 2005; Lew & Walther, 2022).

After introducing itself BuddyBot asks questions to the user which they can answer with the provided answer options. The chatbot's design was inspired by De Gennaro et al. (2020), similarly, they used a chatbot with answer options. Both chatbots have the same questions, answer options, and approximate number of words when answering. Only the empathic and neutral answers differed. The chatbot responses are inspired by De Gennaro et al. (2020) and Brave et al. (2005) who compared the response type of conversational agents. The empathic chatbot shows emotional support and understanding throughout the conversation. For example, when the user indicated they had a ‘Not good’ day the empathic chatbot responds “I’m so sorry to hear that! If you want to talk about it, I’m here if you need anything.” On the contrary, the neutral chatbot responds “Noted. You reported that your day was not good. That reflects a negative experience.” The neutral chatbot does not display any emotion unlike the empathic chatbot. BuddyBot starts the conversation by introducing itself and then asks the user what they would like to be called (See Figure 2). Users could type their preferred name, which creates increased interaction since when using chatbots users type answers. Users were addressed with their names throughout the conversation for a more natural conversation. The conversation starts with ice-breaker questions which were found to increase rapport and familiarize users with the chatbot before asking personal questions (Miller & Mandryk, 2021).

A pre-test was conducted to test the manipulation of participants. 16 participants were recruited for the pre-test (*Mage* = 19.75, *SDage* = 0.77). The manipulation was not successful (*χ*2 (1, *N =* 16) = 2.29, *p* = .131). To improve feelings of empathy, interjection words such as “ooh”, “wow”, and affirming phrases such as “I hear you” were added (Goddard, 2013; Kupetz, 2013). One participant commented, “it was funny because it feels like a one-way interaction, as we are not talking but more like an interrogation…”. Based on similar comments, BuddyBot was adjusted to ask questions based on answers. If the participants answer their day was “Great”, the chatbot asks “What made today so good?” and if they answer, “Not good”, the chatbot asks “Why do you think today was not great?”. This caused some minor changes in which participants saw which questions however it was necessary to break the one-way interaction. Other components were equal across conditions (See files ‘neutral\_flow’ and ‘empathic\_flow’ in Appendix B for flow of conversation).

**Figure 2**

**A screenshot of a chat

Description automatically generated***BuddyBot Chat Screen*

*Note*. The image for BuddyBot was taken from:

[https://www.freepik.com/free-vector/chatbot-chat-message-vectorart\_125886829.htm#fromView=keyword&page=1&position=9&uuid=29a6573f-90a8-4942-b2e8-ea3642a9c79f](https://www.freepik.com/free-vector/chatbot-chat-message-vectorart_125886829.htm%23fromView=keyword&page=1&position=9&uuid=29a6573f-90a8-4942-b2e8-ea3642a9c79f)

**Procedure**

The survey approximately took 10 to 15 minutes to complete. Participants were first presented with the goal and procedure of the experiment. After, they saw the informed consent form where they were able to move on if they consent. Participants who did not consent were directed at the end of the survey. The survey was followed with the open-ended filtering question age. If participants were not in the age range (16-25), they were directed at the end. Demographic questions on gender and education level followed. Then participants were asked about the control variables where they answered two questions relating to their previous experiences with chatbots. Participants were then randomly assigned to the empathic or neutral conditions. Instructions on interacting with BuddyBot were given and participants could proceed after 3 minutes as the interaction was timed. The survey continued with the scales on trust, perceived companionship, and perceived anthropomorphism. To ensure users' attention an attention check item was inserted as the last item of the companionship scale where participants were asked to select the ‘Neither agree nor disagree’ option. After they were asked to report how empathic they found the chatbot by answering the manipulation check question ‘The chatbot’s response felt empathetic.’ answered with a yes/no option, inspired by The Robot’s Perceived Empathy (RoPE) scale by Charrier et al. (2019). A definition of empathic was provided to respondents. Lastly, participants were asked for their final consent. The survey ended with the debriefing text that explained the aim of the research and that BuddyBot used pre-determined answers. All answers were forced, and items of variables were randomized to ensure no effect was present due to the order of items presented (See Appendix C for the survey). No rewards were offered to participants.

**Sample**

The required sample size was calculated by a power analysis using the G\*Power software (Faul et al., 2007). With a 95% confidence level, 5% margin of error 80% power, and medium effect size (*f2*= 0.15), the power analysis revealed 77 participants were required to test H1 and H2. Medium effect size was selected due to its use in similar research by De Gennaro et al. (2020). A larger sample size was aimed since similar research has used 96-135 participants (Brave et al., 2005; De Gennaro et al., 2020; Kang & Kang, 2023).

The sample focused on young adults between 16 and 25 (Dovey-Pearce et al., 2005). Young adults are demanding users of chatbots, and they are aware of privacy issues surrounding chatbots (Faverio, 2022; Stöhr et al., 2024). Young adults are also increasingly experiencing loneliness making research on companionship chatbots more essential (Twenge et al., 2021). Convenience sampling and snowball sampling were used to collect participants, due to their practicality and ability to reach many people with limited time (Treadwell & Davis, 2019). Data collection was done between 09.11.2024 and 26.11.2024. An anonymous link to the survey was sent to family, friends, and colleagues, they were asked to share the survey within their social circles. The link was shared on social media and communication platforms: Instagram, WhatsApp, LinkedIn, and Reddit under the subreddit r/SurveyExchange. In addition, students in the University of Amsterdam Roeterseiland campus were approached with a QR code for the survey. 149 responses were collected. Participants who did not consent in the first or final consent (*n* = 17) were excluded, resulting in a final sample of 132 respondents. The mean age of participants was *M* = 20.72 (*SD* = 1.66), 77.3% of respondents were females while 22.7% of participants were males. Participants were moderately educated as 81.1% of participants completed high school. 95.5% of participants passed the attention check. Participants who did not pass the attention check were not removed from the analysis so that the sample size was not affected and remained representative of the population.

**Measures**

***Perceived Companionship***

Companionship is an available and interactive relationship based on social and emotional bonding with an interactive entity (Kang & Kang, 2023; van Oost & Reed, 2010). Perceived companionship refers to the extent to which people feel socially and emotionally bonded with the interactive entity in their relationship. Perceived companionship is measured by four items adapted from the Companionship Scale by Kang and Kang (2023). This scale was selected for its specific implementation on chatbots. The wording of the items was changed from ‘counseling chatbot’ to ‘BuddyBot’ to account for the change of context. The items like “I enjoyed when I was with BuddyBot.” were measured on a 7-point Likert scale (*1=Strongly disagree, 7= Strongly agree*) (See Appendix A for all scale items.). A principal axis factoring analysis (PAF) using a Direct Oblimin rotation revealed all four items together explain 71.46% of the variance with one factor Eigenvalue >1. The KMO measure is 0.81 and the Bartlett’s test of sphericity is significant. The reliability analysis reported high reliability between items (α = 0.87). The mean of items were combined to create the variable ‘Companionship’ (*M* = 3.59, *SD* = 1.40).

***Perceived Anthropomorphism***

Anthropomorphism is the “assignment of human traits and characteristics to computers” (Nass & Moon, 2000, p. 82). Perceived anthropomorphism of a companionship chatbot is how human-like users perceive the chatbot to be. The mediator anthropomorphism was measured using the Anthropomorphism Scale by Bartneck et al. (2008). The scale consists of five semi-differential items, the item ‘moving rigidly-moving elegantly’ was removed since the scale was made for human-embodied robots. The measurement was changed from a 5-point to a 7-point scale to keep the answer options consistent throughout the survey. The items were placed in a semi-differential way in the survey where the middle indicated a neutral opinion for example, 1= BuddyBot is fake., and 7= BuddyBot is natural. A PAF analysis with the four items, using a Direct Oblimin rotation detected one factor with Eigenvalue >1, explaining 70.31% of the variance. The KMO measure is 0.79 and the Bartlett’s test of sphericity is significant. The reliability analysis revealed high reliability between items (α = 0.85). Using the mean of items variable ‘Anthropomorphism’ was created (*M* = 2.40, *SD* = 1.26).

***Level of Trust Towards the Companionship Chatbot***

Trust is defined as one’s compliance to be vulnerable based on their belief in positive actions displayed by the opposite party (Mayer et al., 1995). The mediator level of trust users feel towards the chatbot was measured by the Individualized Trust Scale (Wheeless & Grotz, 1977). The scale was minimized and tested on computer agents in research by Brave et al. (2005), therefore the sub-scale was used to measure trust. The scale has four semi-differential items. The items were measured on a 7-point scale instead of a 10-point scale to ensure consistency throughout the questionnaire. The items are reworded as 1= BuddyBot is trustworthy, 7= BuddyBot is untrustworthy, where the middle indicates a neutral opinion. A PAF analysis with the four items, using a Direct Oblimin rotation detected one factor with Eigenvalue >1, explaining 55.15% of the variance. The KMO measure is 0.73 and the Bartlett’s test of sphericity is significant. A reliability analysis was conducted, revealing moderate to high reliability between items (α = 0.73). The mean of items were used create the variable ‘Trust’ (*M* = 4.31, *SD* = 1.12).

***Control Variables***

In their research in building on the CASA framework, Gambino et al. (2020) highlight the importance of accounting for knowledge and experience of technology. Therefore, participants were asked about their previous interactions with chatbots. The questions are “How frequently, if ever, have you interacted with chatbots in various contexts (e.g., customer service, virtual assistants)?” measured on a 5-point Likert scale (*1= Never, 5=Always*), and “How satisfied have you been with your interactions with chatbots in various roles (e.g., providing information, assisting with tasks)?” measured on a 5-point Likert scale (*5=Very Dissatisfied, 1= Very Satisfied*). 65.9% of participants indicated they use chatbots sometimes (*M* = 5.15, *SD* = 0.90) and satisfaction results were more spread out as 2.3% was very satisfied, 31.1% were satisfied, 34.8% were neutral, 25.8% were dissatisfied, and 6.1% were very dissatisfied (*M* = 4.98, *SD* = 1.09).

**Results**

**Randomization Check**

Demographic and control variables were tested to see if they differed between the empathic and neutral conditions. For categorical variables a chi-square test of independence and for continuous variables an independent samples t-test was conducted. Participants in the empathic and neutral condition did not significantly differ in age *t* (117.96) = 0.39, *p* = .694, chatbot use *t* (130) = -1.20, *p* = .233, chatbot use satisfaction *t* (130) = 0.72, *p* = .471, gender *χ*2 (1, *N =* 132) = .54, *p* = .461, and education level *χ*2 (4, *N =* 132) = 2.32, *p* = .677. Therefore, they were not included as covariates in hypothesis testing.

**Manipulation Check**

58.6% of participants in the empathic condition and 61.3% of participants in the neutral condition perceived the manipulation as intended. A chi-square analysis *χ*2 (1, *N =* 132) = 5.19, *p* = .023 revealed there was a significant difference in conditions in how empathic BuddyBot was, the manipulation was successful.

**Hypothesis Testing**

IBM SPSS Statistics 26 was used in hypothesis testing.To test H1 and H2 PROCESS macro for SPSS, Hayes Model 6 was used. Before conducting the test for a serial mediation, regression analysis test assumptions were tested. Scatter plots were made to test the assumption of linearity between variables. Linearity was satisfied for relationships between response type- anthropomorphism and trust-companionship but was not satisfied between anthropomorphism and trust. Boxplots were created for the variables across the empathic and neutral conditions. Two outliers were identified in trust scores for the empathic condition, no outliers were present in the neutral condition. The two participants had trust scores below two, which could help explain the non-linear relationship between trust and perceived anthropomorphism. In the graph showing standardized residuals against standardized predicted values the residuals were nicely distributed. The assumption of normality was met through the normal distribution of residuals. The residuals also show a mean of zero indicating the assumption of homoscedasticity is met. The fact that the assumption of linearity was not fully met should be considered when interpreting the results.

H1, the prediction that empathic chatbot responses will lead to increased perceived companionship compared to neutral responses was rejected. The direct effect of response type on perceived companionship was not statistically significant, *b* = 0.24, *SE* = 0.19, *p* = .202, 95% CI [−0.13, 0.61]. Therefore, further insight into mediating variables is needed. H2, the expectation that perceived anthropomorphism and level of trust will mediate the relationship between chatbot response type and perceived companionship was supported. The serial mediation pathway through anthropomorphism and trust was positive and significant *b* = 0.11, *SE* = 0.05, BCa 95% CI [0.03, 0.22]. One unit increase in chatbot response type, from neutral to empathic, increased perceived companionship by 0.11, through the combined mediation of perceived anthropomorphism and trust towards the chatbot. Together the model explained 51% of the variance in perceived companionship *(R2* = .51). This finding suggests a large effect size since the predictors explained a substantial amount of variance in the dependent variable perceived companionship.

H2a, the prediction that empathic chatbot responses will increase perceived anthropomorphism more compared to neutral chatbots was supported *b* = 0.66, *SE* = 0.21, *p* = .002, 95% CI [0.24, 1.08]. The results reflect that empathic responses led respondents to believe the chatbot was more human-like, with a 0.66 increase in perceived anthropomorphism compared to neutral responses. Chatbot response type explained 7% variance *(R2* = .07). in perceived anthropomorphism which reflects a small to moderate effect size. Although the effect size is small empathy was found to be an emotion/feeling special to humans which facilitates anthropomorphism in chatbots. In a similar light, H2b was also supported. When participants perceived the chatbot to be more anthropomorphic they trusted it more *b* = 0.46, *SE* = 0.07, *p* < .001, 95% CI [0.33, 0.60]. One unit increase in anthropomorphism predicted a 0.46 increase in trust towards the chatbot. The results also show support for H2c the prediction that increased trust leads to increased perceived companionship, *b* = 0.34, *SE* = 0.90, *p* < .001, 95% CI [0.16, 0.52]. One unit increase in trust led to a 0.34 increase in perceived companionship (See Figure 3 for an overview of results).

**Figure 3**

*Path Coefficients and Significance Levels on Conceptual Framework*

**A diagram of a graph

Description automatically generated with medium confidence**

*Note.* The relationships highlighted by red arrows were not originally hypothesized in this paper.

Although not hypothesized, other significant mediation pathways were found. Perceived anthropomorphism was found to significantly mediate the relationship between chatbot response type and companionship. Users who perceived the chatbot to be more empathic had increased perceived anthropomorphism leading to increased perceived companionship. Trust was found to be a significant and negative mediator in the relationship between chatbot response type and perceived companionship. The negative relationship indicates that empathic chatbots decreased trust compared to neutral chatbots, and this decrease in trust led to a 0.22 decrease in perceived companionship. Although through the mediating variable anthropomorphism, participants perceived the empathic chatbot to be more trustworthy and more like a companion without the mediation of anthropomorphism, empathic responses decreased participants perceived trust towards the chatbot (See Table 1 for statistical findings of indirect effects.). The implications of this finding will be further discussed in the discussion section of this paper.

**Table 1**

*Indirect Effects of Mediation Analysis*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Path | b | Boot SE | Significant | BCa 95% CI |
| Chatbot Response Type -> Anthropomorphism -> Companionship | 0.39 | 0.14 | Yes | [0.13, 0.70] |
| Chatbot Response Type -> Trust -> Companionship | -0.22 | 0.09 | Yes | [-0.42, -0.06] |
| Chatbot Response Type -> Anthropomorphism -> Trust -> Companionship (H2) | 0.11 | 0.51 | Yes | [0.03, 0.22] |

**Conclusion & Discussion**

In conclusion, in line with the growing interest in chatbots replacing human companions, this paper aimed to explore the relationship between chatbot response type (empathic vs. neutral) and perceived companionship. Together mediators perceived anthropomorphism and trust were expected to mediate and explain the relationship between chatbot response type and perceived companionship. The findings of this experiment reject H1, no direct effect between chatbot response type and perceived companionship was found. However, support for H2 was found through the serial mediation of perceived anthropomorphism and trust the relationship between chatbot response type and perceived companionship can be explained. This conclusion explains the underlying process of how users feel companionship towards a chatbot when the chatbot adopts the ‘human-like’ feature of empathy.

**The Mediating Role of Anthropomorphism**

The relationship between chatbot response type (empathic vs. neutral) could only be explained by mediating variables trust and anthropomorphism. This outcome could be explained by the design of the experiment. Forming a companionship is a process that requires time (Croes & Antheunis, 2020). Gong and Nass (2007) found similar results where deeper relational outcomes could not be made with a one-time interaction. Longitudinal research might help explain how repeated exposure to empathic chatbots affects the forming of emotional bonds. Part of this finding is in line with the CASA paradigm. CASA suggests that users mindlessly apply social rules to computers when they elicit social cues (Nass & Moon, 2000). The fact that BuddyBot asks users questions “to get to know you better” elicits this social cue. However, it was insufficient to explain how users perceive BuddyBot as a companion the moderation of anthropomorphism and trust was needed. Although the effects were small, empathic responses heightened anthropomorphism compared to neutral responses. This is in line with findings by Brave et al. (2005) where participants were found to possess the ability to understand empathic facial expressions by agents. In CASA, the explanation of anthropomorphism is ruled out because participants are argued to be adults who are aware that the computer is not human. Since 2000 many have built upon CASA such as Lombard and Xu (2021) who identified empathic responses as a secondary cue that helps interpret the response as a social signal. The results of this study support the idea by Lombard and Xu (2021) that secondary cues are not enough to provide social support. Empathy alone was insufficient to provide users with companionship other cues were needed alongside empathy to reach the goal of companionship. Although not hypothesized by this paper anthropomorphism was found to mediate the relationship between chatbot response type and perceived companionship. The findings highlight, the importance of incorporating human-like cues in chatbots to achieve goals such as companionship.

**The Mediating Role of Trust**

Findings for the mediator trust highlight some nuanced results. Together with anthropomorphism, trust was found to mediate the relationship between chatbot response type and companionship. This finding is in line with SPT which identifies trust as an important component in self-disclosure and building a relationship (Altman & Taylor, 1973). Participants who had higher trust towards the chatbot had increased perceived companionship. However, this conclusion is only present with the mediation of anthropomorphism between chatbot response type and trust. This finding is similar to findings by Ischen et al. (2020) who demonstrated that reduced privacy concerns were present when the chatbot was more ‘human-like’. Interestingly, a negative mediating effect of trust between chatbot response type and perceived companionship was present in the absence of anthropomorphism. Participants may have found excessive empathic responses as unsettling or less credible which might have decreased their trust towards the chatbot. This could be explained by the Uncanny Valley Theory (UVT) the idea that a machine having its own mind might be disturbing to users (Stein & Ohler, 2016). Empathy is marked as unique to humans when a chatbot elicits empathy this can be viewed as artificial and lead to uncanny perceptions (Liu & Sundar, 2018). Based on this conclusion finding a good balance of anthropomorphic cues is key, since excessive human-like qualities used by chatbots can decrease users’ trust.

**Limitations & Recommendations**

One of the first limitations that should be addressed is the use of answer options provided when answering the chatbot. Although this design has been used in research by De Gennaro et al. (2020), it limits users' expression. The chatbot aims to provide companionship, therefore it would be ideal if users could express themselves without restriction. This approach would better reflect the design of current companionship chatbots like *Replika*. Due to the design of the experiment and technical complications, it could not be adopted. The researchers aimed for the only difference between conditions (neutral and empathic) to be the answers participants received. When users are allowed to type their responses, the answers can not be pre-determined where there are differences between empathic and neutral responses. Future researchers are advised to employ Natural Language Processing (NLP) models for the chatbot to give adequate responses. This approach would further increase the external validity of the study however, the manipulation should still be controlled for not to decrease internal validity in the process.

Additionally, this study falls short of reflecting how empathy could be incorporated into real companionship chatbots. The study makes the manipulation between empathic and non-empathic (neutral) very clear, providing a good basis for researching empathy in the context of companionship chatbots. However, the empathic chatbot designed for this research only responded with empathic language which might have disrupted the authenticity of the conversation. Future research could consider researching empathy on different levels (e.g. low, moderate, high). This approach could lead to finding a threshold for empathic responses that maximizes companionship without leading to uncanny perceptions. Researching the interplay between empathic responses and other chatbot features such as the use of emojis, avatar gender, and chatbot personality could provide insight into how empathy could be used to increase self-disclosure through SPT (Beattie et al., 2020; Kang & Kang, 2023).

Another limitation of this study is the assumption of linearity not being met for the relationship between anthropomorphism and trust. This indicates that more nuanced non-linear patterns could be present between the variables. Since the assumption for the serial mediation was not met the results presented for the variable trust should be viewed critically. In addition, two outliers were identified in the variable trust, the test was rerun removing them and the relationship between chatbot response type, trust, and perceived companionship remained negative. Future research should investigate the relationship between empathic chatbots and trust more closely by incorporating variables to measure eeriness or spine-tingling perception relating to the UVT (Liu & Sundar, 2018). Researchers are recommended to record or save participant responses to conduct a content analysis to ensure how much users self-disclosed in line with SPT. By analyzing the answers researchers can see how much users trusted the chatbot with sharing their personal information.

**Concluding Remarks**

Overall, this study contributes to the understanding of the relationship between chatbot response type and perceived companionship. The experimental design of this study fills in the gap in research by researching the specific context of companionship chatbots and employing a design where the manipulation empathy is clearly isolated. The study found anthropomorphism and trust to explain the relationship between chatbot response type and perceived companionship as their direct relationship was not significant. These findings are essential for lonely users who are at risk of using such chatbots excessively. Policymakers such as the OECD should work with researchers to ensure clear regulations for the design and use of empathic chatbots. It should be ensured that chatbots have transparent guidelines on emotional engagement to prevent the manipulation of users’ emotional states. Users should be aware that they are interacting with a chatbot to avoid over-reliance.

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**Appendix A**

**Scale Items**

**Scale Items for Perceived Companionship:**

1. I enjoyed when I was with BuddyBot.
2. I thought I was there with BuddyBot.
3. I found it interesting to talk to BuddyBot.
4. I think I had a good conversation with BuddyBot.

**Scale Items for Perceived Anthropomorphism:**

1. BuddyBot is fake. - BuddyBot is natural.
2. BuddyBot is machinelike. - BuddyBot is humanlike.
3. BuddyBot is unconscious. - BuddyBot is conscious.
4. BuddyBot is artificial. - BuddyBot is lifelike.

**Scale Items for Level of Trust Towards Friendship Chatbot:**

1. BuddyBot is trustworthy. - BuddyBot is untrustworthy.
2. BuddyBot is honest. - BuddyBot is dishonest.
3. BuddyBot is reliable. - BuddyBot is unreliable.
4. BuddyBot is sincere. - BuddyBot is insincere.

**Appendix B**

**Links of The GitHub Containing Code and Materials**

**Code For Empathic Chatbot:**

Brunnschweiler, H. & Havlucu Levi V. (2024). BuddyBot--Empathic. GitHub. <https://github.com/hannahbrunn/BuddyBot---Empathetic>

**Code For Neutral Chatbot:**

Havlucu Levi V. & Brunnschweiler, H. (2024). BuddyBot--Neutral. GitHub. <https://github.com/vhavlucu/Buddybot--Neutral>

**Appendix C**

**Survey**

Start of Block: Intro

Letter

Dear participant,

First, thank you for your interest in participating in this research project! Before the experiment starts, it is important that you are well-informed about the procedure. Therefore, we would like you to read this information letter carefully. Please do not hesitate to ask for clarification about this text or the general procedure. If anything is unclear, the researcher will gladly answer your questions.

**Goal of the study**

This research aims to investigate the impact of chatbot interactions on participants' emotional experiences.

**Procedure**

Participants will engage in a conversation with a chatbot. Participants will answer demographic questions as well as questions relating to the participant’s emotional experiences.

Participation in the study entails possible risks or inconveniences. There are questions regarding loneliness and emotional self-reflection which may be triggering for some participants. Please do not participate if these questions may be triggering.

Participation in this study takes approximately 10-15 minutes. No compensation will be provided for participation in this study.  Information about the researchAs this research is being carried out under the responsibility of the Amsterdam School of Communication Research (ASCoR), which is part of the University of Amsterdam (UvA), we can guarantee that:

A) Your personal information (about who you are) remains confidential and will not be shared without your explicit consent. Your research data will be analyzed to answer the research question as described above in the goal of this study. Note that further processing of your data is possible, provided that this is compatible with this purpose. Research data published in scientific journals will be anonymous and cannot be traced back to you as an individual. Finally: Completely anonymized data can be shared with other researchers.

B) No later than 4 months after completion of the study, you can obtain a summary of the research results. If you wish to receive this, please send an e-mail to the researcher (see below).

C) You can refuse to participate in the research or cut short your participation without having to give a reason for doing so.

**More information**

For more information about the research you are welcome to contact the researcher Hannah Brunnschweiler, hannah.brunnschweiler@student.uva.nl, (+31) 0620280136. Should you have any complaints or comments about the course of the research and the procedures it involves as a consequence of your participation in this research, you can contact the designated member of the Ethics Review Board representing ASCoR via ascor‐secr‐fmg@uva.nl Any complaints or comments will be treated in the strictest confidence. We hope to have provided you with sufficient information. We would like to take this opportunity to thank you in advance for your assistance with this research, which we greatly appreciate.

Kind regards,

Hannah Brunnschweiler and Vendi Havlucu Levi

**Consent**

If you would like to participate in the survey, indicate your consent below. With this you declare:

I am 16 years or older.

I have read and understood the information.

I agree to participate in the study and to use the data obtained with it.

I reserve the right to withdraw this consent without giving any reason during the study.

I reserve the right to stop the study at any time I wish.

* I understand the text presented above, and I agree to participate in the research study. (1)
* I do not agree and will not participate in the research study (2)

*Skip To: End of Survey If*

*If you would like to participate in the survey, indicate your consent below. With this you declare... = I do not agree and will not participate in the research study*

End of Block: Intro

Start of Block: Age

Info\_demographic

Thank you for agreeing to participate in this study. Firstly, will ask some questions about yourself. We would like to remind all answers stay anonymous.

Age What is your age in years? (For example, if you were born on 1st January 2000, write 24)

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End of Block: Age

Start of Block: Not qualified

Not\_qualified

Thank you for participating in this survey! Unfortunately, you do not meet the qualifiations of this research of being between the ages 16 and 25.

Please press the arrow to end the experiment.

End of Block: Not qualified

Start of Block: Demographic

Gender How do you describe yourself?

* Male (1)
* Female (2)
* Other (3)

Education

What is the highest level of education you have COMPLETED to date?

* Less than high school degree (1)
* High school graduate (high school diploma or equivalent) (2)
* Associate degree (3)
* Bachelor's degree (4)
* Master's degree (5)
* Doctoral degree or higher (6)

End of Block: Demographic

Start of Block: Control

Info\_Control

The following questions will focus on your experience with chatbots.

Experience\_chatbots

How frequently, if ever, have you interacted with chatbots in various contexts (e.g., customer service, virtual assistants)?

* Never (1)
* Rarely (4)
* Sometimes (5)
* Always (6)
* Often (7)

Satistfacti\_chatbots

How satisfied have you been with your interactions with chatbots in various roles (e.g., providing information, assisting with tasks)?

* Very Satisfied (1)
* Satisfied (4)
* Neutral (5)
* Dissatisfied (6)
* Very Dissatisfied (7)

End of Block: Control

Start of Block: Anthro\_moderator

Info\_anthro\_mod

On the next page, we will ask you to rate the extent to which you believe various stimuli (e.g. technological or mechanical items, wild and domestic animals, and natural things) possess certain capacities. On a 0-10 scale (where 0 = “Not at All” and 10 = “Very much”), please rate the extent to which the stimulus possesses the capacity given. Please choose a number to indicate your response. We will ask you about the extent to which the stimulus has a mind of its own, has free will, has intentions, has consciousness, can experience emotions, is good-looking, is durable, is lethargic, is active, and is useful.

By “has a mind of its own” we mean able to do what it wants.

By “has free will” we mean able to choose and control its own actions.

By “has intentions” we mean has preferences and plans.

By “can experience emotion” we mean it has feelings.

By “has consciousness” we mean able to be aware of itself and its thoughts and feelings.

By “good-looking” we mean attractive.

By “durable” we mean sturdy and able to last a long time.

By “lethargic” we mean moving slowly.

By “active” we mean moving frequently and quickly.

By “useful” we mean able to be used for something.

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Anthro\_moderator

Please indicate your agreement with the following statements using the provided scale. To what extent:

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 0 (1) | 1 (17) | 2 (2) | 3 (3) | 4 (4) | 5 (5) | 6 (6) | 7 (7) | 8 (8) | 9 (9) | 10 (10) |
| does technology—devices and machines for manufacturing, entertainment, and productive processes (e.g. cars, computers, television sets)—have intentions. (1) |  |  |  |  |  |  |  |  |  |  |  |
| does the average fish have free will. (4) |  |  |  |  |  |  |  |  |  |  |  |
| does the average mountain have free will? (5) |  |  |  |  |  |  |  |  |  |  |  |
| does a television set experience emotions? (6) |  |  |  |  |  |  |  |  |  |  |  |
| does the average robot have consciousness. (7) |  |  |  |  |  |  |  |  |  |  |  |
| do cows have intentions? (8) |  |  |  |  |  |  |  |  |  |  |  |
| does a car have free will? (9) |  |  |  |  |  |  |  |  |  |  |  |
| does the ocean have consciousness? (10) |  |  |  |  |  |  |  |  |  |  |  |
| does the average computer have a mind of its own. (11) |  |  |  |  |  |  |  |  |  |  |  |
| does a cheetah experience emotions? (17) |  |  |  |  |  |  |  |  |  |  |  |
| does the environment experience emotions? (12) |  |  |  |  |  |  |  |  |  |  |  |
| does the average insect have a mind of its own? (13) |  |  |  |  |  |  |  |  |  |  |  |
| does a tree have a mind of its own? (16) |  |  |  |  |  |  |  |  |  |  |  |
| does the wind have intentions? (14) |  |  |  |  |  |  |  |  |  |  |  |
| does the average reptile have consciousness? (15) |  |  |  |  |  |  |  |  |  |  |  |

End of Block: Anthro\_moderator

Start of Block: Info\_condition

info\_condition

In the next section, you will interact with chatbot named BuddyBot. You will engage in a conversation with BuddyBot. A text box will be provided for you to write your nickname and for the rest of the conversation you will be provided with answer options to choose from.  An arrow will appear when you are able to move on to the next questions; please take your time, as you cannot go back once you proceed. Please finish the whole conversation with the chatbot.

End of Block: Info\_condition

Start of Block: neutral

Time\_neutral Timing

First Click (1)

Last Click (2)

Page Submit (3)

Click Count (4)

Neutral

End of Block: neutral

Start of Block: empathic

Time\_empathic Timing

First Click (1)

Last Click (2)

Page Submit (3)

Click Count (4)

Empathic

End of Block: empathic

Start of Block: Variables

info-variables

Thank you for interacting with BuddyBot. In this next set of questions you will be asked about your experience with BuddyBot.

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social\_presence

Please indicate your agreement with the following statements using the provided scale.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Strongly disagree (8) | Somewhat disagree (9) | Neither agree nor disagree (10) | Somewhat agree (11) | Strongly agree (12) |
| When I was talking to BuddyBot, it felt as though BuddyBot was a real person. (1) |  |  |  |  |  |
| When I was talking to BuddyBot, it felt as though I was talking to a person. (4) |  |  |  |  |  |
| When I was talking to BuddyBot, BuddyBot nearly seemed to be a real person. (5) |  |  |  |  |  |
| When I was talking to BuddyBot, it felt as though I was with a person. (6) |  |  |  |  |  |

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trust

Please rate BuddyBot on the following scale based on your interaction with it. The scale represents two extremes with the middle indicating a neutral opinion.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 13 (13) | 14 (14) | 15 (15) | 16 (16) | 17 (17) | 18 (18) | 19 (19) |  |
| BuddyBot is trustworthy. |  |  |  |  |  |  |  | BuddyBot is untrustworthy. |
| BuddyBot is honest. |  |  |  |  |  |  |  | BuddyBot is dishonest. |
| BuddyBot is reliable. |  |  |  |  |  |  |  | BuddyBot is unreliable. |
| BuddyBot is sincere. |  |  |  |  |  |  |  | BuddyBot is insincere. |

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Compan + atten\_check

You are halfway done!! Please indicate your agreement with the following statements using the provided scale.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Strongly disagree (13) | Disagree (14) | Somewhat disagree (15) | Neither agree nor disagree (16) | Somewhat agree (17) | Agree (18) | Strongly agree (19) |
| I enjoyed when I was with BuddyBot. (1) |  |  |  |  |  |  |  |
| I thought I was there with BuddyBot. (4) |  |  |  |  |  |  |  |
| I found it interesting to talk to BuddyBot. (5) |  |  |  |  |  |  |  |
| I think I had a good conversation with BuddyBot. (6) |  |  |  |  |  |  |  |
| Please select "Neither agree nor disagree" (8) |  |  |  |  |  |  |  |

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anthro\_mediator

Please rate BuddyBot on the following scale based on your interaction with it. The scale represents two extremes with the middle indicating a neutral opinion.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 1 (1) | 2 (2) | 3 (3) | 4 (4) | 5 (5) | 6 (6) | 7 (7) |  |
| BuddyBot is fake. |  |  |  |  |  |  |  | BuddyBot is natural. |
| BuddyBot is machinelike. |  |  |  |  |  |  |  | BuddyBot is humanlike. |
| BuddyBot is unconscious. |  |  |  |  |  |  |  | BuddyBot is conscious. |
| BuddyBot is artificial. |  |  |  |  |  |  |  | BuddyBot is lifelike. |

Manipulation\_check

The BuddyBot's response felt empathetic. Empathetic meaning you felt empathy from BuddyBot. Empathy occurs when you feel that your emotions were understood.

* Yes (1)
* No (2)

Info\_Loneliness

Thank you for sharing about your experience with BuddyBot. You are almost done! For the following question, please reflect on yourself and indicate your agreement with the following statements.

loneliness

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Strongly disagree (6) | Somewhat disagree (7) | Neither agree nor disagree (8) | Somewhat agree (9) | Strongly agree (10) |
| There is always someone I can talk to about my day-to-day problems (1) |  |  |  |  |  |
| I miss having a really close friend (4) |  |  |  |  |  |
| I experience a general sense of emptiness (5) |  |  |  |  |  |
| There are plenty of people I can lean on when I have problems (6) |  |  |  |  |  |
| I miss the pleasure of the company of others (7) |  |  |  |  |  |
| I find my circle of friends and acquaintances too limited (8) |  |  |  |  |  |
| There are many people I can trust completely (9) |  |  |  |  |  |
| There are enough people I feel close to (10) |  |  |  |  |  |
| I miss having people around (11) |  |  |  |  |  |
| I often feel rejected (12) |  |  |  |  |  |
| I can call on my friends whenever I need them (13) |  |  |  |  |  |

End of Block: Variables

Start of Block: Final\_consent

final\_consent

This is the end of the survey. Please indicate again whether you agree to submit your data for research purposes. Data collected cannot be deleted anymore after submitting your response due to the anonymization of your data.

* By clicking this box, I agree to participate in this study and to submit my data for analysis. I understand my data can no longer be deleted. (1)
* By clicking this box, I don’t agree to participate in this study and submit my data for analysis. (4)

End of Block: Final\_consent