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AI-powered mental health communication: Examining the effects of affection expectations on health behavioral intentions

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ABSTRACT

Objectives: This study proposed and examined users' expectations of chatbots in mental health communication and compared them with human doctors. Focusing on the affective expectation, we aimed to unveil the impacts of changes in affection on individuals' expectations and behavioral intentions.
Methods: A 2 (chatbot vs. human doctor) x 2 (affective vs. neutral) online experiment (N = 364) was conducted. Participants were asked about their expectations towards communicating health with chatbots and human doctors, watched pre-recorded conversations, and answered questions about expectancy violation toward affection and willingness to further health actions.
Results: Individuals have higher expectations from human doctors in almost all aspects. Individuals' expectation of online chat with doctors is more likely to be violated compared with chatbots. Significant results are found on individuals' behavioral intentions, with a greater likelihood of switching to online chatbots when chatbots use an affective approach or doctors use a neutral tone. Individual's past experiences with chatbots play a key role in expectancy violations.
Conclusion: Individuals have higher expectations of human doctors, but using an affective approach may better meet individuals' expectations toward chatbots and switch their behavioral intentions.
Practice Implications: Chatbots that meet expectations can be designed and applied to address mental health concerns.

1. Introduction

1.1. Chatbots in mental health communication

The World Health Organization (WHO) reported that 1 in every 8 people worldwide lived with mental health concerns (e.g., depression, anxiety, etc.) [1]. Despite effective treatments, accessibility remains challenging [2], especially for people with less income or fewer resources [3]. However, artificial intelligence (AI) development may offer a potential solution. AI-driven chatbots can ask questions, provide possible diagnoses, and offer actionable solutions [4]. Given the availability and affordability of chatbots compared to human doctors, patients can receive immediate and effective responses. Therefore, it is meaningful to improve chatbots' applications in mental health communication.

Research on the applications of chatbots in mental health communication often focuses on users' experiences and perceptions of chatbots [5], which appear more like evaluations of chatbots than concern for users. Users' expectations cannot be fully understood and new ideas for chatbot design cannot be inspired. This may lead to a superficial understanding of the interaction between users and chatbots. Users tend to have expectations toward chatbots [6], which is regarded as a central maintaining mechanism in mental disorders [7] and will impact behaviors [8]. However, based on our review of previous literature, what specific expectations people may have from chatbots in mental health communication, to what extent chatbots meet or violate the expectations, and the diversified effects they produce on interactions are unclear [9]. In addition, most psychological treatments do not consider the basic psychological concepts of expectation change [7], assuming expectations are set in stone. However, people's expectations may change with different contexts. For example, people have a higher privacy expectation for mental illnesses than physical illnesses, especially in online conditions [10]. Therefore, discussing expectations without examining changes may lead to incomplete research. To fill the gaps in previous research, important questions are raised as follows: What expectations do users have when using chatbots to solve mental health concerns,

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compared with human doctors? Will the expectations change, and will the change impact subsequent health behavioral intentions?

1.2. Expectations for chatbots in mental health communication

Guided by the Computer As Social Actor (CASA) theory [11], we first fill the knowledge gap by investigating the inventory of expectations of online mental health communication. The CASA theory states that humans may mindlessly apply the same social heuristics used for human interactions to computers [12]. Since chatbots are intelligent conversational computer systems designed to mimic human conversations [13], we tried to sort out the expectations of human doctors and apply them to the current context. Based on the summary of the existing literature, eight expectations are raised. They are 1) *accurate information* [14], which means that the chatbot can understand users' questions and provide answers that have gone through substantial quality control, 2) *personalized service* [15], which means that the chatbot can tailor its message to users' question and relate to earlier conversations, 3) *timely feedback* [15], which refers to the immediate response after sending a message and the 24/7 service of the chatbot, 4) *affective expression* [16], which means that the chatbot can recognize users' emotional state and provide affective feedback accordingly, such as placating anger or assuring anxiety, 5) *confidential privacy* [17], which means that the chatbot can protect users' private data free from intrusion and misuse, 6) *developed relationship* [18], which refers to the interaction between users and the chatbot in which users can immerse themselves in it like chatting with a friend, 7) *easy operation* [19], which means that users are able to use the chatbot without the help of an expert and it is easy to understand what is going on, and 8) *entertaining atmosphere* [20], which refers to the chatbot has a sense of humor and even uses emojis to express emotion. Although these aspects have been investigated separately in various articles, their integration with expectations, especially in the field of mental health, has rarely been done. This study aims to establish fundamental constructs for current and future research in understanding users' expectations of chatbots and provide preliminary results regarding how people perceive these desired features.

Additionally, we want to find out whether this applies to users' expectations of human doctors, as few studies have comprehensively addressed expectations for human-human mental health interactions. Chatbots are designed to mimic, assist, or even replace human communication [13], so it is necessary to compare one's expectations of a chatbot versus a human doctor to better facilitate their applications. Therefore, we ask the following research question:

RQ1. : To what extent do users have different expectations for online chatbots, compared with human doctors?

1.3. Expectations of affective expression

In addition to the overall test of the above user expectations, it is meaningful to observe the subsequent consequences triggered by different conversation partners (human doctors vs. chatbots) by adjusting a specific expectation. For instance, researchers [15] investigated timely feedback and personalized services and found that communicators showing greater personalized services and faster responses were more credible in e-commerce chat. Kasilingam [19] revealed that perceived easy operation and entertainment would influence consumers' attitudes toward using chatbots for shopping. Among all the other factors, affection displayed by chatbots has attracted researchers' attention [21]. We choose affective expression as the research object as it is a vital factor in mental health communication [22] and a central component of communicative processes in close personal relationships [23].

The affective expression indicates that chatbots can recognize the user's emotional state and provide affective feedback accordingly [16]. Perceived affection can furthermore impact people's affective and behavioral reactions [24]. Previous findings indicate that affective expression is a crucial consideration in human-chatbot interaction. For example, people are more likely to have positive psychological outcomes when conversational partners use an emotional disclosure than a factual one in daily conversation [25], and a chatbot with an empathic character is considered to be more capable of handling health topics [26]. However, insufficient research exists regarding the connection between affection and expectations, especially in terms of mental health communication. Specifically, to what extent affective expression is a crucial element when considering chatbots as an alternative solution to human doctors, and what effect will it have on subsequent health behaviors?

To solve the problems, we seek help from the Expectancy Violation Theory (EVT) [27], which presents the influence of expectancy violation on individuals' corresponding behaviors. EVT shows that unmet expectations in communication contexts lead to behavior changes [28]. Grimes et al. [29] tested users' expectation violation toward the chatbot's conversational capability, and Rief and Joormann [30] tried to treat depression by understanding the violations of expectations. These investigations guide us to study individuals' expectation changes in different affective conditions and their possible impacts on future behaviors. Although the CASA theory states that people instinctively apply social scripts to computer interactions [11], it does not claim that people will equally treat computers in all situations. Previous research has shown that people may perceive different supportiveness from different conversational partners [31] and show different responses [26]. This enlightens us that different conversational partners may not be treated as equals by default. In other words, individuals may have different expectations of affection from chatbots and human doctors and thus when an affective message is presented from different sources, it may be perceived differently. Interacting with machines (e.g., chatbots), people tend to view them as mechanistic, objective, and unemotional [32] and diminish their roles as real sources of emotional support [31]. This may lead to low affective expectations toward chatbots and shape the outcome of interactions in the end. In contrast, human doctors are perceived as warm and emotionally supportive [33], generating higher affective expectations. Therefore, we infer that positive expectation violations are more likely to occur in chatbots and put the following hypothesis:

H1. : Individuals have higher expectations towards human doctors using an affective expression, compared with chatbots.

1.4. Effects on mental health-related behavioral intentions

Another aim of this study is to investigate whether positive interaction with chatbots will affect their willingness for further health behavioral intentions. Healthcare chatbots offer unique benefits such as constant availability and cost-effectiveness, and thus potentially more efficient than human doctors [34]. Despite the pointed benefits and potentials, the use of chatbots in mental health is relatively limited [35]. Existing research has revealed that failure to provide mental support based on users' situations and characteristics is a critical concern of chatbots [36]. Therefore, we are investigating if an affective approach can address similar concerns.

By adding affection to the messages of different conversational partners, we aim to unveil whether and to what extent users would consider using chatbots as a substitute for non-emergent consulting, preliminary diagnoses, or human doctor visits in the future [34]. Thus, we raise the following research questions:

RQ2. : To what extent will affective messages from chatbots (compared with from human doctors) make users more likely to consider chatbots for mental health communication?

2. Methods

Upon IRB approval at the authors' institution, a between-subject experiment with four message conditions (chatbot-neutral, chatbot-affective, doctor-neutral, and doctor-affective) was conducted online with a sample recruited from Qualtrics that represents the U.S. population based on age, gender, and geographic location. Using a convenience sample, a total of 364 participants were recruited to detect the expected effects. Participants are limited to those who were residing in the U.S. when taking the survey and passed the attention checks.

2.1. Stimuli and procedure

The research team created four videos of conversations between patients with mental health concerns and communication partners based on different message conditions (see Appendix for links). The manipulation of affective expression was manifested in the way the conversational partner (chatbot or human doctor) responded – with affection or without affection. Specifically, the conversational partner may express support and emotion based on the symptoms described by the patient or merely inform the facts [16,27]. For example, the patient told the conversational partner that he or she had felt stressed recently. In the non-affective condition, the conversational partner would say, "Can you share more information with me?" In the affective condition, the conversational partner would reply, "I'm sorry to hear this, it is understandable and common to feel stressed, can you share more information with me?" The conversational partner further provided solutions as well as emotional support depending on the symptoms. Aside from sentences about affective expressions, there was no difference between chatbots and doctors in giving medical advice. In addition, a human doctor's response time was slightly longer than a chatbot's, assuming that the chatbot was able to provide faster replies than the human partners typing words [31].

For the questionnaire, after providing informed consent, participants were randomly assigned to view a pre-recorded video and complete the questions by imagining the position of the patient in the video. Before the video, participants were asked to answer questions regarding their experience with chatbot communication and attitudes toward using chatbots to treat mental health concerns. They then indicated their expectations toward different conversational partners based on the definitions given in the survey. After the video, questions were given to participants to test their expectation violation toward affection and willingness to further health behavioral intentions. We used the same scale items to measure the expectations of both chatbots and human doctors, replacing the terms "chatbots" and "human doctors" accordingly. An attention check was included, which asked participants to choose common sense questions and the significant differences between conditions, and participants were excluded if they failed to answer these questions. We asked participants to provide their demographic information, including age, gender, etc. in the end. This experiment lasted about 15 mins, and participants may quit at any time if they feel uncomfortable. Participants who finished the questionnaire and passed the attention check received incentives.

2.2. Key measures

Eight expectations were measured by a single-item question respectively on a scale of 1 (strongly disagree) to 5 (strongly agree), including "when using a chatbot to address mental health concerns, I expect it to 1) provide accurate information/ 2) provide personalized service/ 3) provide timely feedback/ 4) use an affective expression/ 5) keep confidential privacy/ 6) develop a relationship with me/ 7) be easy to use/ 8) be able to entertain me". We provided detailed descriptions of each expectation. The human doctor uses the same scale but replaces "chatbot" with "human doctor".

Expectation violation was measured by 3 items on a 5-point scale from strongly disagree to strongly agree [29], including "the respondent's message tone was appropriate as a chatbot / human doctor", "the respondent wrote in a way that I would expect most chatbots/human doctors to write", and "the respondent used a normal writing style for a chatbot" ($M = 2.55$, $SD = .70$, Cronbach's $\alpha = .85$).

Behavioral intentions scale measures the degree to which situations participants tend to consider chatbots as health communication alternatives. This measure was adapted from Lai et al. [34] with 3 items "I'm willing to use chatbots for non-emergent consulting", "I'm willing to use chatbots for preliminary diagnosis", and "I will use chatbots as a substitute for human doctor visits in the future". Participants rated the statements on a 5-point scale (1 = strongly disagree, 5 = strongly agree; $M = 2.62$, $SD = 1.27$; Cronbach's $\alpha = .91$).

An individual's chatbot experience with addressing mental health concerns was measured by one question "I have used AI-powered chatbots to help me with addressing mental health concerns" [37] (1 = strongly disagree, 5 = strongly agree; $M = 1.96$, $SD = 1.32$).

2.3. Statistical analysis

Using SPSS 27, we conducted a series of paired samples *t*-tests to compare users' expectations toward different conversational partners. Two-way ANOVAs were conducted to test H1 and RQ2. Specifically, message source and tone were entered as fixed factors, expectancy violation and switching intention were entered as dependent variables respectively, while chatbot experience was entered as a covariate.

3. Results

3.1. Demographics

A total of 364 participants completed the survey, 50.3% identified as female and 0.5% identified as other genders, with an average age of 47 (SD = 17). Other specific demographic information can be found in Table 1. Among all the participants, most of them have not used Chatbots with mental health concerns (59%). Additionally, participants showed a generally positive attitude towards seeking professional help ($M = 3.47$ on a 5-point scale, $SD = .58$). However, the initial willingness to use is relatively low as well ($M = 2.6$ on a 5-point scale, $SD = 1.35$).

Table 1
Demographic information of participants.

Baseline characteristic	N	%
Age group	364	100
18-34	100	27.5
35-54	123	33.8
55 +	141	38.7
Gender	364	100
Female	183	50.3
Male	179	49.2
Non-binary/third gender	2	.5
Race	364	100
White	290	79.7
African American	44	12.1
Asian	10	2.7
Others	20	5.5
Region	364	100
Midwest	76	20.9
Northwest	61	16.8
South	145	39.8
West	82	22.5
Education	363	99.7
High school/some college	169	46.4
Associates or technical degree	50	13.7
Bachelor's degree or above	133	36.5
Others	11	3.1

3.2. Expectations of online chat with chatbot vs. doctors

RQ1 asked about how individuals rate their expectations of online health chat with chatbots or human doctors. A series of paired samples *t*-tests were conducted to compare the effect of source on different expectations. The results showed significant differences in nearly all expectations between chatbots and human doctors. Specifically, individuals have higher expectations from human doctors in all aspects except confidential privacy. The detailed results are presented in Table 2.

3.3. Effects of affection and conversational partners on expectation violation

The results of the two-way ANOVA (H1) showed one main effect of conversational partners on individuals' expectation violation (F (1, 359) = 48.55, $p < .001$, partial η2 = .12). Specifically, individuals' expectation of online chat with a doctor ($M = 2.67$, $SD = 1.10$) is more likely to be violated compared with a chatbot ($M = 1.98$, SD =.73). No significant difference (F (1, 359) = .764, p = .39) was observed with using affection (M = 2.27, SD =.98) or not (M = 2.34, SD =.96), and the interaction between conversational partners and affection were not significant either (F (1, 359) = .26, p = .61). Thus, H1 is not supported. Additionally, an individual's chatbot experience of mental health concern is a significant positive predictor for expectancy violation (F (1, 359) = 6.01, p = .02, partial η2 = .02).

3.4. Effects of affection and conversational partners on behavioral intention

The results of the two-way ANOVA (RQ2) showed a significant interaction effect between conversational partners and affection on behavioral intention (F (1, 359) = 4.49, p = .04). Specifically, individuals are more likely to switch to an online chatbot when the chatbot uses an affective approach (M =2.86, SD =1.32) compared with chatbot with a neutral tone (M = 2.44, SD = 1.29), and similarly, individuals are more likely to switch to chatbots when human doctors are using a neutral tone (M = 2.64, SD = 1.26) compared with a doctor with affective tone (M = 2.52, SD = 1.19). Fig. 2 shows that the switching intention increases when an affection tone is used. Individuals' experience with chatbots for mental health use is also a significant predictor of switching behavior (F (1, 359) = 116.4, $p < .001$).

4. Discussion and conclusion

4.1. Discussion

The current study summarized and examined people's possible expectations toward different mental health conversation partners. The results showed that significant differences exist in nearly all expectations between chatbots and human doctors, in general, individuals' expectations of human doctors are higher than chatbots. Possibly, as the application of such technology in healthcare is still developing, people

Table 2
Means, standard deviations, and paired *t*-test results of expectations.

Expectations	Chatbot (M, SD)	Doctor (M, SD)	df	t
Accuracy	3.63 (1.34)	4.52 (.74)	361	-11.83 **
Personalization	3.53 (1.36)	4.50 (.75)	360	-12.43 **
Timely feedback	3.93 (1.19)	4.53 (.73)	359	-17.37 **
Affection	3.43 (1.32)	4.72 (.66)	357	-17.37 **
Confidential privacy	4.14 (.25)	4.28 (.84)	362	-1.85
Relationship	3.03 (1.40)	4.28 (.84)	362	-15.90 **
Easy to use	4.08 (1.15)	4.36 (.90)	359	-4.15 **
Entertainment	2.79 (1.28)	3.30 (1.23)	362	-7.63 **

Note: ** p < .001

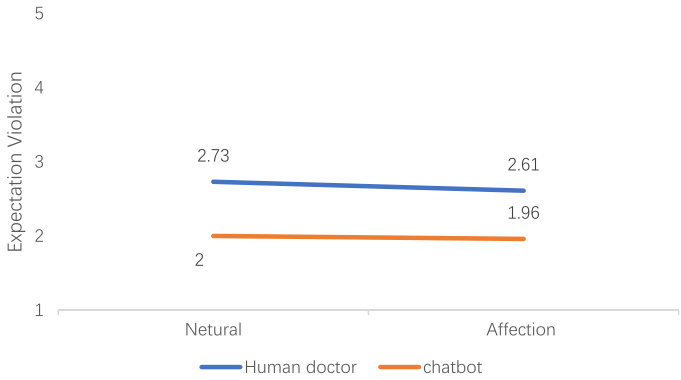


Fig. 1. The effects of conversational partners and affection on expectation violation.
Note: $p < .001$ (Main effect between human doctor and chatbot).

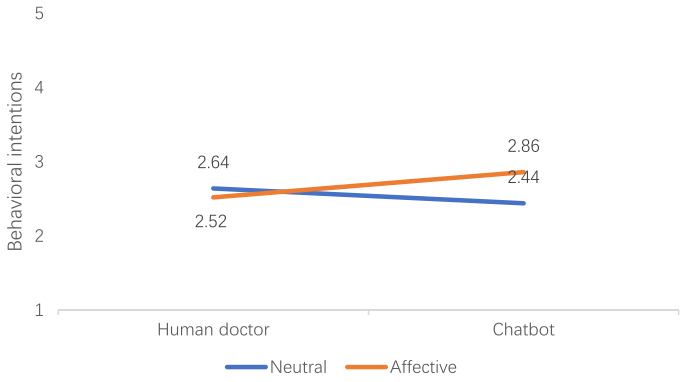


Fig. 2. The impacts of conversational partners and affection on switching intentions.
Note: p = .04 (Interaction effect between source and affection).

are unclear about what the chatbots can do, which makes their expectations toward chatbots undefined [6]. Meanwhile, more interaction with human doctors makes us label human doctors as having high credibility [38], thus raising our expectations. However, current lower expectations for chatbots mean that they can be better designed to meet people's expectations more effectively, which shows the promise of the applications of chatbots. In addition to the comparison between different conversational partners, there are slight differences within the eight expectations. For example, people's expectation of privacy is the highest and entertainment is the lowest, both for human doctors and chatbots. In the context of mental health communication, it is understandable that people want to keep their concerns private, and entertainment is not the main appeal. In addition, whether these differences in expectations are applicable to other contexts is worth studying in the future.

When comparing individuals' affective expectation violation of chatbots and human doctors, we found that individuals' expectation of online chat with a doctor is more likely to be violated compared with a chatbot. The finding is consistent with the literature on emotional support [31], highlighting that emotional support from a human partner led to greater perceived supportiveness of the partner than that from a chatbot. However, no significant difference was observed in the interaction between conversational partners and affection, which suggests that the affective approach cannot yet overturn the different expectations between doctors and chatbots. Meng and Dai [31] explained that a conversational partner's affective tone may not have a significant impact on the overall event. Lew & Walther [15] also pointed out that the interactions with chatbots are affected by plenty of social factors and social scripts, it might be unrealistic to expect significant expectation

violations or discrepancies between different conversational partners just by using an affective approach.

Regarding behavioral intentions, i.e., non-emergent consulting, preliminary diagnosis, and a substitute for human doctors, we found that affection and conversational partners have a significant positive effect on individuals' intention to use chatbots. Specifically, individuals are more likely to consider using a chatbot when the chatbot uses an affective approach, and consistently, individuals are more likely to switch to chatbots when human doctors use a neutral tone. From the result of RQ1, it can be seen that people have lower affective expectations for chatbots than human doctors, so they are more likely to be satisfied with chatbots. Given that a conversational partner should provide support rather than ignore or blame someone disclosing their mental health concerns [39], we infer that a chatbot with a high level of affection is more likely to meet people's expectations, which gives it an advantage compared to human doctors. This finding is consistent with the literature on supportive communication [40], highlighting that perceived supportiveness makes chatbots a successful and reliable source for mental health communication. This could be achieved by designing high-quality support messages [41]. We bring this up in hopes of inspiring more effective designs for chatbots, such as adding affective expressions to chatbots when it comes to mental health topics.

The current study is not without limitations. First, the experiment in this study required participants to watch a pre-recorded video rather than engage in an actual conversation with a chatbot or doctor. This keeps the content of the experiment controlled but does not fully reflect natural interaction. Future studies might consider interactivity when processing messages, such as having participants engage in an immediate conversation with the conversation partner. Furthermore, although the implications for mental health problems are supported by the current study, its application to other contexts needs to be confirmed. In other words, it would be meaningful for future research to replicate our findings in other scenarios to confirm their validity. A third limitation is the insufficient consideration of participants' demographic factors and past personal experiences such as their clinical diagnosis or experience with the healthcare system, which could affect their interactions with communication partners. Future research may consider these and investigate their impacts on subsequent behavioral intentions.

4.2. Conclusion

As chatbots play larger roles in daily life, and their merits in mental health communication cannot be ignored, questions arise regarding what people expect from their communications and their weight with human doctors. However, work on expectations has not been well proposed and studied. The current work summarized and proposed eight expectations for mental health communication, and found that individuals' expectations of human doctors are generally higher than chatbots. Taking affective expectation as the object, this work investigated people's expectations of chatbots and human doctors, as well as their corresponding behavioral intentions. Specifically, individuals are more likely to use an online chatbot when the chatbot uses an affective approach or the human doctor uses a neutral tone. Individuals' expectation of online chat with a doctor is more likely to be violated compared with a chatbot, and their past experiences with chatbots for mental health communication use play a significant role. Results from this study not only contribute to a better understanding of the expectations of chatbots and human doctors in mental health communication but also provide a basis for better designing chatbots that meet human expectations.

4.3. Practice Implications

The findings of this study have several practical implications. First, the findings unveiled users' preferences and responses to chatbot use in mental health care, chatbot designers and physicians can better design their messages when communicating with people with mental health concerns to communicate effectively. For example, adding affection to messages may better meet patient expectations and lead to smoother communication. From a large scope of view, with the increase in the availability of chatbots or other AI-powered communication technology, instead of seeing chatbots as a competing resource of actual doctors, the widespread adoption of high-quality chatbots can significantly benefit individuals with mental health concerns and serve as human doctors' helpers, thereby helping to reduce social problems such as physician resource shortages and medical resource inequality.

CRediT authorship contribution statement

Yuan Shupei: Writing – review & editing, Supervision, Funding acquisition, Formal analysis, Data curation. **Qian Xuan:** Writing – review & editing, Writing – original draft, Resources, Methodology, Investigation, Conceptualization.

Declaration of Competing Interest

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

Appendix A

Chatbot - Neutral https://www.youtube.com/watch?v=54cheZafjWs.

Chatbot – Affection https://www.youtube.com/watch?v=yXDYxTTNM_8&t=43s.

Human doctor – Neutral https://www.youtube.com/watch?v=MNwURcSzMlU.

Human doctor – Affection https://www.youtube.com/watch?v=zV1fC_syFn8&t=44s.

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