

Abstract

Based on the Computers Are Social Actors (CASA) paradigm, this study investigates how the identity cues (human vs. chatbot) and emoji usage influence the effect of using chatbots to obtain emotional support in the context of Hong Kong. Through a 2*2 online experiment with 494 valid participants, the results showed that the interaction between emoji use and identity cues significantly affected the social presence. Only in the condition of human cues, using emojis in the message could significantly increase social presence, which enhanced participants' perceived warmth and perceived competence with regards to the communication partner. Moreover, these social perceptions could further increase perceived emotional support when human identity cues were present. Theoretical and practical implications are discussed.

Keywords: chatbots, emotional support, identity cues, emojis, social presence, CASA paradigm

Lay summary

Chatbots have emerged as a cost-effective way to provide emotional support to people under stress. Our study examines the effects of emoji use and identity cues, which are two widely used designs in messages of supportive chatbots. We were interested in examining which design can efficiently improve users' perceptions of emotional support. When people communicate with a human-identity chatbot, users perceive more social presence, warmth, competence, and emotional support from messages that adopt emojis compared to messages without emojis. Interestingly, emojis use does not lead to higher perceived social presence and emotional support when people are interacting with the chatbot claiming its machine identity. This work will help designers build more useful and supportive chatbots to provide support for users.

How can chatbots comfort humans? Exploring effects of emoji and identity cues in emotional support

Chatbots have been developed in various fields of application, ranging from customer services (Folstad & Skjuve, 2019), entertainment (Jin et al., 2019), and education (Neto & Fernandes, 2019) to mental health (Miner et al., 2017). As a new supportive communication partner in different fields, one of the critical communication functions of chatbots is to provide social support (Meng et al., 2023). Specifically, chatbots have been growing used to provide emotional support to people undergoing stress. For instance, a group of psychologists and AI (Artificial Intelligence) experts at Stanford University have developed a chatbot named “Woebot” on a cognitive-behavioral therapy (CBT) platform to help people manage their mental health conditions by enabling them to reconstruct their negative thoughts into positive ones. Replika is another U.S. chatbot product that aims to build emotional connections with its users and provides customized chatting services to customers based on their conversations. As previous systematic reviews of AI and health care have summarized, the application of chatbots predominates in the mental health field (Laranjo et al., 2018). It has been a cost-efficient way of providing emotional support, especially during the COVID-19 pandemic and beyond.

Mental health is essential to personal well-being and has especially been so since the outbreak of COVID-19. The pandemic has had significant impacts on the psychological status of people of all age groups around the globe. According to a survey of 130 countries by the World Health Organization, the pandemic has significantly increased the demand for mental health services but has at the same time disrupted or halted critical mental health services, especially in-person consultation, in 93% of countries (World Health Organization, 2020). In the United States, 42% of adults reported symptoms of anxiety or depression during the pandemic,

suggesting a dramatic increase from 11% before the pandemic. In Hong Kong, the mean mental health index score (WHO-5 score) of the Hong Kong population declined from 57.78 in 2015 to 48.03 in 2021, with more than half of the respondents reporting mental health index scores of less than 52 (JMHF, 2021; MindHK, 2019). Organizations concerned with mental health have urged the Hong Kong public to take care of their mental and emotional health and use online platforms wisely. They have also called on the government to provide more funding for the development of online mental health services (Re: Fresh, 2022). A large number of people therefore need an efficient way to release their stress.

In Hong Kong, there are already some companies and organizations that have made attempts in this area. For example, the mental health charity MindHK has developed a virtual chat assistant, “Help Me Virtual Assistant,” to make access to mental health knowledge and emotional support easier (Mind HK, 2020). In addition, “Lihkg Cantonese Bot” generates random chit-chat dialogues with users according to their input based on training that uses data from a Hong Kong forum – Lihkg. However, there is insufficient research on the effectiveness of chatbots in supporting emotional needs in Hong Kong. This study explores how the designs of chatbots (identity cues and emoji) influence the effect of using chatbots to obtain emotional support among Hong Kong people based on the Computers Are Social Actors (CASA) paradigm.

In line with the literature, a key factor could be the different designs of chatbots that reflect cues in interpersonal communication. This has been suggested by the Computers Are Social Actors (CASA) paradigm (Nass et al., 1994), which indicates that users may have social responses to technologies as if they are facing humans. Previous studies have found that users will express politeness to computers, impose gender stereotypes on computers, and attribute sociability to computers rather than to programmers. Using different types of social cues as part

of the smart device design could affect the interaction between the device and the user, further affecting the user's cognitive and psychological results. Researchers have shown that users are more likely to be compliant with service feedback requirements from human-like chatbots than from non-human chatbots (Adam et al., 2021). Moreover, users may perceive intelligent devices based on their colors following gender stereotypes (Carolus et al., 2018). According to Fogg (2003), emojis are a form of psychological cues that make people think of machines as social actors. Emoji-enabled chatbots are found to be similar to humans (Beattie et al., 2020).

Supportive chatbots like Woebot may amplify the CASA effect through explicitly imitating social cues and behaviors related to humans, in which people tend to treat computers as if they were humans. Nevertheless, exploration in the field of chatbots and emotional support has been insufficient. Two types of cues that have been commonly used in chatbots, namely, identity cues and emoji adoption, may influence emotional support when using chatbots for mental health enhancement. It is thus necessary to investigate how the identity cues and emojis from chatbots influence the outcome of emotional support. In view of the above discussion, we propose a research question:

How does the design of chatbots (identity cues and emoji adoption) influence the effectiveness of emotional support?

This study investigates whether identity cues and emoji adoption will generate social presence and emotional effects from the users and further affect their perceived emotional support, specifically in the Hong Kong context. Theoretically, this study tested the CASA paradigm in the context of chatbots providing emotional support to their users. It also added the discussion on social presence, perceived warmth and perceived competence in the supportive chatbot. As for the practical contributions, this study also suggests that chatbot designers could

increase the social cues (e.g., the human identity cues, emoji adoption) in chatbots; that is, chatbots using emojis and human identity cues make users feel more socially supported.

Literature review

Chatbot and Emotional support

People may derive various emotional outcomes from chatbot usage. Some scholars investigated the relational experiences people arise from chatbots, such as relationship satisfaction, attachment, and enjoyment (Heerink et al., 2009; Kim et al., 2013). These studies show that people may feel a sense of enjoyment when interacting with virtual agents (Heerink et al., 2009) and may develop a feeling of friendship towards the chatbot (Skjuve et al., 2021). The companionship experiences from the media technology can subsequently develop into users’ emotional support (Ta et al., 2020). While past studies paid much attention to the relational aspects in human-chatbot interactions, studies that directly examine the effects of supportive communication in the chatbot context are scarce.

Similar to support in human-human interaction, scholars believe that the objective of communicating with supportive chatbots is to obtain effective help (Beattie & High, 2022). Supportive communication refers to verbal or nonverbal behaviors used to help others when they are facing life adversities, including upsetting or stressful situations (MacGeorge et al., 2011). In supportive communication, emotional support is regarded as the most used type of support (Burleson, 2008) and applies to various stressor arrangements (MacGeorge et al., 2011). According to Cutrona and Suhr (1992), emotional support refers to the provision of expressions involving care, love, compassion, and empathy, is one type of social support. The limited extant studies provided preliminary findings that chatbots have the potential to provide emotional support to people. For example, chatbots were found to emotionally support people in worry

reduction (Meng & Dai, 2021) and self-compassion enhancement (Lee et al., 2019). There are also studies concentrating on mental health chatbots that deliver health information (Skjuve & Brandtzæg, 2018) and how those chatbots affect user satisfaction and continuous use intention (Zhu et al., 2022). However, studies about the antecedents of perceived emotional support in supportive communication with chatbots are limited. It is unknown how a specific symbol like an emoji affects support perception in user-chatbot interactions.

Perceived warmth and perceived competence of supportive chatbots

In human-computer interaction research, the computer as social actors (CASA) paradigm (Nass et al., 1994) is a widely accepted paradigm that explains users' responses to human-like technologies. The social cues of a computer will elicit social responses from people (Nass & Moon, 2000). In the context of conversational AI, people may develop social perceptions of these digital agents, such as perceived warmth and perceived competence. Based on the warmth and competence theoretical framework, warmth and competence are two universal dimensions of social perception used to identify if the other is a friend or foe (Fiske et al., 2007). It could bring either positive or negative emotions to people.

Scholars have found that people can perceive warmth and competence from machines (Bigman & Gray, 2018; Gray & Wegner, 2012; Ho et al., 2018), and have explored the effect of an agent's emotional expression on people's perception of warmth and competence (DeMeur et al., 2011; Liu et al., 2021). For example, DeMeur et al. (2011) found that people perceived the agents to be warmer and more competent when they expressed emotion appropriately and plausibly rather than inappropriately and implausibly, and when expressed both verbally and nonverbally as opposed to only verbally. Similarly, Belanche et al. (2021) revealed that the perceived competence and warmth of a robot positively influence its emotional value to people.

However, studies have also found inconsistencies in people's perceptions of competence and warmth. For example, Huang et al. (2021) found that using visual nonverbal cues could lead to higher perceptions of warmth but lower perceptions of competence for chat agents. In the business world, Kull et al. (2021) shown that a warm initial message from the chatbot could foster closer connections between consumers and the brand, compared to a less warm but more competent message. The antecedents and consequences of perceived warmth and perceived competence in a supportive chatbot context require further investigation.

Social presence

Social presence is a concept with different definitions depending on the type of cues it generates (Xu & Liao, 2020). In mediated communication, social presence refers to the extent to which the partner is perceived to be a real social entity, which involves intimacy and immediacy in human-to-human communication (Short et al., 1976). In the realm of human-chatbot communication, it is widely accepted to be conceptualized as the sense of “being with another” (Biocca et al., 2003, p.456). The principle of medium-as-social-actor presents that chatbots equipped with anthropomorphic cues are perceived by users as social entities, thereby leading users to generate responses similar to those in human-to-human interaction (Lombard & Ditton, 1997). This idea is supported by evidence that chatbots with human-like traits, including the use of emoji and human-like linguistic styles, can foster a sense of social presence for users (Araujo, 2018; Liebrecht et al., 2020; Morana et al., 2020; Park & Sundar, 2015), resulting from a higher level of human-likeness (Beattie et al., 2020; Liu et al., 2018).

The social presence can heighten perceptions related to emotional support, since it fosters stronger emotional connection and a sense of companionship (Araujo, 2018; Heerink et al., 2008). In the context of interpersonal interaction, previous research revealed that greater social

presence might strongly associate with emotional support, as it helps to cultivate emotional connections in the online collaborative environment (So & Brush, 2008). Kim et al. (2013) also found that participants' feeling of social presence when interacting with a machine positively influences their enjoyment, attachment, and relationship satisfaction during the interaction.

The relationship between social presence and perceived warmth and competence has been extensively studied in the academic literature. Dinh and Park (2023) have highlighted the importance of these dimensions in characterizing social presence in chatbots. In addition, Song et al. (2008) suggested that there is a strong connection between social presence and human warmth. Van Doorn (2017) also demonstrated the existence of positive effects of high perceived social presence on both perceptions of warmth and competence. In this research, we also hypothesize the positive effects of social presence on users' social judgments towards the human agent and chatbot that provide support.

Effects of emoji use

An emoji is "a small digital image or icon" (Schneebeli, 2017) utilized for expressing emotions, ideas, or concepts in digital communication. Its design is aimed at enhancing written text with personality, context, and humor and can effectively convey emotions or ideas that may be challenging to articulate solely through words (Bai et al., 2019). As the use of emojis in online communication has become increasingly common, the role of emoji use in enhancing emotional outcomes (e.g., higher trust, more positive impressions and evaluations, and improved mood) has garnered attention among scholars (Coyle & Carmichael, 2019; Ganster et al., 2012; Park & Sundar, 2015; Zhang et al., 2021). It has also been studied in terms of its ability to manifest emotional changes during interactions (Mostafavi & Porter, 2021).

As the use of emojis in digital communication becomes increasingly prevalent, researchers have been exploring their use in the design of the chatbot’s conversation. For example, Asensio-Cuesta et al. (2021) integrated emojis in the Wakamola chatbot in order to establish a rapport with users while discussing health problems related to obesity. Although emoji use by chatbots is found to have similarities to that by human agents (Beattie et al., 2020), its impact on users’ perceptions of chatbots is still controversial and underexplored. Zlatkute et al. (2021) found that the use of emojis in chatbots had no significant impact on user trust and satisfaction, while other studies have shown that emojis can play a positive role in human-chatbot interactions. Fadhil et al. (2018) reported that participants felt more confident discussing their mental health issues with a chatbot that used emojis. Other research (Diederich et al., 2020; Svikhnushina & Pu, 2021) also found that the emoji in user-chatbot interaction can lead to higher enjoyment and subsequently improve the intention to further use the chatbot. In the current study, the emoji use is considered to be a part of linguistic style, which may make people perceive of machines as social actors (Fogg, 2003). Sundar (2019) found that users who interact with such chatbots feel more socially present when they see anthropomorphic visual cues, and those cues then bring favorable attitudes and emotional closeness to the users. Thus, the use of emojis in chatbots is deemed to have the potential to foster social presence, which is crucial for the development of support perceptions.

Effects of identity cues

In technology-based communication, an identity cue refers to information indicating the identity of the communication partner (Go & Sundar, 2019). In studies comparing human and machine interlocutors, the identity cue is commonly manipulated as a disclosure of whether the agent is a chatbot or a human (Park et al., 2022). Self-claiming to be human on the part of the

chatbot can enhance people's sense of social presence, leading to improved perceptions of competence and warmth towards the chatbot (Poinsot et al., 2022; Sundar et al., 2016; Toader et al., 2019). However, there is concern that the use of human-related identity messages in chatbots may lead to confusion and a sense of deception, which may result in rejection (Park et al., 2022).

Previous research also shows contradictory findings on the effects of identity cues. Some studies found no substantial differences between human-to-human interaction and human-chatbot interactions regarding people's perceptions and disclosures (e.g., Ho et al., 2018). In line with the CASA paradigm (Nass et al., 1994), the emotional support received from chatbots can be perceived as being equivalent to that received from a human agent (Abendschein et al., 2021). However, there are also studies showing that people attribute different judgments toward machines and humans. People may have a series of stereotypes such as coldness and objectivity towards machines (Sundar & Kim, 2019), which may hinder the effects of emojis in the context where a chatbot provides emotional support.

Based on the discussion of related work above, three hypotheses and a research question are proposed as follows:

H1: Compared to text only, using emojis in the message will lead to a higher level of social presence.

RQ1: How does the identity cue (human vs. chatbot) moderate the influence of emoji use on social presence?

H2: The interaction between emoji use and identity cues will indirectly affect perceived emotional support through social presence.

H3: The interaction between emoji use and identity cues will indirectly affect perceived emotional support (a) through the social presence and perceived warmth in serial; and (2) through the social presence and perceived competence in serial.

Method

Design and procedure

In this study, a 2 (identity cues: human vs. chatbot) by 2 (text only vs. text+emoji) online experiment was conducted. All participants were randomly assigned to one of the four conditions. Participants were told that they would have a conversation with a chatbot or a human agent before the questionnaire. The chatbots in this study were built using Sanuker, an existing chatbot development platform (<http://www.sanuker.com/>), which can customize the conversation. Specifically, our chatbots can identify keywords from the user's typing, then provide a response with these keywords. Sanuker was embedded in the online questionnaire. We used traditional Chinese in the experimental design and questionnaire to accommodate the language preference. In addition, we invited native speakers to refine the wording of the experimental material and questionnaire.

To enhance the manipulation of the conversation partner, human avatars and names were used to suggest that the partner was typing in the human condition. A text alert was provided to remind different identity cues of the agent at the beginning of the chat. In addition, it was assumed that the chatbot would be able to provide more timely responses than the human partner, who, in the beginning, would take one minute longer to respond than the chatbot. In the chatbot identity condition, the text alert was “You will talk with a chatbot,” and the greeting would appear immediately. In the human identity condition, the text alert was “You will talk

with a human partner, and please wait a minute, she/he is coming,” and then the greeting would appear after one minute.

In addition, the content of the greeting was different for the two identity cue conditions. In the human identity condition, the greeting was: “Hi, nice to meet you! My name is Hsi-Min Chen. I am a counselor at the Mental Health Institute of the City University of Hong Kong. I am very happy to chat with you. You can share any of your thoughts and feelings with me.” In the chatbot identity condition, the greeting content was: “Hi, nice to meet you! I am a mental health chatbot designed by the City University of Hong Kong. I am very happy to chat with you. You can share any of your thoughts and feelings with me.” (Figure 2)

After the greeting, the participant was asked a question to self-disclose about his/her stress issues. After the participant revealed these, the chat partner provided a text-only response or a text and emoji response, depending on the experimental condition. This completed one round of the conversation. The scripts of the text reply were the same for every condition. There were 11 rounds of the entire conversation (see Appendix A for the full script). To ensure that users completed the interaction with the chatbot, we assigned them a unique verification code at the end of the interaction, which they were asked to fill in at the beginning of the survey.

According to Beattie et al. (2020), the affective value, number, and placement of the emojis in the experiment can simulate comparable conversations in real life. The emojis we adopted in the scripts were based on the frequently used emojis that Hong Kong users use in similar chat conversations in WhatsApp. WhatsApp is the most widely-used instant communication application in Hong Kong, with nearly 85% of Hong Kong people using it in their daily lives (Datareportal, 2022).

We conducted three rounds of the pre-test to ensure that the chatbot’s features and stimulus material would work successfully. Through the sampling recruited from Qualtrics, we received 150 participants’ valid responses. The content of the script, the size and category of the emojis, and the wording of the questionnaire were modified based on responses from participants in the pre-tests. The samples in the pre-tests were not included in the formal experiment.

To control the influence of different genders of the human identity cues on users, we set up different genders of agents (female vs. male) in the human identity cues condition. The analyses in the pre-tests of the gender effect in the human identity cues allowed the final analyses to collapse the different genders to the same identity cues (while still maintaining the 2*2 design), as reported in the results.

Participants

Participants were recruited via Qualtrics in September and October of 2022. To make sure that the selected sample was representative of the general Hong Kong user population, quotas on age and gender were established. As the study focused on using AI chatbots for emotional support, eligibility was limited to Hong Kong people who had recently experienced depression, stress, or anxiety. We set a screening question at the beginning (e.g., “Have you been feeling depressed, anxious, or stressed lately?” If the participant answered no, they were not allowed to take part in the subsequent experiment.

We did a priori power analysis using G*Power 3.1 (Faul et al., 2009) to estimate the sample size. The results showed that 330 was the minimum sample size with a power of 0.8, alpha = 0.05 and effect size f=0.20. A total of 637 people participated in the study, and the final valid sample was 494. Participants were excluded if they did not fill in the correct certifying code (n =15), and we also double-checked the chat record of the participants. In cases where they

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3 did not have a valuable chat record ($n = 73$, reasons: did not answer the chatbot's question or
4 asked irrelevant questions), they were excluded. The final valid sample was 494, of which 234
5 were male (47.4%), 258 were female (52.2%), and 2 were others (0.4%).
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8 **Measurement**

9 *Social Presence*

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12 A combination of 7-point semantic differential scales and 7-point Likert scales adopted
13 from Walther and Bazarova (2008) and Park and Sundar (2015) were used to measure social
14 presence. The scales ranged from strongly disagree (1) to strongly agree (7), (Cronbach's $\alpha =$
15 .87). Examples of items from Walther and Bazarova (2008) were "please rate your feeling of (or
16 toward) your communicative agent as follows: distance-close, separate-together." Examples of
17 items from Park and Sundar (2015) in the chatbot conditions were "the chatbot could tell how I
18 felt," "the chatbot was sometimes influenced by my moods," and "the chatbot influenced the
19 mood of our interaction." Examples of items in the human agent conditions were "the human
20 agent could tell how I felt," "the human agent was sometimes influenced by my moods," and
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38 *Perceived Competence and Perceived Warmth*

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40 Perceived competence was measured using 7-point Likert scales adopted from Fiske et al.
41 (2007). The scales ranged from strongly disagree (1) to strongly agree (7). Five items were used
42 to measure the perceived competence (Cronbach's $\alpha = .91$) and 4 items were used to measure the
43 perceived warmth (Cronbach's $\alpha = .88$). Examples of items were "As viewed by you, how
44 competent do you think this chatbot/human agent is?", "As viewed by you, how tolerant do you
45 think this chatbot/human agent is?" and "As viewed by you, how warm do you think this
46 chatbot/human agent is?"
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Perceived emotional support

Nine items adapted and revised from a previous study (Zimet et al., 1988) measured participants’ perceived emotional support on a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree, Cronbach’s $\alpha = .94$, $M = 4.33$, $SD = 1.19$). Examples of items from the scale were: “There is a human agent/chatbot who is around when I am in need.”, “I get the emotional help and support from the human agent/ chatbot.” And “The human agent/ chatbot is a real source of comfort to me.”

Manipulation check questions

Two separate questions were asked to assess the manipulations of identity cues and emoji cues at the beginning of the survey. Participants were asked about the identity of the conversational partner (1 = female human agent, 2 = male human agent, 3=chatbot) and the message elements (1= text only, 2=text and emoji) in their interaction with the chatbot. Participants who did not give the correct answer were deleted.

Results

H1 posited the effect of emoji use in the message on social presence. An independent t-test showed that participants perceived more social presence when the communication partner used emoji ($M = 4.48$, $SD = 0.96$) than when there is only text ($M = 4.07$, $SD = 1.10$) in the message, $t = -4.45$, $p < .05$. Thus, H1 was supported.

To answer the RQ, we conducted a 2 (emoji use vs. text only) $\times 2$ (identity cues: chatbot identity vs. human identity) ANCOVA analysis on the social presence. The results showed that the interaction between emoji use and identity cues significantly affected the social presence ($F[1, 490] = 46.95$, $p = .009$, partial $\eta^2 = 0.01$). There is an interaction effect between emoji use

and identity cues on social presence. We then did the simple effects analysis using the Fisher's least significant difference (LSD) method. The results showed that for the human identity cue condition, using emoji ($M = 4.62$, $SD = 0.09$) led to a significantly higher level of the social presence than the condition of the text ($M = 4.00$, $SD = 0.09$), $t = 5.11$, $p < .01$. For the chatbot identity cue condition, the differences between emoji ($M = 4.30$, $SD = 0.10$) and text-only ($M = 4.17$, $SD = 0.10$) were not significant on the social presence ($p = 0.36$). (See Figure 3 for the interaction plots.)

To test H2 and H3, we further customized a moderated serial mediation model following Hayes' (2018) PROCESS instructions. The indirect effect was tested using 5000 bias-corrected bootstrap samples with 95% confidence intervals. We set emoji use as the independent variable, identity cues as the moderator, social presence, perceived warmth and perceived competence as mediators and perceived emotional support as the dependent variable.

For H2, the moderated mediation effect of social presence was significant (index = 0.15, $SE = 0.07$, 95% CI [0.04, 0.30]). The results showed that the indirect effects of emoji use through social presence were different between the chatbot condition and human condition. The indirect effect of emoji use through social presence was not significant in the chatbot identity cue, while it was significant in the human identity cue ($b = 0.20$, $SE = 0.05$, 95% CI = [0.11, 0.30]).

Therefore, H2 was supported.

For H3, the moderated mediation index was significant on perceived emotional support through the social presence and perceived competence (index = 0.22, $SE = 0.09$, 95% CI [0.05, 0.41]), and through the social presence and perceived warmth (index = 0.04, $SE = 0.02$, 95% CI [0.01, 0.09]). For the chatbot identity cue condition, the indirect effect of emoji use on perceived emotional support through the social presence and perceived competence was not significant. In

addition, the indirect effect of emoji use on perceived emotional support through the social presence and perceived warmth was not significant. For the human identity cue condition, the indirect effect of emoji use on perceived emotional support through social presence and perceived competence was significant ($b = 0.28$, $SE = 0.063$, $95\% CI = [0.17, 0.41]$). Furthermore, the indirect effect of emoji use on perceived emotional support through social presence and perceived warmth was significant ($b = 0.05$, $SE = 0.02$, $95\% CI = [0.02, 0.09]$). Thus, H3a and H3b were supported. Overall, the results showed that identity cues moderated the impact of emoji use on perceived emotional support through the social presence. Only in the human condition could using emojis in the message increase the level of social presence of the participants and enhance their perceived warmth and perceived competence, respectively, further increasing their perceived emotional support.

As mentioned before, we also considered that the gender of the human identity cues might affect the user's perception, so we used human agent pictures of different genders (n of female = 142, n of male = 141) in the human identity cues condition to examine the effect. An independent t-test showed that there was no significant relationship between gender difference in social presence ($t = -1.94$, $p = 0.13$), perceived competence ($t = -1.07$, $p = 0.18$), perceived warmth ($t = -1.10$, $p = 0.15$) and perceived emotional support ($t = -1.33$, $p = 0.47$) within the human identity cues condition.

Conclusion and discussion

The present study examines how emoji usage and identity cues influence people's perceived emotional support in the context of online supportive conversations. First, our results indicate that chatbots can generate the perception of social presence by incorporating human-like message elements, like using emojis instead of text-only descriptions. Second, the results

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3 identify the identity cue as the boundary condition under which the emoji use of the
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5 communication partner could successfully facilitate social presence, which can further help to
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7 improve people's perceived support. Only when users are presented with human identity cues,
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9 can they derive higher social presence from the emojis, which further leads to perceived
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11 emotional support. Third, the study indicates that social presence is the underlying mechanism
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13 for effective supportive communication. More specifically, the study reveals the indirect effect of
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15 the interaction of emoji use and identity cues on perceived emotional support through a) social
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17 presence, and perceived competence in serial, and b) social presence, and perceived warmth in
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24 Our study finds the moderating role of identity cues in the effects of emoji use. Only in
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26 the human identity condition rather than the chatbot condition can emojis elicit a higher degree
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28 of social presence. This finding echoes the arguments about machine heuristics (Sundar, 2008),
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30 that is, people may have stereotypes when communicating with chatbots. In the chatbot
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32 condition, the belief that a communication partner is a machine may trigger the stereotypical
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34 image that the machine is objective and cold (Sundar & Kim, 2019), and that the response
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36 contains fewer emotions (Prahl & Van Swol, 2021). Therefore, emojis from chatbots in their
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38 responses cannot influence people's perceptions of social presence and perceived emotional
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45 In the human identity condition, people may apply human-human schemata to explicate
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47 the message they received. They may think the message from a human is more sincere and
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49 sensitive when communicating emotional or personal issues (Meng & Dai, 2021). Compared to
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53 in terms of influencing the tone and intended interpretation of the message (Ganster et al., 2012;
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Kelly & Watts, 2015). So people are more likely to perceive the emojis from human identity cues as an attempt to clarify, contextualize, or interpret the messages in depth (Prada et al., 2018).

Furthermore, our research demonstrates that warmth and competence are two foundational dimensions of human perceptions that are used to judge the chatbot or human communication partner in supportive communication. More specifically, using emoji cues and human identity cues results in higher competence perception than warmth perception of the chatbot, and consequently increases perceived emotional support. Previous research has shown that when people experience stressful times, the comforting words of a chatbot could effectively smooth down negative thoughts (Meng & Dai, 2021). Our results add an additional explanation that perceived competence from chatbots is also important when people use chatbots for emotional support, and thus more research could be done to understand how social cues influence users' competence perception and their psychological outcomes when they use chatbots for emotional support.

Theoretical and practical implications

Our research has several theoretical contributions. First, the study extends the literature on the social presence of supportive chatbots. Specifically, social presence is identified as the underlying psychological mechanism that drives chatbots to effectively provide emotional support. Second, we investigate the potential antecedents and outcomes of social presence through demonstrating the indirect effect of social cues, perceived warmth and perceived competence in the context of supportive chatbots. Third, the results indicate that adding human-like social cues (e.g., emoji use, human identity cues) can enhance social presence and further influence perceived emotional support. It supports the previous proposition regarding how factors of humanness affect the support process, that is, the greater levels of human social cues in

human-machine communication lead to more supportive interactions and outcomes (Beattie & High, 2022). Fourth, the research adds a discussion on the design of social cues in supportive chatbots. Specifically, our study highlights the importance of the context-dependent meaning of social cues in designing chatbots for supportive communication. A single social cue (e.g., emoji only) cannot directly result in a social response. Many social cues should be incorporated to create a natural, expressive and believable social behavior (Feine et al., 2019). When people communicate with supportive chatbots, users' emotional support results from an interplay of emoji cues and human identity cues. Therefore, for an efficient supportive chatbot, social cues should be designed with contextual meaning and can also elicit the specific pattern of human-human schemata in communication (Meng & Dai, 2021).

Our research further demonstrates that effective supportive chatbots rely on whether the chatbot's human-like social cues (e.g., emojis, human-like language) are consistent with the user's expectations of who they are (e.g., human). When companies design chatbots for emotional support, chatbot designers can consider increasing subtle human-like linguistic cues (e.g., emoji) in chatbots labeled with human identity cues. In addition, our study emphasizes the role of social presence as an underlying mechanism mediating the impact of human-like social cues on positive affective outcomes in supportive chatbot communication. Users can only perceive emotional support from a chatbot if the human-like social cues of the chatbot enhance the chatbot's social presence. Consequently, for chatbots to provide adequate emotional support, practitioners can seek specialist knowledge to design their chatbots. In the initial stages of designing the chatbot, practitioners can test the chatbot by investigating potential customers to confirm that the chatbot's human-like social cues are able to evoke the users' perception of a social presence. Furthermore, perceived competence and perceived warmth are two crucial social

judgments toward chatbots when people use chatbots for emotional support. The chatbot’s designer can add advice and comforting language to the chatbot’s supportive message to increase the users’ competence and warmth perceptions.

Limitations and future research

First, the focus on the effect of emoji use in the supportive chatbots in the Hong Kong context limits the generalizability of our findings. Using emojis in the message has different acceptance levels in different cultural environments (Konrad et al., 2020). Such differences may limit the external validity of our model in a different cultural context. Therefore, future studies could engage in cross-cultural studies and compare the results. Second, this study investigates users’ perceived emotional support after the first interactions with supportive chatbots. As the development of chatbots accelerates, user acceptance and the behavior of chatbots in terms of providing emotional support will change over time. Future research could use a longitudinal study design to explore how users’ perceptions of supportive chatbots and responses change over time. Third, users’ prior experience and literacy about AI applications can profoundly influence their perceptions of and how they behave in relation to chatbots for emotional support. It would also be worthwhile in future studies to investigate the moderating effects of individual characteristics in human-chatbot interactions.

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Data Availability Statement

The data underlying this article will be shared on reasonable request to the corresponding author.

Figure 1. Research model

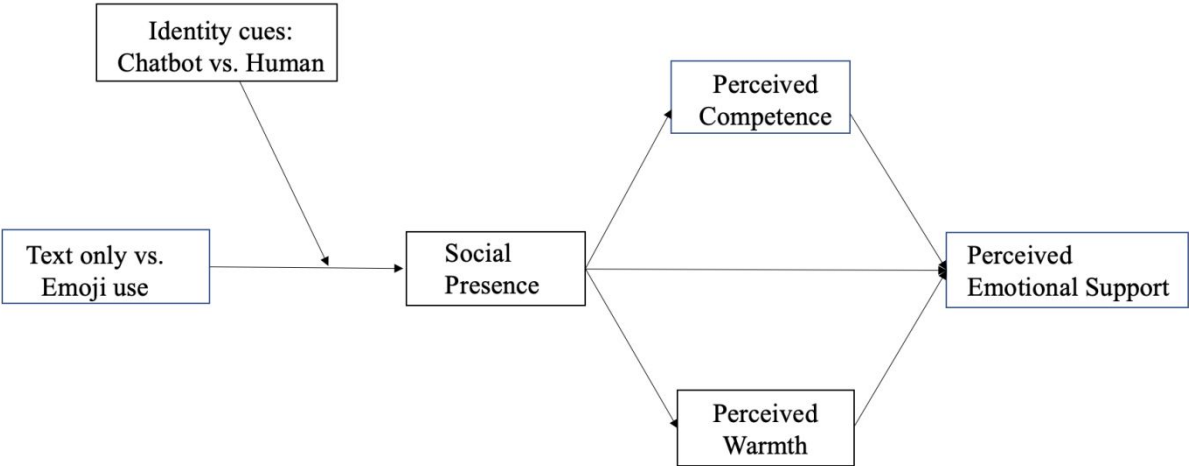


Figure 2. Manipulation materials of the identity cues for different conditions

Human agent identity cues (Female)

Header: 情感支持服務 Emotional Support Service

Text Alert

在接下來的時間中，你將和一位聊天夥伴進行對話。請你稍等一會兒，你的聊天夥伴正在趕來。大約需要1~2分鐘的時間，請不要輸入，等待我們的回覆.....

13:07

In the upcoming time, you will have a conversation with a chat partner. Please wait for a moment as your chat partner is on their way. It will take approximately 1-2 minutes. Please kindly refrain from typing and wait for our response...

Greeting

嗨，很高興見到你！我叫陳希敏，我是香港城市大學心理健康研究所的一名心理諮詢員。我很高興和你聊天。你可以和我分享你的任何想法和感受。

13:08

Hi, nice to meet you! My name is Siu Man Chan and I am a counselling psychologist at the City University of Hong Kong's Mental Health Research Institute. I am delighted to chat with you and welcome you to share any thoughts or feelings with me.

Human agent identity cues (Male)

Header: 情感支持服務 Emotional Support Service

Text Alert

在接下來的時間中，你將和一位聊天夥伴進行對話。請你稍等一會兒，你的聊天夥伴正在趕來。大約需要1~2分鐘的時間，請不要輸入，等待我們的回覆.....

13:07

In the upcoming time, you will have a conversation with a chat partner. Please wait for a moment as your chat partner is on their way. It will take approximately 1-2 minutes. Please kindly refrain from typing and wait for our response...

Greeting

嗨，很高興見到你！我叫陳希敏，我是香港城市大學心理健康研究所的一名心理諮詢員。我很高興和你聊天。你可以和我分享你的任何想法和感受。

13:08

Hi, nice to meet you! My name is Siu Man Chan and I am a counselling psychologist at the City University of Hong Kong's Mental Health Research Institute. I am delighted to chat with you and welcome you to share any thoughts or feelings with me.

Chatbot identity cues

Header: 情感支持服務 Emotional Support Service

Greeting

嗨，很高興見到你！我是由香港城市大學設計的心理健康聊天機械人。很高興和你聊天，你可以和我分享你的任何想法和感受。

13:07

Hi, nice to meet you! I am a psychological chatbot designed by City University of Hong Kong for mental health. I'm happy to chat with you, and you can share any thoughts and feelings with me.

Figure 3. Interaction between emoji use and identity cues on social presence

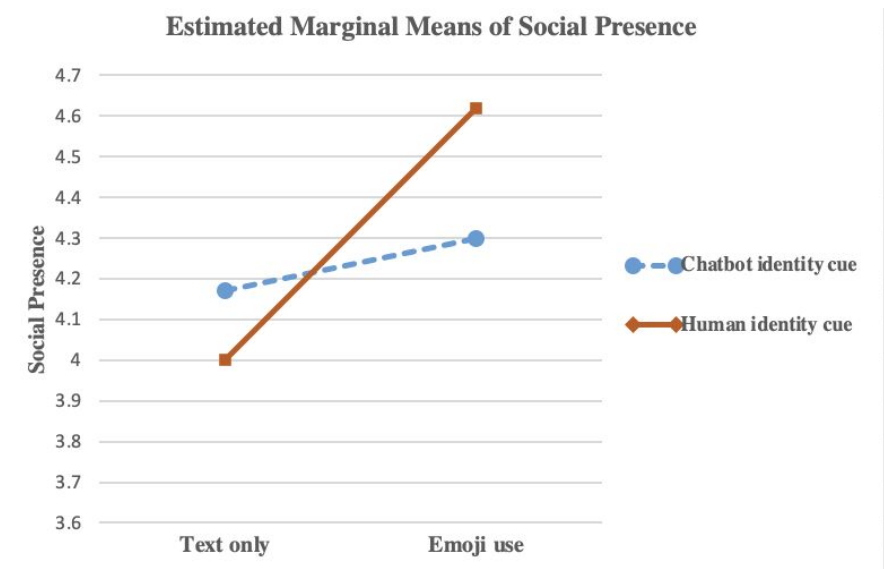





Table 1. Indirect effects of emoji use on perceived emotional support via a) social presence and perceived competence in serial, b) social presence and perceived warmth under two conditions of identity cues

Mediation Path		Indirect Effect Bootstrap Estimate (b)	Indirect Effect 95% Confidence Intervals	
			Confidence Intervals	
			LL	UL
Emoji use →Social presence →Perceived competence→Perc eived emotional support	Chatbot identity	0.06(0.07)	-0.08	0.2
	Human identity	0.28(0.06)	0.17	0.41
	Chatbot identity	0.01(0.01)	-0.02	0.04
	Human identity			

→Perceived				
warmth				
→Perceived	Human	0.05(0.02)	0.02	0.09
emotional support	identity			

For Peer Review

	Human × Emoji	Human	Chatbot × Emoji	Chatbot
Hand-over Round	In the upcoming time, you will have a conversation with a chat partner. Please wait for a moment as your chat partner is on their way. It will take approximately 1-2 minutes. Please kindly refrain from typing and wait for our response...	In the upcoming time, you will have a conversation with a chat partner. Please wait for a moment as your chat partner is on their way. It will take approximately 1-2 minutes. Please kindly refrain from typing and wait for our response...	-	-
Round 1 (Start with greeting)	Hi, nice to meet you! My name is Siu Man Chan and I am a counselling psychologist at the City University of Hong Kong's Mental Health Research Institute. I am delighted to chat with you and welcome you to share any thoughts or feelings with me.	Hi, nice to meet you! My name is Siu Man Chan and I am a counselling psychologist at the City University of Hong Kong's Mental Health Research Institute. I am delighted to chat with you and welcome you to share any thoughts or feelings with me.	Hi, nice to meet you! I am a psychological chatbot designed by City University of Hong Kong for mental health. I'm happy to chat with you, and you can share any thoughts and feelings with me.	Hi, nice to meet you! I am a psychological chatbot designed by City University of Hong Kong for mental health. I'm happy to chat with you, and you can share any thoughts and feelings with me.
	How should I address you?			
Round 2		How should I address you?		
	Nice to meet you, <name>!	Nice to meet you, <name>!	Nice to meet you, <name>!	Nice to meet you, <name>!
	Could you tell me how old are you?		Could you tell me how old are you?	

		Could you tell me how old are you?	Could you tell me how old are you?
Round 3	Oh, so your age is <age>. / It's okay.	Oh, so your age is <age>. / It's okay.	Oh, so your age is <age>. / It's okay.
	Can you tell me what things are making you feel sad, anxious, or stressed?	 Ok!	 Ok!
		Can you tell me what things are making you feel sad, anxious, or stressed?	Can you tell me what things are making you feel sad, anxious, or stressed?
Round 4	Give you a hug.	Give you a hug.	Give you a hug.
			
	The problem about <problem that the user input> sounds very challenging.	The problem about <problem that the user input > sounds very challenging.	The problem about <problem that the user input > sounds very challenging.
	Life can be difficult sometimes. Can you give me some specific examples of what situations you're facing?	 Life can be difficult sometimes. Can you give me some specific examples of what situations you're facing?	 Life can be difficult sometimes. Can you give me some specific examples of what situations you're facing?

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Round 5

I am sorry to hear that you said <details the user input>. That's the problem that lots of people have to deal with.

If possible, could you elaborate a bit more? For example, describe it in 3-4 sentences. I would like to understand your problems better.

I am sorry to hear that you said <details the user input >. That's the problem that lots of people have to deal with.



If possible, could you elaborate a bit more? For example, describe it in 3-4 sentences. I would like to understand your problems better.

I am sorry to hear that you said < details the user input >. That's the problem that lots of people have to deal with.

If possible, could you elaborate a bit more? For example, describe it in 3-4 sentences. I would like to understand your problems better.

I am sorry to hear that you said < details the user input >. That's the problem that lots of people have to deal with.



If possible, could you elaborate a bit more? For example, describe it in 3-4 sentences. I would like to understand your problems better.

Round 6

What are your specific feelings about this matter?

What are your specific feelings about this matter?

你對這件事具體有什麼感受？

What are your specific feelings about this matter?

你對這件事具體有什麼感受？

What are your specific feelings about this matter?

Round 7

Your feeling is totally normal.
I can definitely understand why did you feel <feeling the user input>.

In your case, do you have anyone like friends or family members who are helping you?

Your feeling is totally normal. ❤️
I can definitely understand why did you feel <<feeling the user input>>.



Your feeling is totally normal.
I can definitely understand why did you feel <feeling>.

In your case, do you have anyone like friends or family members who are helping you?

Your feeling is totally normal. ❤️
I can definitely understand why did you feel <<feeling the user input>>.



Round 8

I'm really glad that someone is helping you. You are not alone. / I'm sorry that you don't have anyone to help you right now, but I'm here to listen to you. You are not alone.

What methods would you use to solve this problem?/Do you think there are any ways for others to help you?

In your case, do you have anyone like friends or family members who are helping you?

I'm really glad that someone is helping you. You are not alone. / I'm sorry that you don't have anyone to help you right now, but I'm here to listen to you. You are not alone.

陪住你



What methods would you use to solve this problem?/Do you think there are any ways for others to help you?

I'm really glad that someone is helping you. You are not alone. / I'm sorry that you don't have anyone to help you right now, but I'm here to listen to you. You are not alone.

What methods would you use to solve this problem?/Do you think there are any ways for others to help you?

In your case, do you have anyone like friends or family members who are helping you?

I'm really glad that someone is helping you. You are not alone. / I'm sorry that you don't have anyone to help you right now, but I'm here to listen to you. You are not alone.

陪住你



What methods would you use to solve this problem?/Do you think there are any ways for others to help you?

Round 9

I'm glad you know what to do. I know it's hard, but you're doing great. / It's okay, I know it's difficult. You're doing great.

If you'd like to share, could you describe your difficulties in more detail?

I'm glad you know what to do. I know it's hard, but you're doing great. / It's okay, I know it's difficult. You're doing great.



I'm glad you know what to do. I know it's hard, but you're doing great. / It's okay, I know it's difficult. You're doing great.

If you'd like to share, could you describe your difficulties in more detail?

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Round 10

We understand that the current situation is very difficult. I have found some information online that may be helpful to you. You can eat healthily , exercise your body, get plenty of sleep, and take a break if you feel stressed.

If you'd like to share, could you describe your difficulties in more detail?

We understand that the current situation is very difficult. I have found some information online that may be helpful to you. You can eat healthily ☐, exercise your body 🧘, get plenty of sleep ☐, and take a break if you feel stressed.



If you would like to contact a professional, here are some organizations that provide online or hotline counseling:
24-hour hotline counseling service:
The Samaritans Hong Kong (Cantonese only): 2389 2222
The Samaritans (multi-lingual): 2896 0000
Caritas Hong Kong Counselling Hotline (Cantonese only): 18288

If you would like to contact a professional, here are some organizations that provide online or hotline counseling ☎:
24-hour hotline counseling service:
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Caritas Hong Kong Counselling Hotline (Cantonese only): 18288

Online counseling service:
Open Up provides services
in Chinese and English,
available 24 hours
Facebook/Instagram/Wechat
: @hkopenup
The Samaritans Hong Kong
Chat Room (Cantonese only)
IOS/Android App: Chat
Room

Online counseling service:
Open Up provides services
in Chinese and English,
available 24 hours
Facebook/Instagram/Wechat
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Chat Room (Cantonese only)
IOS/Android App: Chat
Room



Round 11

I want to know if the
conversation above was
helpful for you?

I want to know if the
conversation above was
helpful for you?

I want to know if the
conversation above was
helpful for you?

I want to know if the
conversation above was
helpful for you?

I'm glad that the
conversation was helpful to
you. I think you're taking the
right steps to make things
better. / I'm sorry that our
conversation wasn't helpful
to you. But what's important
is that you want to make
things better.

I'm glad that the
conversation was helpful to
you. I think you're taking the
right steps to make things
better. 😊/ I'm sorry that our
conversation wasn't helpful
to you. But what's important
is that you want to make
things better. 😊

I'm glad that the
conversation was helpful to
you. I think you're taking the
right steps to make things
better. / I'm sorry that our
conversation wasn't helpful
to you. But what's important
is that you want to make
things better.

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**Verification
code**

Now, I am afraid that it's time to end our conversation. Thank you for sharing your story. I wish you all the best.	Now, I am afraid that it's time to end our conversation. Thank you for sharing your story. I wish you all the best.	Now, I am afraid that it's time to end our conversation. Thank you for sharing your story. I wish you all the best.	Now, I am afraid that it's time to end our conversation. Thank you for sharing your story. I wish you all the best.
Thank you for your participation. Please record the verification code below and enter it in the questionnaire afterwards:	Thank you for your participation. Please record the verification code below and enter it in the questionnaire afterwards:	Thank you for your participation. Please record the verification code below and enter it in the questionnaire afterwards:	Thank you for your participation. Please record the verification code below and enter it in the questionnaire afterwards: