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Can AI Elicit More Psychological Self-Cure Assistance? An Empirical Study of the Chatbots

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1. INTRODUCTION AND RESEARCH QUESTIONS

Traditional mental health care consistently encounters several significant challenges, such as the imbalance of great demand and limited supply, the high cost associated and difficulty of providing instant psychological service [8]. The coverage and availability of mental health services are excessively insufficient. With the rapid development of emerging generative artificial intelligence (GAI), artificial intelligence (AI) has applied in various fields. Especially, the chatbots, as a significant application of AI, are extensively applied in the field of mental health for psychological cure and emotional support. The utilization of these chatbots offers new possibilities for overcoming the limitations of traditional mental health care, with lower barrier to entry and more convenient access to prompt and instant psychological assistance [4]. Unlike previous technological tools, chatbots attempt to simulate the atmosphere just like the human-to-human communication, establishing a natural and interpersonal environment to facilitate users' engagement and emotional connection through the human-chatbot interaction in mental health setting [7]. And the quality of this interactions greatly depends on the chatbots' human-like competencies to create a natural interaction [1]. Based on media naturalness theory(MNT), chatbots mainly represent three human-like competencies like the human-to-human communication during the human-chatbot interaction, that is cognitive competency, relational competency and emotional competency, which respectively decrease users' cognitive effort, lessen communication ambiguity and heighten physiological arousal [1].

Previous studies have extensively explored the mechanism of the utilization of health-related chatbots to promote users' health behavior change and support disease self-management for physical health [6]. However, fewer studies investigate the impact of chatbots' utilization on users' psychological well-being in the field of mental health. Specifically, there exists a research gap of comprehensive understanding of how chatbots' human-like competencies influence users' psychological well-being through human-chatbot interaction. Self-esteem, as a crucial aspect of an individual's sense of self-worth [6], is an important indicator to reflect an individual's psychological well-being. In this study, we conceptualize "AI-enabled self-esteem" as users' subjective self-esteem enhanced by AI technology to reflect their overall psychological well-being by the use of AI.

Therefore, this study will examine how chatbots reshape the AI-enabled self-esteem of users. Our research questions are as follows: (1) How do human-like competencies of chatbots (cognitive competency, relational competency and emotional competency) foster user's emotional resonance? (2) How does users' emotional resonance influence users' AI-enabled self-esteem?

2. THEORY AND RESEARCH MODEL

2.1 The Effect of AI's Human-Like Competencies on Emotional Resonance

The level of interaction between humans and AI chiefly relies on the chatbots' competencies to mimic human behavior. Based on media naturalness theory, we mainly discuss AI's cognitive, relational and emotional competency as AI's human-like competencies, which corresponds with less cognitive efforts, communication

ambiguity and higher physiological arousal respectively. The three competencies can foster human-chatbot interaction, enhancing users' emotional resonance. So we propose the following hypotheses:

H1: AI's cognitive competency is positively related to user's emotional resonance.

H2: AI's relational competency is positively related to user's emotional resonance.

H3: AI's emotional competency is positively related to user's emotional resonance.

When individuals experience emotional resonance during the interactions, they will feel that their emotions are understood and valued, thereby enhancing their emotional connections and establish close relationship. By providing positive support, users will receive a sense of self-value in emotional connection process, enhancing their AI-enabled self-esteem.

H4: Emotional resonance positively influences user's AI-enabled self-esteem.

The hypotheses and research framework are proposed Figure 1.

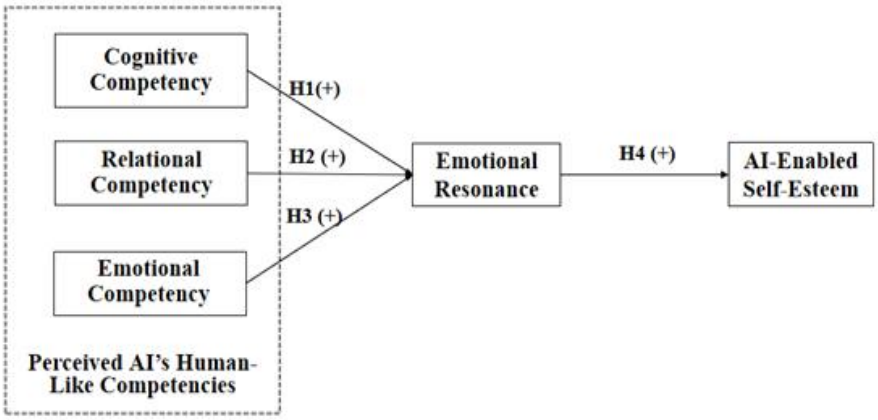

Figure 1. Research model

3. MATERIALS, RESULTS AND MAJOR FINDINGS

A questionnaire was used to validate the conceptual model. All constructs are measured with multi-item 7-point Likert scales adapted from prior studies, and the measurement items for all constructs were derived from existing scales. We conducted a pretest and had some certain revisions to confirm the on the reliability and validity tests of the data. Then we collected 451 valid questionnaires from a Chinese online questionnaire platform during January 2024, and the participants all once had used chatbots for mental health counseling. We adopted PLS-SEM to assess the measurement model and structural model using SmartPLS4.0 software, and the result is shown in **Table 1**.

This study observed some valuable and interesting findings: (1) The AI's human-like competencies (cognitive, relational and emotional competency) have a positive effect on the emotional resonance experienced by users, which further confirms the conclusion tested in prior research [2]. Interestingly, among these competencies, the relational competency has the most significant effect (highest standard path), indicating that reducing communication ambiguities has more influence than high physiological arousal (emotional competency) and low cognitive effort (cognitive competency). This may be due to the fact that relational competency, involving the ability to cooperate with others and develop and maintain harmonious interpersonal relationships, is crucial in creating a supportive and engaging environment. It directly impacts the quality of interaction and communication, fostering a sense of trust and emotional bonds [5]. (2) Emotional resonance experienced by users also has a significantly positive effect on user's AI-enabled self-esteem.

Table 1. Results of hypotheses testing

Hypotheses	Beta, P-Values	Supported?
Cognitive Competency → Emotional Resonance (H1)	0.139** (0.001)	Yes
Relational Competency → Emotional Resonance (H2)	0.473***(0.000)	Yes
Emotional Competency → Emotional Resonance (H3)	0.312***(0.000)	Yes
Emotional Resonance → AI-Enabled Self-Esteem (H4)	0.641***(0.000)	Yes

4. MAIN CONTRIBUTIONS

Our research not only theorizes the AI's human-like competencies into cognitive competency, relational competency and emotional competency based on the media naturalness theory, but also enriches the study on the relationship between AI's human-like competencies and user's AI-enabled self-esteem, which reflects the psychological well-being to a certain extent. From a management perspective, although the effect of three competencies is different, all of them are of great significance. In the context of mental health, companies should take a holistic approach to design and development of chatbots, ensuring that cognitive, relational, and emotional competencies are integrated greatly. At the same time, with the strong correlation to AI-enabled self-esteem, organizations should prioritize the development and design of chatbots to create and maintain a safe and warm environment which make users easier engage into the emotional resonance state. In addition, some potential ethical and privacy concerns related to the use of chatbots for psychological assistance, such as general attitudes towards AI and AI literacy, is not considered in this research, so the empirical results may be limited and the test is encouraged in the future study.

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REFERENCES

1. Chandra, S. et al.: To Be or Not to Be…Human? Theorizing the Role of Human-Like Competencies in Conversational Artificial Intelligence Agents. Journal of Management Information Systems. 39(4), 969–1005 (2022).
2. Diener, E., Seligman, M.E.P.: Beyond Money: Toward an Economy of Well-Being. Psychological Science in the Public Interest: A Journal of the American Psychological Society. 5(1), 1–31 (2004).
3. Donnellan, M.B. et al.: Self-Esteem: Enduring Issues and Controversies. The Wiley-Blackwell Handbook of Individual Differences. 718–746 (2013).
4. Ebert, D.D. et al.: Internet- and Mobile-Based Psychological Interventions: Applications, Efficacy, and Potential for Improving Mental Health. European Psychologist. 23(2), 167–187 (2018).
5. Li, J. et al.: Patients' emotional bonding with MHealth apps: An attachment perspective on patients' use of MHealth applications. International Journal of Information Management. 51, 102054 (2020).
6. Orth, U., Robins, R.W.: The Development of Self-Esteem. Current Directions in Psychological Science. 23(5), 381–387 (2014).
7. Schuetzler, R.M. et al.: The influence of conversational agent embodiment and conversational relevance on socially desirable responding. Decision Support Systems. 114, 94–102 (2018).
8. Wei, L.-C.: Enhancing mental health support for healthcare workers: Integrating mobile apps with traditional services. Archives of Psychiatric Nursing. 49, 55(2024).