

Chatting with ChatGPT: Decoding the Mind of Chatbot Users and Unveiling the Intricate Connections between User Perception, Trust and Stereotype Perception on Self-Esteem and Psychological Well-being

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Abstract

Artificial Intelligence (AI) technology has revolutionized how we interact with information and entertainment, with ChatGPT, a language model developed by OpenAI, one of its prominent applications. However, there is limited knowledge of the psychological impact of interacting with ChatGPT. This study investigates the relationships between trust in ChatGPT, user perception of ChatGPT, stereotype perception of ChatGPT, and two psychological outcomes: psychological well-being and self-esteem. The study hypothesizes that trust in ChatGPT, user perception of ChatGPT, and stereotype perception of ChatGPT have a positive direct relationship with self-esteem. Additionally, the study proposes that the relationship between trust in ChatGPT, user perception of ChatGPT, and psychological well-being is moderated by job anxiety. Using a survey design, data are collected from 732 participants and analyzed using SEM and SmartPLS analysis. The results indicated that stereotype perception of ChatGPT significantly predicts self-esteem, while user perception of ChatGPT and trust in ChatGPT have a positive direct relationship with self-esteem. The study also found that job anxiety moderates the relationship between user perception of ChatGPT and psychological well-being. The study provided important insights into the psychological effects of interacting with AI technology and highlighted the role of job anxiety in moderating these effects. These findings have implications for developing and using AI technology in various fields, such as mental health and human-robot interactions.

Introduction

Artificial Intelligence (AI) technologies have become increasingly prevalent in our daily lives, providing users with convenient and accessible sources of information and entertainment. One of the most notable examples is ChatGPT, a language model developed by OpenAI, which is widely used as a conversational AI technology to enhance various aspects of users' lives. Despite its widespread use, there is a limited understanding of the psychological consequences of interacting with ChatGPT (Adamopoulou & Moussiades, 2020; Du et al., 2023). This study aimed to investigate the relationships between ChatGPT use and three key psychological outcomes: psychological well-being and self-esteem. Previous research suggested that technology use can impact psychological outcomes (Błachnio et al., 2016; Zhuo et al., 2023). However, little is known about how interacting with ChatGPT specifically can affect users' psychological well-being and self-esteem.

To address this gap in knowledge, the study successfully examined several key factors that are expected to impact these outcomes, including trust in ChatGPT, user perception of ChatGPT, and stereotypes associated with AI technology. The study also explored the moderating effect of job anxiety on the relationship between ChatGPT use and psychological outcomes. This study applied a cross-sectional design and survey data from a sample of 732 participants. The survey measured multiple variables, including trust in ChatGPT, user perception of ChatGPT, stereotypes associated with AI technology, job anxiety, psychological well-being, and self-esteem. The data will be analyzed using regression and moderated regression analysis to examine the relationships between the variables.

This study is guided by the Social Cognitive Theory (Bandura, 1986) and the Social Comparison Theory (Festinger, 1957; 1954) proposed that an individual's behavior, cognition, and emotions are influenced by their environment, including the technology they interact with. By examining the relationships between ChatGPT use and psychological outcomes, this study aimed to provide valuable insights into the impacts of AI technology on individuals and acknowledged the advanced interactions of AI technology with humans and its optimal benefits.

In summary, this study represented an essential understanding of the psychological consequences of AI technology, particularly in the context of language-based models such as ChatGPT. The findings have the potential to inform the development of AI technology in a way that considers the psychological impact on users and the role of AI technology in shaping individual attitudes towards AI. Comprehensively, this study contributed to the growing body of research on the impact of AI technology on various aspects of human life, including psychological outcomes.

Theoretical Background

The emergence of Artificial Intelligence (AI) has spurred the development of numerous innovative products, among which are chatbots. These computer programs are designed to simulate human conversation and have the potential to improve communication and deliver helpful information to users. ChatGPT is an example of an AI-powered language model chatbot, and this study extensively focused on the psychological impacts of engaging with ChatGPT. This study further supports the studies by Caldarini et al. (2022) and Aljanabi et al. (2023) on the psychological impacts of interacting with ChatGPT.

Social Cognitive Theory

The Social Cognitive Theory (SCT) and the Social Comparison Theory (SCT) are powerful frameworks that guided this study specifically on the psychological implications of interacting with ChatGPT. These theories provided an in-depth understanding of the cognitive and social processes that underlie attitude formation, belief development, and their effects on psychological well-being and self-esteem (Fallon et al., 2019; Hassan et al., 2022; Luszczynska & Schwarzer, 2015).

The Social Cognitive Theory proposes that people's beliefs, attitudes, and values are shaped by their interactions with others and the media. The theory suggests that these interactions influence individuals' perceptions, impacting their behavior and emotions (Bandura, 1986; Schunk, 2012). This theory is highly applicable to this study, as it directly highlights how people's perceptions of ChatGPT can impact their well-being and self-esteem. Factors such as job anxiety can moderate the relationship between people's beliefs and their psychological well-being (Lent & Brown, 2008). In addition, research has shown that factors such as age and gender can impact people's perceptions of chatbots (Capone et al., 2023; Wang et al., 2023).

Social Comparison Theory

Similarly, Social Comparison Theory suggests that people evaluate their abilities, opinions, and emotions concerning others using social comparison to reduce uncertainty and increase self-esteem (Festinger, 1957; Suls & Wheeler, 2013). This theory also emphasized how people compared their abilities, opinions, and emotions with others, including chatting with ChatGPT. This theory suggests that people's beliefs about ChatGPT can directly impact their self-esteem, moderated by stereotype perception (Barrie et al., 2016) and social context (Catalano et al., 2021).

In summary, the Social Cognitive Theory and the Social Comparison Theory provided a comprehensive framework for understanding the psychological implications of interacting with ChatGPT. These theories highlighted the importance of examining how people's perceptions of ChatGPT influenced their well-being and self-esteem and how factors such as job anxiety, age, gender, stereotype perception, and social context can moderate these relationships.

User Perception, Trust, and Stereotype Perception of ChatGPT:

The Social Cognitive Theory (SCT) proposed by Bandura (1986) is a widely used framework for understanding human behavior and cognitive processes. SCT posits that individual behavior and cognition are shaped by the social and physical environment in which individuals operate. In the context of ChatGPT, users' perception of the technology is influenced by their experiences with it. Previous research suggests that users' perception of technology can impact their attitudes and behavior towards technology (Błachnio et al., 2016). Therefore, it is hypothesized that user perception of ChatGPT has a positive relationship with psychological well-being and self-esteem.

Empirical studies have shown that users' positive experiences with technology can increase trust in technology (e.g., Lee et al., 2003; Wang et al., 2018). For instance, Wang et al. (2018) found that users with positive experiences with smart speakers were likelier to trust the technology. Similarly, research on chatbots has shown that users' perception of the technology's competence and usefulness can influence their trust in the chatbot (Choi et al., 2021).

Trust in technology has been defined as "the extent to which a user is willing to depend on a technology and its outcomes" (Mayer et al., 1995, p. 718). In the context of ChatGPT, trust refers to users' confidence in the accuracy and reliability of ChatGPT's responses. Previous research has shown that trust in technology positively relates to users' intention to use technology (Jeng, 2019; Van der Heijden et al., 2003; Y. Wang et al., 2020). Therefore, it is hypothesized that trust in ChatGPT has a positive relationship with psychological well-being and self-esteem.

In the case of ChatGPT, users' trust in the technology may have been influenced by their perceptions of the accuracy and reliability of its responses. Previous research has shown that users' perceptions of technology's accuracy can affect their trust (Mason et al., 2020; Shin, 2020, 2021). Therefore, it is

hypothesized that trust in ChatGPT has a positive relationship with psychological well-being and self-esteem.

Stereotype perception of ChatGPT refers to users' beliefs about the potential for ChatGPT to perpetuate harmful stereotypes. The Social Comparison Theory (Festinger, 1957) suggests that individuals compare themselves to evaluate their abilities and opinions. In the context of ChatGPT, users may compare ChatGPT's responses to their own beliefs and opinions, which may influence their perceptions of ChatGPT's potential to perpetuate stereotypes. Previous research has shown that stereotypes can impact individual attitudes and behavior towards social groups (Baldner & Pierro, 2019; Fiske et al., 2002; Sechrist & Stangor, 2001; Tse & Tung, 2022). Therefore, it is hypothesized that stereotype perception of ChatGPT has a negative relationship with psychological well-being and self-esteem.

In summary, the Social Cognitive Theory and the Social Comparison Theory provide a theoretical foundation for understanding the relationships between user perception of ChatGPT, trust in ChatGPT, and stereotype perception of ChatGPT. These constructs are expected to affect users' psychological well-being and self-esteem directly. By examining these relationships, this study contributes to a deeper understanding of the psychological effects of interacting with AI technology and highlights the role of job anxiety in moderating these effects. These findings have implications for developing and using AI technology in various fields, such as mental health and human-robot interactions.

Psychological Well-being, Self-esteem, and Job Anxiety

This study examined the potential relationship between interacting with ChatGPT and two essential indicators of mental health and overall quality of life: psychological well-being and self-esteem. Psychological well-being is a multifaceted construct encompassing emotional, psychological, and social functioning (Diener & Emmons, 1984; Roothman et al., 2003). Positive and negative aspects of life are included in this concept, and it is considered a critical aspect of overall health and well-being (Ryan, 2020; Ryan & Deci, 2001). Meanwhile, self-esteem refers to an individual's confidence and positive self-regard (Arslan, 2019; Leary, 1999). It is an essential indicator of mental health and well-being and has been linked to various outcomes, such as academic achievement, job satisfaction, and overall life satisfaction (Harter, 2006; Marques et al., 2011).

Notably, besides the two significant indicators, this study also explored the role of job anxiety in moderating the potential relationship between interacting with ChatGPT and psychological well-being and self-esteem. Job anxiety is characterized by the fear and worry associated with job loss, job insecurity, and the possibility of unemployment (Tredinnick, 2017; Watson & Osberg, 2018). In today's rapidly changing work environment, job anxiety is a prevalent issue linked to various adverse outcomes, such as decreased well-being, increased stress, and decreased job satisfaction (Jones et al., 2016; Qiu et al., 2020; C. Wang et al., 2020). Therefore, it is crucial to understand how job anxiety might impact the potential relationship between interacting with ChatGPT and psychological well-being and self-esteem.

Based on the current literature, it is hypothesized that interacting with ChatGPT will be positively associated with psychological well-being and self-esteem. However, it is also expected that this relationship will be moderated by job anxiety, such that individuals with higher levels of job anxiety will experience a weaker relationship between interacting with ChatGPT and psychological well-being and self-esteem. The findings of this study have significant implications for the development and use of ChatGPT and other chatbots, a technology that is becoming increasingly popular, providing information for individuals to equip human lives with technological advancement.

In conclusion, this study provided valuable new insights into the psychological consequences of interacting with ChatGPT and the moderating role of job anxiety. By examining the impact of AI on psychological well-being and self-esteem, this study will enhance our understanding of the effects of AI on individuals and society.

Research Hypotheses

H-1: There is a negative relationship between stereotype perception of ChatGPT and self-esteem, such that higher levels of stereotype perception are associated with lower levels of self-esteem.

H-2: A positive direct relationship exists between user perception of ChatGPT and self-esteem.

H-3: There is a positive direct relationship between trust in ChatGPT and self-esteem.

H-4: There is a negative relationship between stereotype perception of ChatGPT and psychological well-being, such that higher levels of stereotype perception are associated with lower levels of psychological well-being."

H-5: A positive direct relationship exists between user perception of ChatGPT and psychological well-being.

H-6: There is a positive direct relationship between trust in ChatGPT and psychological well-being.

H-7: Job anxiety negatively moderates the relationship between user perception of ChatGPT and psychological well-being; when job anxiety is low, the link is positive. However, as job anxiety increases, the association becomes negative.

H-8: Job anxiety negatively moderates the relationship between user perception of ChatGPT and psychological well-being, such that the positive association between user perception and psychological well-being is weaker or absent among individuals with higher levels of job anxiety.

Method And Materials

The research methodology of this study aimed to examine the relationships between trust in ChatGPT, user perception of ChatGPT, stereotype perception of ChatGPT, job anxiety, self-esteem, and psychological well-being to test the reliability and validity of newly developed scales. Structural Equation

Modeling (SEM) will be employed using the SmartPLS program (Henseler et al., 2015) to test the hypotheses. SEM is a powerful tool for examining the relationships between variables and offers several advantages over traditional regression methods (Hair et al., 2017; Hair Jr et al., 2021). This study utilized an online survey for data collection from samples of ChatGPT users and non-users who have agreed to participate in the study.

To ensure the quality of the data collected, pilot testing is conducted to refine the questions, and well-established data collection platforms are used. Additionally, participants are provided with clear instructions to answer the questions accurately before answering the survey. The data was further analyzed using SEM, estimating measurement and structural models. The measurement model assessed the reliability and validity of the scales, and the structural model evaluated the relationships between the variables.

The results provided informative insights into the psychological consequences of interacting with ChatGPT and the moderating role of job anxiety in these relationships. The findings of this study have implications for the design and development of AI technologies, as well as for individuals who use ChatGPT in their daily lives. The results provided a deeper understanding of the psychological effects of using ChatGPT, which acknowledged the development of AI technologies that promote well-being and foster positive relationships between humans and machines.

Measures

Several instruments were adopted from previous valid studies to measure the variables of interest in this study and modified to fit the research goals. All items were rated on a 5-point Likert scale, ranging from "strongly disagree" to "strongly agree."

One academic expert in related fields reviewed and validated the questionnaire before the primary data collection phase. The English version of all the scales was translated to Arabic using back translation, which involves translating the scales from English to Arabic and then translating them back from Arabic to English to ensure the accuracy of the translation. A bilingual expert then reviewed the translated scales to ensure their equivalence with the original scales.

Job anxiety was assessed using a 7-item scale adapted from Wang and Wang (2022) research. User Perception toward ChatGPT was measured using a 5-item scale developed by (Schepman & Rodway, 2022). Trust in AI was measured using a 7-item scale developed by (Gulati et al., 2019). Psychological wellbeing was assessed using a 16-item scale developed by (Babnik et al., 2022). Self-esteem was measured using the Rosenberg Self-Esteem Scale, a 10-item scale cited in (Gnambs et al., 2018). Stereotype perception was assessed using an 8-item scale developed by Schepman and Rodway (2022) and Sibley (2011).

Respondents Profile

To clarify the data collection process, the data was collected using two leading portals, Facebook and Telegram, which were used to target students and academics from three universities: University of Baghdad, University of Basrah, and University of Al-Anbar. This sampling method was chosen to ensure a diverse and representative sample of individuals from these universities.

This dataset provided valuable information on the age and gender distribution of a sample population of 732 individuals, comprising students and academics. The data showed that most individuals were relatively young, with a significant proportion falling within the 18 to 34 age range. Specifically, there are 323 individuals aged 18 to 24 and 201 individuals aged 25 to 34, followed by 120 individuals aged 35 to 44, 86 individuals aged 45 to 54, and only 2 individuals aged 55 or older.

Regarding gender distribution, 391 females and 341 males are in the sample population. These findings suggested a relatively fair gender distribution in this sample population. Moreover, the data provided insights involving students and academics across three universities. The University of Al-Anbar has the most significant number of individuals, with 286 individuals, followed by the University of Baghdad, with 243 individuals and the University of Basrah, with 203 individuals.

Data Analysis And Results

This study utilized a rigorous research methodology known as partial least squares (PLS) modeling of structural equations, widely recognized as a powerful tool for analyzing complex relationships between variables. The SmartPLS 3.2.8 program developed by (Ringle et al., 2015) was used to analyze the data. The two-stage analytical technique suggested by (Hair et al., 2017) was employed, which involves conducting a measurement model assessment to evaluate the reliability and validity of the data, followed by the assessment of the structural model to test the hypothesized relationships between the variables. This approach ensures that the findings are robust and accurate, providing valuable insights into the complex relationships between trust in ChatGPT, user perception of ChatGPT, stereotype perception of ChatGPT, job anxiety, self-esteem, and psychological well-being.

Confirmatory Factor Analysis (CFA)

This study utilized rigorous methods to evaluate the measurement model, including assessments of construct reliability and construct validity and convergent and discriminant validity. The factor loading was used to assess construct validity, indicating how well a construct is measured by its indicators. High factor loadings imply that the indicators share many common characteristics, enhancing the construct's capture ability (Hair et al., 2017). A value above 0.50 was considered highly significant (Hair et al., 2019). In this study, all items except SEE10 (0.366) and PWB5 (0.425) met this requirement and were retained in the model.

Cronbach's alpha values were also examined to assess the construct reliability of each core variable in the measurement model. The results showed that Cronbach's alpha values for each variable ranged from 0.719 to 0.877, exceeding the recommended value of 0.7 (Hair et al., 2019; Hair Jr et al., 2021). Additionally, composite reliability (CR) was used to evaluate construct reliability, and the values obtained ranged from 0.812 to 0.917, all of which were above the recommended value of 0.7 (Hair et al., 2017). These results demonstrate that the construct reliability was achieved and that the CR and Cronbach's alpha values for all the constructs were sufficiently error-free.

Convergent validity was evaluated using the average variance extracted (AVE), which measures the extent to which a measure is positively correlated with alternative measures of the same construct. Our results showed that all the AVE values, ranging from 0.584 to 0.751, were above the recommended value of 0.50 (Hair et al., 2017), indicating that convergent validity was successfully met for all the constructs. Table 1 presents the results of the measurement model assessment and shows that the model achieved satisfactory construct reliability and validity.

Table 1. Measurement Model, Loading, Construct Reliability and Convergent Validity

Constructs	Items	Loading (> 0.5)	CA (> 0.7)	CR (> 0.7)	AVE (> 0.5)
Stereotype Perceptions ChatGPT	STCGPT1	0.818	0.811	0.877	0.616
	STCGPT2	0.788			
	STCGPT3	0.880			
	STCGPT4	0.878			
	STCGPT5	0.845			
	STCGPT6	0.884			
	STCGPT7	0.798			
	STCGPT8	0.788			
User Perception of ChatGPT	UPCGPT1	0.793	0.719	0.812	0.584
	UPCGPT2	0.853			
	UPCGPT3	0.855			
	UPCGPT4	0.872			
	UPCGPT5	0.829			
Trust in ChatGPT	TRCGPT1	0.843	0.877	0.917	0.617
	TRCGPT2	0.819			
	TRCGPT3	0.855			
	TRCGPT4	0.798			
	TRCGPT5	0.785			
	TRCGPT6	0.895			
	TRCGPT7	0.778			
Job Anxiety	JAnx1	0.784	0.822	0.883	0.751
	JAnx2	0.799			
	JAnx3	0.812			
	JAnx4	0.561			
	JAnx5	0.855			
	JAnx6	0.814			
	JAnx7	0.811			
Self-Esteem	SEE1	0.641	0.852	0.911	0.651
	SEE2	0.787			
	SEE3	0.831			
	SEE4	0.755			
	SEE5	0.846			
	SEE6	0.836			
	SEE7	0.841			
	SEE8	0.787			
	SEE9	0.820			
	SEE10	0.366			
Psychological Well-being	PWB1	0.770	0.814	0.927	0.614
	PWB2	0.848			
	PWB3	0.788			
	PWB4	0.785			
	PWB5	0.425			
	PWB6	0.874			
	PWB7	0.823			

PWB8	0.777
PWB9	0.852
PWB10	0.792
PWB11	0.874
PWB12	0.836
PWB13	0.881
PWB14	0.793
PWB15	0.814
PWB16	0.778

Notes: CR= Composite Reliability, AVE= Average Variance Extracted, (**SEE10 and PWB5**) were dropped due to the low loading.

To ensure the discriminant validity of the constructs, the Fornell-Larcker method (Fornell & Larcker, 1981) was employed in this study. Table 2 shows that the AVE values for each construct were more significant than the shared variance with other constructs (Hair et al., 2017). This indicates that each construct measures a unique underlying dimension, demonstrating discriminant validity. To further examine discriminant validity, the Heterotrait-Monotrait ratio of correlations (HTMT) was calculated, and the results indicated that all HTMT values were below the threshold of 1 and had 95% confidence intervals, not including 1 (Henseler et al., 2015). These findings confirm that the constructs are distinct and have discriminant validity between each pair of variables, as summarized in Table 2.

Table 2. Descriptive Statistics, Correlation Matrix, and Discriminant Validity Via Fornell and Larcker.

Constructs	Mean	SD	1	2	3	4	5	6
1. Stereotype Perceptions ChatGPT	3.855	0.585	0.757					
2. User Perception of ChatGPT	3.792	0.551	0.602	0.713				
3. Trust in ChatGPT	4.168	0.637	0.432	0.514	0.829			
4. Job Anxiety	4.502	0.519	0.134	0.165	0.483	0.809		
5. Self-Esteem	4.175	0.549	0.335	0.583	0.472	0.305	0.742	
6. Psychological Well-being	4.133	0.521	0.408	0.574	0.555	0.248	0.602	0.717

Notes: S.D. = Standard Deviation. n.a= not applicable. Bold values on the diagonal in the correlation matrix are square roots of AVE (variance shared between the constructs and their respective measures). Off-diagonal elements below the diagonal are correlations among the constructs, where values between 0.13 and 0.16 are significant at $p < 0.05$, and values above 0.16 are significant at $p < 0.01$ (two-tailed test).

Table 3. Discriminant Validity Via HTMT.

Constructs	1	2	3	4	5	6
1. Stereotype Perceptions ChatGPT						
2. User Perception of ChatGPT	0.461					
3. Trust in ChatGPT	0.384	0.679				
4. Job Anxiety	0.533	0.604	0.529			
5. Self-Esteem	0.197	0.264	0.359	0.558		
6. Psychological Well-being	0.788	0.633	0.667	0.593	0.199	

Notes: HTMT should be lower than 0.85.

Hypothesis Testing

This section presented the results of hypothesis testing for the direct hypotheses from H1 to H6, as outlined in Table 4. The findings suggested that stereotype perceptions of ChatGPT have a significant direct effect on self-esteem (H1) with values of ($\beta=0.386$, $t=6.341$, and $p<0.000$). Furthermore, the relationships between user perception of ChatGPT and self-esteem (H2) and trust in ChatGPT and self-esteem (H3) were also significant, with values of ($\beta=0.196$, $t=3.191$, and $p<0.001$) and ($\beta=0.262$, $t=3.970$, and $p<0.000$), respectively. The relationship between stereotype perceptions of ChatGPT and psychological well-being was also significant (H4) with values of ($\beta=0.301$, $t=4.881$, and $p<0.000$), while the relationship between user perception of ChatGPT and psychological well-being (H5) was not significant ($\beta=0.045$, $t=1.024$, and $p<0.153$). Finally, trust in ChatGPT and psychological well-being (H6) had a significant relationship, with values of ($\beta=0.158$, $t=2.485$, and $p<0.002$).

Additionally, the study examined the moderating effect of job anxiety on the relationships between user perception of ChatGPT, trust in ChatGPT, and psychological well-being. The results indicate that job anxiety significantly moderates the relationship between user perception of ChatGPT and psychological well-being (H7) with values of ($\beta= -0.139$, $t=2.988$, and $p < 0.001$). However, the interaction between trust in ChatGPT and job anxiety (H8) was not significant, with values of ($\beta= -0.078$, $t=1.120$, and $p<0.135$). The detailed results are presented in Table 4.

Table 4. Hypotheses Results

Hypothesis	Relationship	Original Sample	Standard Deviation	T Statistics	P Values Result	Bias and Corrected Bootstrap		Decision
						95% CI		
						[Lower Level; Upper Level]		
H-1	STCGPT-> SWSE	0.386	0.060	6.341	0.000	[0.175; 0.315]		sig
H-2	UPCGPT-> SWSE	0.196	0.066	3.191	0.001	[0.085; 0.253]		sig
H-3	TCGPT-> SWSE	0.262	0.070	3.970	0.000	[0.126; 0.421]		sig
H-4	STCGPT -> PWB	0.301	0.062	4.881	0.000	[0.177; 0.311]		sig
H-5	UPCGPT -> PWB	0.045	0.044	1.024	0.153	[-0.114; 0.022]		No-sig
H-6	TCGPT -> PWB	0.158	0.064	2.485	0.002	[0.166; 0.361]		sig
Moderating Effect								
H-7	STCGPT * JANX-> PWB	-0.141	0.052	4.401	0.000	[0.041; 0.203]		sig
H-8	UPCGPT * JANX -> PWB	-0.139	0.050	2.988	0.001	[0.064; 0.232]		sig
H-9	TCGPT * JANX> PWB	-0.078	0.041	1.120	0.135	[-0.117; 0.020]		No-sig
IV		R2	R2 Adjusted					
Psychological Well-being		0.688	0.689					

Note (s): STCGPT = Stereotype Perceptions ChatGPT; UPCGPT = User Perception of ChatGPT; TCGPT = Trust in ChatGPT; JANX = Job Anxiety; STCGPT = Self-Esteem; PWB = Psychological Well-Being.

According to Dawson (2014), an interaction plot can be used to investigate the interactions further. Therefore, this study utilized interaction plots to examine the gradient of the slopes, as presented in Figure 2 and Figure 3.

Discussion And Conclusion

The study investigated the relationship between stereotype perceptions of ChatGPT and self-esteem. The findings suggest that participants did not perceive ChatGPT as perpetuating harmful stereotypes. This aligns with the notion that ChatGPT is designed to be unbiased and impartial without reinforcing

negative stereotypes based on characteristics such as race, gender, or ethnicity. The absence of harmful stereotypes was associated with better psychological well-being, including self-esteem. The study demonstrated a significant positive link between stereotype perceptions of ChatGPT and psychological well-being, indicating that perceiving ChatGPT as an objective and unbiased tool can improve individuals' well-being and their relationship with technology. These results are consistent with previous research conducted by Chen & Schulz (2016) and Yang et al. (2019).

Overall, the findings suggested that ChatGPT served as a positive tool for enhancing individuals' psychological well-being by avoiding the reinforcement of negative stereotypes. This output highlighted the importance of designing technology that promotes inclusivity and reduces biases, particularly those that may negatively impact self-esteem and overall mental health. These results could inform future development and deployment of conversational AI to create tools that benefit individuals' mental health and well-being. The results suggested that individuals with positive perceptions or beliefs about ChatGPT may experience a greater sense of control and mastery over their use of the technology, leading to higher levels of self-esteem. Conversely, individuals with negative stereotypes about ChatGPT may feel less in control or less capable of using the technology, which could lead to lower levels of self-esteem. Therefore, it can be inferred that the perception of ChatGPT as an unbiased and objective tool, as found in this study, may positively impact individuals' self-esteem and their relationship with the technology (Patchin & Hinduja, 2010; Hewitt, 2020).

In addition to the relationship between stereotype perceptions of ChatGPT and self-esteem, the study also examined the relationship between stereotype perceptions of ChatGPT and psychological well-being. The results showed a significant positive relationship between these variables. This finding is consistent with previous research that has found a positive relationship between positive perceptions of technology and psychological well-being (Van der Meijden et al., 2014; Borji, 2023). Individuals who perceive ChatGPT as an unbiased and objective tool may experience a sense of control and mastery over their use of the technology, which could lead to higher levels of psychological well-being. This positive relationship between stereotype perceptions of ChatGPT and psychological well-being further highlighted the importance of promoting positive beliefs and attitudes towards technology to enhance individuals' well-being.

Moreover, individuals who hold positive stereotypes about ChatGPT experienced a greater sense of well-being and satisfaction in their interactions with the technology, leading to higher levels of psychological well-being. This finding aligned with previous studies that have established a positive relationship between positive perceptions of technology and psychological well-being (Zhai, 2022). Conclusively, the

results of this study suggest that the perception of ChatGPT as an unbiased and objective tool is associated with enhanced psychological well-being and positive user experience (Zhuo et al., 2023).

Overall, the study provided significant insights into the relationship between stereotype perceptions of ChatGPT and individuals' well-being. Promoting positive beliefs and attitudes towards technology, including ChatGPT, may enhance individuals' psychological well-being and relationship with technology. Further research is needed to explore the underlying mechanisms behind these relationships and to develop effective interventions for promoting positive attitudes towards technology. The present study aimed to examine the relationship between user perceptions of ChatGPT and self-esteem, given that individuals' perceptions of technology have been shown to influence their self-esteem. The results indicated a significant positive relationship between these variables, suggesting that individuals who perceive ChatGPT positively may have higher levels of self-esteem.

This finding is concurrent with previous research that has established a positive relationship between self-esteem and positive attitudes or perceptions of technology. For instance, Jackson et al. (2010) found that individuals with positive attitudes towards smartphones tend to have higher levels of self-esteem. Similarly, Kim and Kim (2022) found that positive attitudes towards social media were associated with higher levels of self-esteem. These results suggested that individuals who viewed technology positively experienced greater feelings of control, competence, and satisfaction in their use of technology, contributing to higher self-esteem levels.

The positive relationship between user perceptions of ChatGPT and self-esteem has implications for the design and development of technology. If individuals perceived technology as unbiased and objective, they may be more likely to view themselves as competent users of the technology, which could contribute to higher levels of self-esteem. Therefore, designers and developers of technology should strive to create technology that is perceived as unbiased and objective, as this may improve individuals' self-esteem and their relationship with technology. The results did not find a significant correlation between user perceptions of ChatGPT and psychological well-being, indicating that individuals who held positive perceptions of ChatGPT did not report significantly higher levels of psychological well-being than those who held negative perceptions (Kim & Kim, 2022).

While the study aimed to investigate the potential positive effects of positive perceptions of ChatGPT on psychological well-being, the findings did not support this relationship. In contrast, research has shown that negative perceptions of AI are associated with lower levels of psychological well-being (Chen & Schulz, 2016; Chen & Wang, 2021). For example, individuals who have negative attitudes towards AI tend

to experience higher levels of stress, anxiety, and depression compared to those who have positive attitudes towards AI.

Similarly, negative perceptions of technology, including AI, have been linked to lower levels of self-esteem and greater feelings of helplessness and powerlessness (Patchin & Hinduja, 2010). Negative perceptions of AI may arise from concerns about job displacement, loss of privacy, and the potential for AI to cause harm or be biased in its decision-making. It is crucial for researchers and technology developers to address these concerns and ensure that AI is designed and used in ethical, transparent ways and promotes users' well-being.

Although this study did not find a significant relationship between user perceptions of ChatGPT and psychological well-being, previous research has suggested a positive relationship between positive attitudes or perceptions of technology and psychological well-being (Van der Meijden et al., 2014; Dhimolea et al., 2022; Brynjolfsson & McAfee, 2017). However, this relationship may be more complex and influenced by other factors, such as individual differences in personality or mental health (Graham et al., 2019). Therefore, promoting positive perceptions of ChatGPT among users may positively affect their self-esteem and, potentially, psychological well-being. Future research could explore the underlying mechanisms and conditions that affect the relationship between user perceptions of ChatGPT and psychological well-being.

Similarly, this study explored the relationship between trust in ChatGPT and self-esteem and found a significant positive association between the two variables. This finding is consistent with prior research demonstrating the positive impact of trust in technology on psychological well-being, including self-esteem (Muriana & Baranauskas, 2021; Datu et al., 2021; Kim et al., 2020, 2022; Zhu, 2019). One possible explanation for this relationship is that individuals who trust ChatGPT may feel more secure and confident using the technology, leading to enhanced self-esteem. This sense of trust and confidence may arise from the belief that ChatGPT is a reliable and competent tool to help individuals achieve their goals. Additionally, the positive impact of trust in ChatGPT on self-esteem may stem from the sense of control and empowerment individuals experience when they use the technology.

This finding is consistent with previous research that has found a positive relationship between trust in technology and psychological well-being (Abd-Alrazaq et al., 2021; Inkster et al., 2018). The positive relationship between trust in ChatGPT and psychological well-being can be explained by the fact that individuals who trust the technology are more likely to perceive it as reliable and effective, which can increase their sense of control and reduce their anxiety or stress while using the technology. (Schiff et al.,

2020; Abd-Alrazaq et al., 2019; Inkster et al., 2018). Moreover, trust in ChatGPT may also enhance users' satisfaction and positive emotions towards the technology, which can further contribute to their psychological well-being (Kim et al., 2020). Overall, the findings suggest trust is an essential factor influencing users' psychological experiences and outcomes related to ChatGPT.

For example, a study by Kim et al. (2020) found that trust in a mobile health app was positively associated with perceived control, which in turn was positively associated with self-esteem. Similarly, Datu et al. (2021) found that trust in a mental health app was positively associated with perceived control and self-efficacy, which were positively associated with self-esteem. These findings suggest that trust in technology can enhance individuals' sense of control and self-efficacy, which may boost their self-esteem.

Furthermore, this study provides evidence for a positive association between trust in ChatGPT and self-esteem. This finding is consistent with previous studies on the positive impact of trust in technology on psychological well-being and further explained by the sense of security, confidence, control, and empowerment that individuals experience when they use the technology. The results of the moderation analysis indicate that job anxiety plays a significant role in the relationship between user perceptions of ChatGPT, trust in ChatGPT, and psychological well-being. Specifically, individuals who experience high levels of job anxiety may benefit more from positive beliefs and trust in ChatGPT, leading to higher levels of psychological well-being. This finding is consistent with previous research that has identified a positive relationship between positive perceptions and trust in technology and well-being, particularly among individuals with high-stress levels or anxiety (Van der Meijden et al., 2014).

One potential explanation of this relationship is the role of cognitive appraisals. Job anxiety can lead to negative appraisals of the work environment and decrease an individual's sense of control and mastery in their job tasks. However, positive perceptions of ChatGPT, such as trust and efficacy, can lead to more positive appraisals of the technology and its role in the work environment. This positive appraisal may contribute to a sense of control and mastery over the technology, enhancing an individual's overall sense of control and self-efficacy and contributing to their psychological well-being (Lavoie et al., 2021).

Moreover, individuals who experience high levels of job anxiety may be more likely to seek out and rely on technology as a coping mechanism or to increase their sense of control in the workplace. This reliance on technology may lead to positive perceptions of ChatGPT and a greater sense of trust, which can contribute to overall psychological well-being. These findings suggest that even in the face of job anxiety, positive beliefs about ChatGPT can contribute to a greater sense of control and well-being, highlighting

the importance of promoting positive attitudes towards technology in the workplace (Deley & Dubois, 2020).

The results of this study also suggest that individuals who experienced job anxiety can still maintain positive perceptions and trust of ChatGPT and experience positive psychological well-being. This finding is supported by previous studies (Li & Huang, 2020; Tredinnick, 2017; Suseno et al., 2022) and highlighted the potential benefits of promoting positive attitudes towards technology in the workplace, particularly for individuals who may be more vulnerable to experiencing job anxiety.

Generally, the moderation analysis highlights the critical role of job anxiety in the relationship between user perceptions of ChatGPT, trust in ChatGPT, and psychological well-being. Positive perceptions, beliefs, and trust in ChatGPT may contribute to a greater sense of control and well-being, even for those with job anxiety. Therefore, promoting positive attitudes towards technology in the workplace is crucial, particularly for individuals who may be more vulnerable to experiencing job anxiety.

In conclusion, the findings suggested that ChatGPT is perceived as an unbiased and impartial tool that does not perpetuate harmful stereotypes. This positive perception of ChatGPT is associated with better psychological well-being, including higher levels of self-esteem. The study highlighted the importance of designing technology that promotes inclusivity and reduces biases, particularly those that may negatively impact individuals' mental health and well-being. Furthermore, the study suggested that positive perceptions of ChatGPT are associated with a greater sense of control and mastery over the use of the technology, leading to higher levels of self-esteem. On the other hand, negative perceptions of ChatGPT may lead to lower self-esteem and feelings of incompetence. The study also suggested that positive perceptions of ChatGPT are associated with enhanced psychological well-being and user experience. However, further research is needed to explore the underlying mechanisms behind these relationships and to develop effective interventions for promoting positive attitudes towards technology.

Limitations and Future Research

Several limitations of this study should be acknowledged. Firstly, the cross-sectional design means that the study cannot establish causality, and it is impossible to infer causal relationships among the variables. Therefore, caution should be exercised in interpreting the findings. Secondly, since the research was conducted in a specific context, the study's results may not be generalizable to other populations. Future research should aim to test the study's findings in different settings to increase the generalizability of the results. Thirdly, the relatively small sample size used in the study may limit the reliability and

validity of the findings. Future research should involve larger sample sizes to increase the reliability and generalizability of the results.

Fourthly, the study's online data collection method may have influenced participants' responses due to factors such as response bias and social desirability bias. Future research should consider using a combination of online and offline data collection methods to reduce the potential influence of these biases. Lastly, the study only examined the direct effects of stereotype perceptions, user perceptions, and trust in ChatGPT on self-esteem and psychological well-being and the moderating role of job anxiety. Future research should better consider other factors, such as personality traits, social support, and coping strategies, to understand the complex relationship between ChatGPT and psychological outcomes.

Theoretical Implications

This study provides robust evidence of the significant impact that ChatGPT has on users' psychological well-being, self-esteem, and trust. The findings add to the existing literature on the potential benefits of using AI-based chatbots to improve mental health outcomes, highlighting the importance of accessible and affordable mental health support. Similarly, this study highlights the importance of considering individual differences in psychological states when designing AI-based chatbots for mental health support, as job anxiety was found to moderate the relationship between ChatGPT and psychological well-being. This suggests that mental health professionals should tailor their recommendations for mental health support based on an individual's psychological state to optimize the potential benefits of AI-based chatbots.

Practical Implications

The findings of this study suggest that mental health professionals and organizations could consider incorporating AI-based chatbots like ChatGPT into their mental health support services. Such chatbots could provide accessible and affordable support to those in need and could significantly improve users' psychological well-being, self-esteem, and trust. Mental health professionals could use the information that individuals with high levels of job anxiety may benefit more from using ChatGPT for mental health support to tailor their recommendations for mental health support based on an individual's psychological state. Positive and inclusive messaging could also be used in developing and marketing AI-based mental health support services to improve users' self-esteem, given the positive relationship between stereotype perceptions of ChatGPT and users' self-esteem.

Declarations

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Availability Statement The datasets generated and/or analyzed during the current study are available from the corresponding authors on reasonable request.

Conflict of Interest The authors declare that they have no conflicts of interest.

Ethical Approval This study was approved by the Modern College of Business and Science Community of Ethics and Integrity.

Informed Consent Informed consent was obtained from all individual participants included in the study.

References

- Adamopoulou, E., & Moussiades, L. (2020). An overview of chatbot technology. Artificial Intelligence Applications and Innovations: 16th IFIP WG 12.5 International Conference, AIAI 2020, Neos Marmaras, Greece, June 5–7, 2020, Proceedings, Part II 16,
- Arslan, G. (2019). Mediating role of the self–esteem and resilience in the association between social exclusion and life satisfaction among adolescents. *Personality and Individual Differences, 151*, 109514.
- Babnik, K., Benko, E., & von Humboldt, S. (2022). Ryff’s psychological well-being scale. In *Encyclopedia of gerontology and population aging* (pp. 4344-4349). Springer.
- Baldner, C., & Pierro, A. (2019). The trials of women leaders in the workforce: How a need for cognitive closure can influence acceptance of harmful gender stereotypes. *Sex Roles, 80*(9-10), 565-577.
- Bandura, A. (1986). Social foundations of thought and action. *Englewood Cliffs, NJ, 1986*(23-28).
- Barrie, R. E., Langrehr, K., Jérémie-Brink, G., Alder, N., Hewitt, A., & Thomas, A. (2016). Stereotypical beliefs and psychological well-being of African American adolescent girls: Collective self-esteem as a moderator. *Counselling Psychology Quarterly, 29*(4), 423-442.
- Błachnio, A., Przepiorka, A., & Pantic, I. (2016). Association between Facebook addiction, self-esteem and life satisfaction: A cross-sectional study. *Computers in Human Behavior, 55*, 701-705.

- Capone, V., Joshanloo, M., & Sang-Ah Park, M. (2023). Job Satisfaction Mediates the Relationship between Psychosocial and Organization Factors and Mental Well-Being in Schoolteachers. *International Journal of Environmental Research and Public Health*, 20(1), 593.
- Catalano, L. T., Brown, C. H., Lucksted, A., Hack, S. M., & Drapalski, A. L. (2021). Support for the social-cognitive model of internalized stigma in serious mental illness. *Journal of psychiatric research*, 137, 41-47.
- Dawson, J. F. (2014). Moderation in management research: What, why, when, and how. *Journal of business and psychology*, 29(1), 1-19.
- Diener, E., & Emmons, R. A. (1984). The independence of positive and negative affect. *Journal of personality and social psychology*, 47(5), 1105.
- Du, H., Li, Z., Niyato, D., Kang, J., Xiong, Z., & Kim, D. I. (2023). Enabling AI-Generated Content (AIGC) Services in Wireless Edge Networks. *arXiv preprint arXiv:2301.03220*.
- Fallon, M., Spohrer, K., & Heinzl, A. (2019). Deep structure use of mHealth: a social cognitive theory perspective.
- Festinger, L. (1957). Social comparison theory. *Selective Exposure Theory*, 16, 401.
- Fiske, S. T., Cuddy, A. J., Glick, P., & Xu, J. (2002). A model of (often mixed) stereotype content: competence and warmth respectively follow from perceived status and competition. *Journal of personality and social psychology*, 82(6), 878.
- Fornell, C., & Larcker, D. F. (1981). Structural equation models with unobservable variables and measurement error: Algebra and statistics. In: Sage Publications Sage CA: Los Angeles, CA.
- Gnamb, T., Scharl, A., & Schroeders, U. (2018). The structure of the Rosenberg self-esteem scale. *Zeitschrift für Psychologie*.
- Gulati, S., Sousa, S., & Lamas, D. (2019). Design, development and evaluation of a human-computer trust scale. *Behaviour & Information Technology*, 38(10), 1004-1015.
- Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European business review*, 31(1), 2-24.
- Hair, J. F., Sarstedt, M., Ringle, C. M., & Gudergan, S. P. (2017). *Advanced issues in partial least squares structural equation modeling*. saGe publications.
- Hair Jr, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2021). *A primer on partial least squares structural equation modeling (PLS-SEM)*. Sage publications.

- Harter, S. (2006). The development of self-esteem. *Self-esteem issues and answers: A sourcebook of current perspectives*, 144-150.
- Hassan, M. S., Al Halbusi, H., Razali, A., Ariffin, R. N. R., & Williams, K. A. (2022). The Swedish gamble: trust in the government and self-efficacy in the battle to combat COVID-19. *Current Psychology*, 1-16.
- Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the academy of marketing science*, 43(1), 115-135.
- Jeng, C.-R. (2019). The role of trust in explaining tourists' behavioral intention to use e-booking services in Taiwan. *Journal of China Tourism Research*, 15(4), 478-489.
- Jones, M. K., Latreille, P. L., & Sloane, P. J. (2016). Job anxiety, work-related psychological illness and workplace performance. *British Journal of Industrial Relations*, 54(4), 742-767.
- Leary, M. R. (1999). Making sense of self-esteem. *Current directions in psychological science*, 8(1), 32-35.
- Lent, R. W., & Brown, S. D. (2008). Social cognitive career theory and subjective well-being in the context of work. *Journal of career assessment*, 16(1), 6-21.
- Luszczynska, A., & Schwarzer, R. (2015). Social cognitive theory. *Fac Health Sci Publ*, 225-251.
- Marques, S. C., Pais-Ribeiro, J., & Lopez, S. J. (2011). The role of positive psychology constructs in predicting mental health and academic achievement in children and adolescents: A two-year longitudinal study. *Journal of happiness studies*, 12, 1049-1062.
- Mason, J., Classen, S., Wersal, J., & Sisiopiku, V. P. (2020). Establishing face and content validity of a survey to assess users' perceptions of automated vehicles. *Transportation research record*, 2674(9), 538-547.
- Mayer, R. C., Davis, J. H., & Schoorman, F. D. (1995). An integrative model of organizational trust. *Academy of management review*, 20(3), 709-734.
- Qiu, J., Shen, B., Zhao, M., Wang, Z., Xie, B., & Xu, Y. (2020). A nationwide survey of psychological distress among Chinese people in the COVID-19 epidemic: implications and policy recommendations. *General psychiatry*, 33(2).
- Ringle, C., Da Silva, D., & Bido, D. (2015). Structural equation modeling with the SmartPLS. *Bido, D., da Silva, D., & Ringle, C. (2014). Structural Equation Modeling with the Smartpls. Brazilian Journal Of Marketing*, 13(2).
- Roothman, B., Kirsten, D. K., & Wissing, M. P. (2003). Gender differences in aspects of psychological well-being. *South African journal of psychology*, 33(4), 212-218.

Schepman, A., & Rodway, P. (2022). The General Attitudes towards Artificial Intelligence Scale (GA AIS): Confirmatory validation and associations with personality, corporate distrust, and general trust. *International Journal of Human-Computer Interaction*, 1-18.

Schunk, D. H. (2012). Social cognitive theory.

Sechrist, G. B., & Stangor, C. (2001). Perceived consensus influences intergroup behavior and stereotype accessibility. *Journal of personality and social psychology*, 80(4), 645.

Shin, D. (2020). How do users interact with algorithm recommender systems? The interaction of users, algorithms, and performance. *Computers in Human Behavior*, 109, 106344.

Shin, D. (2021). The effects of explainability and causability on perception, trust, and acceptance: Implications for explainable AI. *International Journal of Human-Computer Studies*, 146, 102551.

Sibley, C. G. (2011). The BIAS-Treatment Scale (BIAS-TS): A measure of the subjective experience of active and passive harm and facilitation. *Journal of personality assessment*, 93(3), 300-315.

Suls, J., & Wheeler, L. (2013). *Handbook of social comparison: Theory and research*. Springer Science & Business Media.

Tredinnick, L. (2017). Artificial intelligence and professional roles. *Business Information Review*, 34(1), 37-41.

Tse, S., & Tung, V. W. S. (2022). Understanding residents' attitudes towards tourists: Connecting stereotypes, emotions and behaviours. *Tourism Management*, 89, 104435.

Van der Heijden, H., Verhagen, T., & Creemers, M. (2003). Understanding online purchase intentions: contributions from technology and trust perspectives. *European journal of information systems*, 12(1), 41-48.

Wang, C., Xu, J., Zhang, T. C., & Li, Q. M. (2020). Effects of professional identity on turnover intention in China's hotel employees: The mediating role of employee engagement and job satisfaction. *Journal of Hospitality and Tourism Management*, 45, 10-22.

Wang, D., Cao, D., & Kiani, A. (2023). How and when can job-insecure employees prevent psychological distress against the COVID-19 pandemic? The role of cognitive appraisal and reappraisal. *Current Psychology*, 1-13.

Wang, Y.-Y., & Wang, Y.-S. (2022). Development and validation of an artificial intelligence anxiety scale: An initial application in predicting motivated learning behavior. *Interactive Learning Environments*, 30(4), 619-634.

Wang, Y., Wang, S., Wang, J., Wei, J., & Wang, C. (2020). An empirical study of consumers' intention to use ride-sharing services: using an extended technology acceptance model. *Transportation, 47*, 397-415.

Watson, B., & Osberg, L. (2018). Job insecurity and mental health in Canada. *Applied Economics, 50*(38), 4137-4152.

Zhuo, T. Y., Huang, Y., Chen, C., & Xing, Z. (2023). Exploring AI Ethics of ChatGPT: A Diagnostic Analysis. *arXiv preprint arXiv:2301.12867*.

Figures

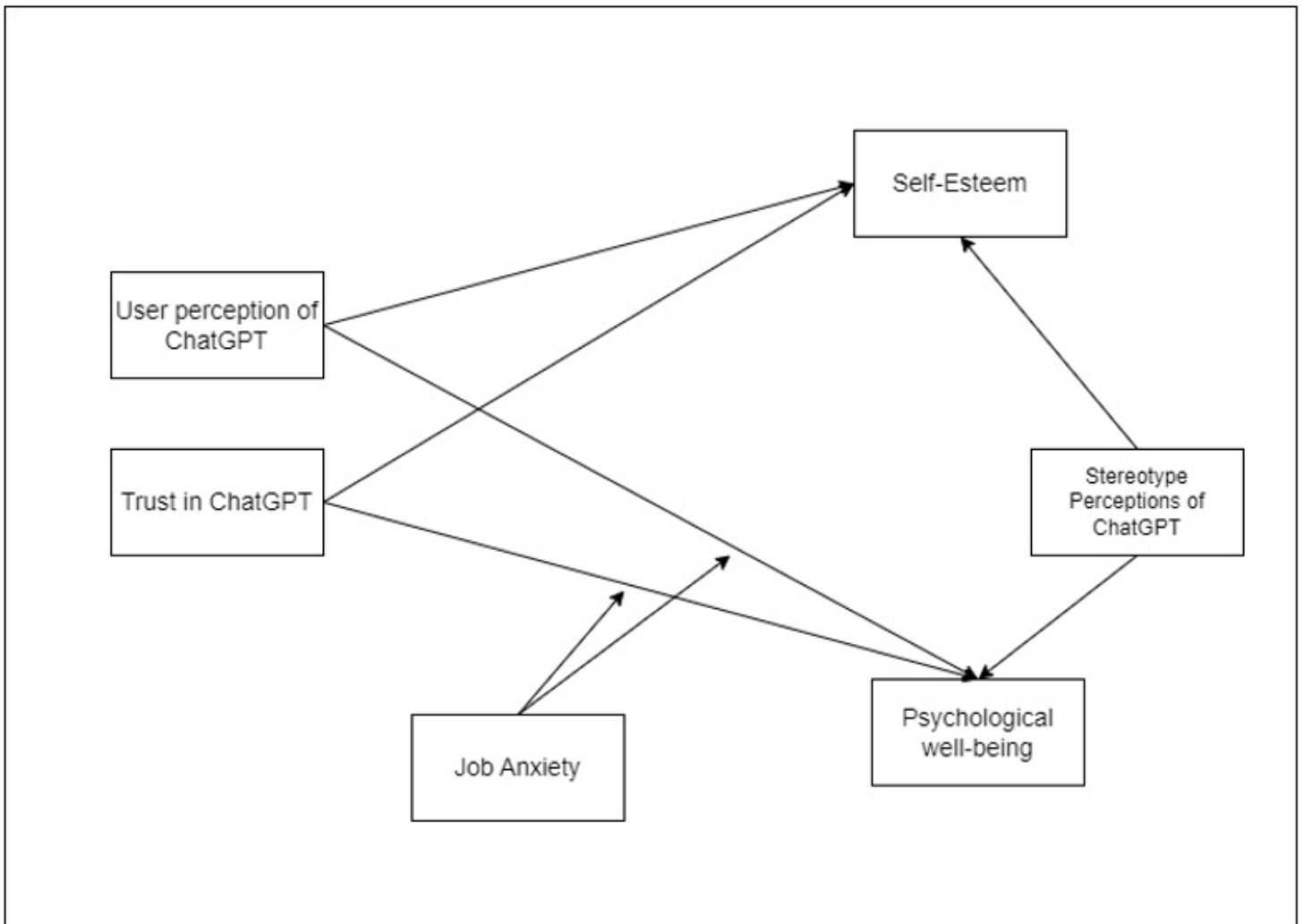


Figure 1

Research Model

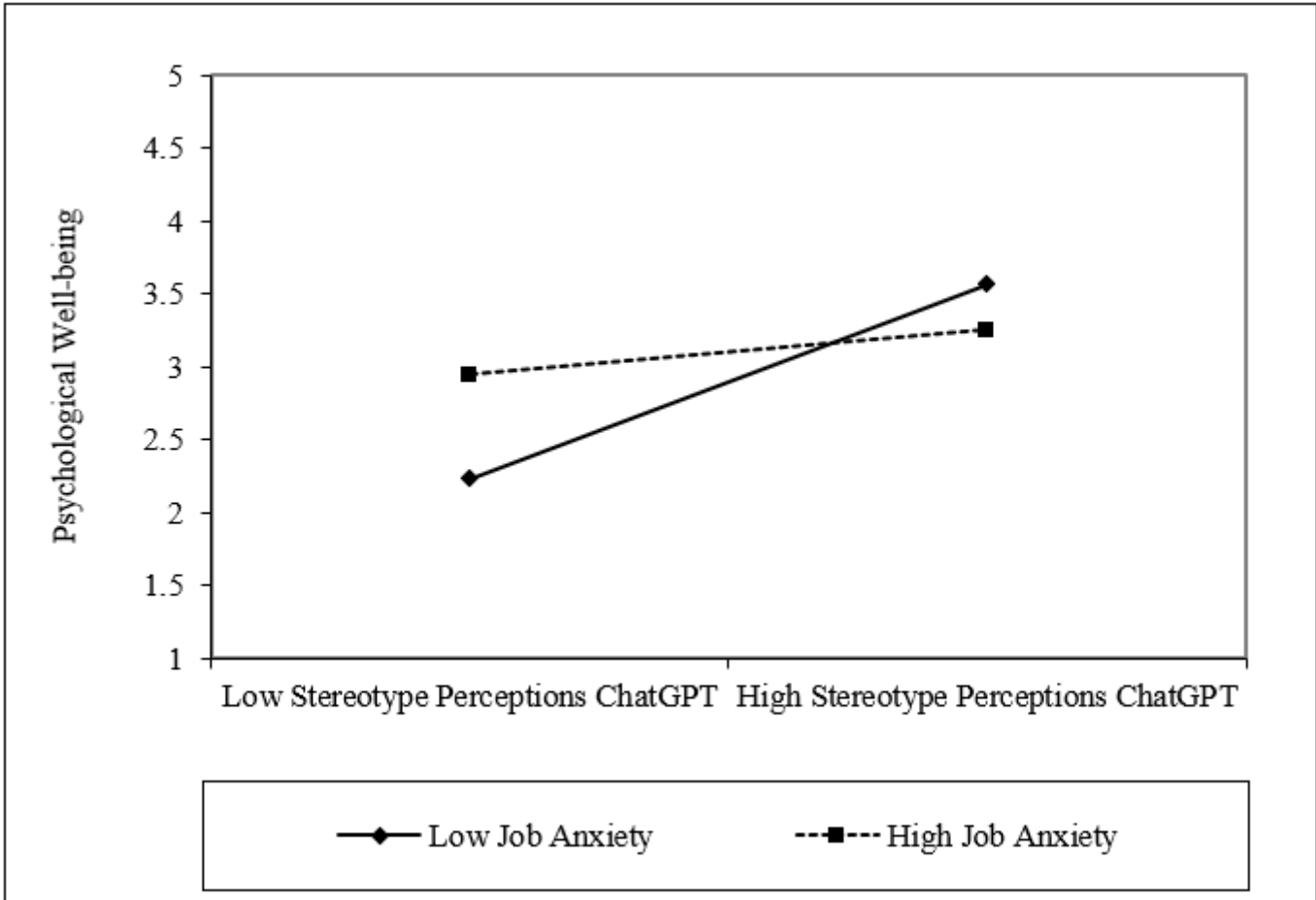


Figure 2

Stereotype perceptions ChatGPT X Job anxiety interaction on the psychological well-being

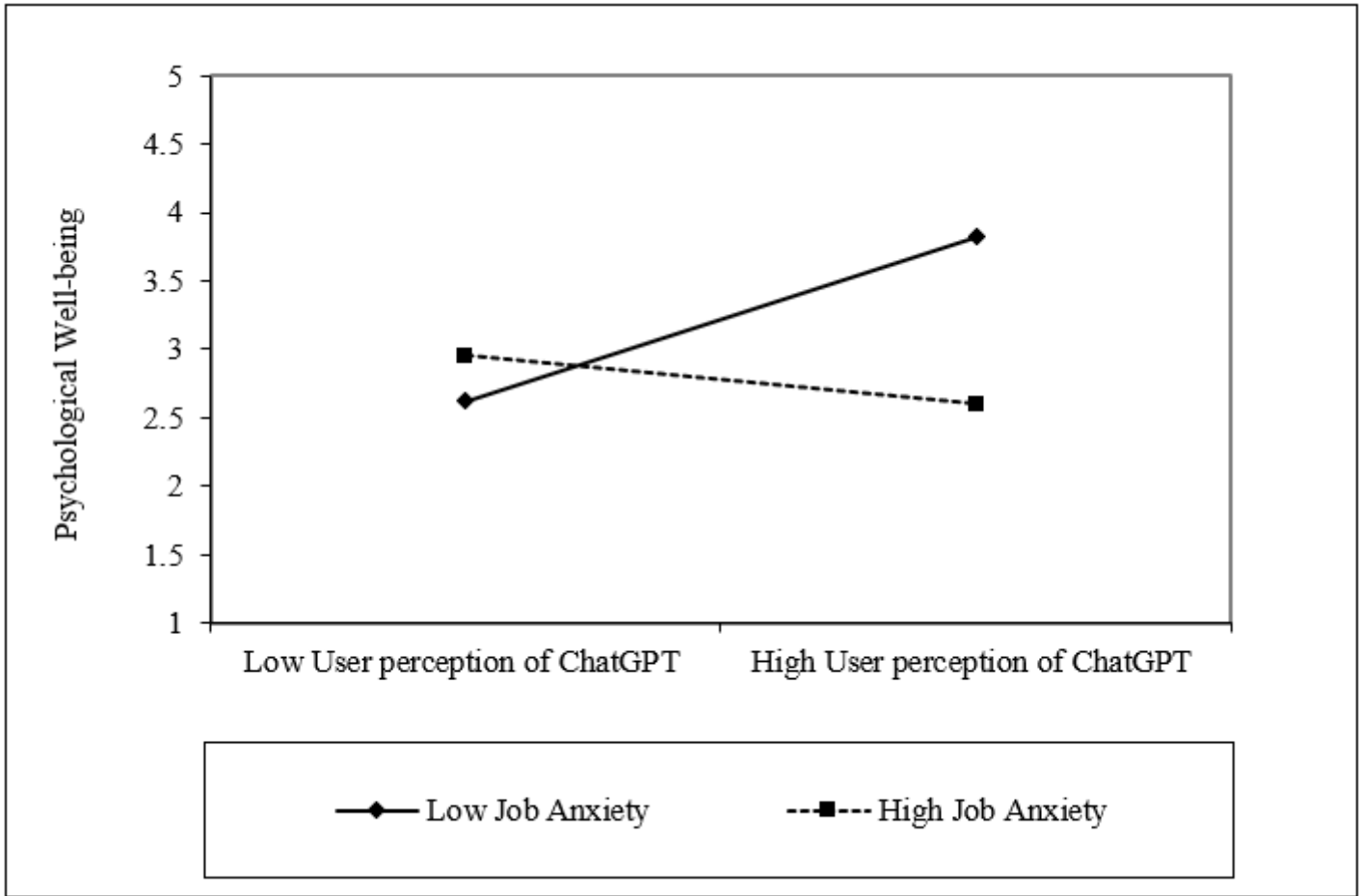


Figure 3

User perception of ChatGPT X Job anxiety interaction on the psychological well-being