

IMPACT OF AI COMPANIONSHIP ON LONELINESS AND EMOTIONAL REGULATION AMONG UNIVERSITY STUDENTS

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DOI: <https://doi.org/10.5281/zenodo.17452222>**Keywords**

AI companionship, Loneliness, Emotional regulation

Article History

Received: 06 September 2025

Accepted: 11 October 2025

Published: 27 October 2025

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Abstract

Introduction Concerns about loneliness and emotional regulation are becoming more prevalent in contemporary society, especially as social isolation and reliance on technology increases. With virtual interactions which mimic human-like talks and emotional support, AI companionship has served as a effective measure.

Purpose: This study investigate the impact of AI companionship on loneliness and emotional regulation among university students, also the impact of AI companionship and their differences across gender were examined.

Methods: This is a quantitative study, a sample of 350 university students completed General Attitude Towards AI Scale (GAAIS), UCLA Loneliness Scale and Emotional Regulation Questionnaire. Data analysis was occurred by regression analysis and t-test to identify the impact of one variable on another.

Conclusion: The results demonstrated a significant impact of AI companionship on loneliness and emotional regulation and non-significant gender differences were observed. Future researchers can investigate the long-term effects of AI companionship on students' mental health and social skills. They can examine potential risks, such as over-reliance on AI for emotional support.

INTRODUCTION

Companion chatbots have been suggested as a potential remedy for the rising loneliness epidemic as AI gets more and more ingrained. However, it is unclear how these AI companions may affect users' social behaviors and psychological health. (Liu et al., 2024). In 2023, the market for AI technology was valued at over \$200 billion USD, and it is projected to rise much above that number. By 2030, to more than 1.8 trillion dollars. (Thormundsson, 2024). AI will be rapidly adopted by businesses worldwide, as recent studies and surveys show a 52% yearly increase in its

application. (The Nation, 2023). According to a State of AI Report, Pakistan's index score for global AI preparedness is 34.03, placing it 117th out of 172 nations. (Amin, 2023).

NASA defines artificial intelligence (AI) as any system that mimics human thought or behavior, including cognitive architectures (NASA, 2024). A new kind of AI application called social chatbots made the idea of "AI friends," which was previously limited to the sci-fi genre, a reality. These apps include Microsoft Xiaoice, Anima, Replika, and Kajiwoto, to name a few. With the

use of machine learning, picture recognition, and natural language processing technology, these applications can communicate with users and offer emotional support and companionship (Xie & Pentina, 2022). The purpose of AI companions is to promote human emotions, friendship, and even love or intimate human relationships (Sahota, 2024).

The developing and a significant public health concern is loneliness. It differs from social isolation in that those who have a large social circle may nonetheless report feeling lonely or alone, just as those who are alone may not report feeling lonely. According to the most widely accepted definition, loneliness is a negative emotional state brought on by the sense that one's social needs and wants are not being met. Many behavioral and cognitive techniques for controlling emotions are used by people to deal or cope with loneliness (Preece et al., 2024). The desire for more fulfilling connections is a pressing public health issue in

today's world, and loneliness is a negative emotion that arises from unmet social demands (Eldesouky et al., 2024).

Understanding, controlling, and reacting to emotions are all aspects of emotional regulation. Lack of emotional regulation skills can have an impact on your social, emotional, and personal life. The limbic system, which produces your stress reaction, and the prefrontal cortex, which aids in rational decision-making, are two physiological and neurological processes that may be involved in this learnt skill, which is one of the key components of emotional intelligence (Silva, 2022). People are more prone to feel lonely when they ruminate or blame themselves for difficulties. These mental processes can make it hard for people to establish good relationships and participate in social activities, which can ultimately make teenagers and young adults feel more alone (Akpunne et al., 2024).

Problem Statement

The impact of AI companionship on loneliness and emotional regulation in university students is being investigated in this study.

Objective

The objectives of the study were as follows:

1. To find out the impact of AI companionship on loneliness among university students.
2. To find out the impact of AI companionship on emotional regulation among university students.
3. To find the difference of AI companionship between male and female university students.

Hypothesis

Following were the hypothesis to achieve objective of the study:

H1: There will be a significant impact of AI companionship on loneliness among university students.

H0: There will be no significant impact of AI companionship on loneliness among university students.

H2: There will be a significant impact of AI companionship on emotional regulation among university students.

H0: There will be no significant impact of AI companionship on emotional regulation among university students.

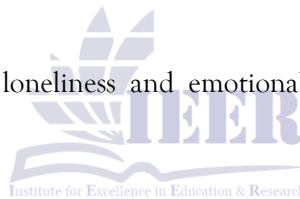
H3: There will be a significant difference of AI companionship between male and female university students.

H0: There will be no significant difference of AI companionship between male and female university students.

Operational Definitions

AI Companionship

AI Companionship is defined as a source of individual's emotional or social support. It involves that how the individuals see AI as helpful for understanding human emotions and reduces loneliness (Schepman & Rodway, 2020). This variable will be operationalized by General Attitude Towards AI Scale (Schepman & Rodway, 2020)



that is a 20-item self-report measure of individual's attitude toward AI.

Loneliness

Loneliness refers to the feeling of being isolated from others as well as lack of companionship. It involves the unpleasant experiences which occurs due to the individual's lack of social relationships (Russell et al., 1980). This variable will be operationalized by UCLA Loneliness Scale (Russell et al., 1980) that is a 20-item self-report measure of individual's loneliness. This variable will be used as loneliness of university students in the study.

Emotional Regulation

Emotional regulation is defined as the processes in which individual's emotions are being influenced and the way in which individual experience emotions and express those emotions. It involves the balance of emotional responses in a manner with situational demands (Gross & John, 2003). This variable will be operationalized by Emotional Regulation Questionnaire (Gross & John, 2003) that is a 10-item self-report measure of individual's emotional regulation.

Literature Review

In 2024, Joseph Crawford and his colleagues conducted a study to assess university students' interactions with and attitudes toward artificial intelligence systems that use large- language models. This study examines the potential costs to student achievement, well-being, loneliness and retention of a particular type of social support that is exclusive to AI. The study reveals that when human beings are more socially connected to AI tools, they think that they don't have support from other human beings. A student choosing to seek help from an AI instead of a human (such as a professor, librarian, or student advisor) may have intriguing learning and teaching policy ramifications, even though using AI chatbots may be linked to worse social outcomes and leads toward loneliness (Crawford et al., 2024).

In 2024, a research was conducted to study chatbot companionship and loneliness and it suggest that relationship between companion chatbot usage and loneliness is not even but highly dependent on individual's personal characteristics and social contexts. As it identifies the group from socially

dependent users to moderate users which indicates that AI usage can have different impacts on individuals depending upon their personality traits and social connectedness (Liu et al., 2024).

A research was conducted in 2024 by Haozhu and Qiu which suggests that using AI in educational settings can help to enhance students' creativity and academic emotions but also repetitive and impersonal nature of AI interactions can reduce student motivation and work engagement. AI tools mostly impose rigid frameworks which lower the critical thinking of students, but also provide problem solving skills which can support emotional well being.(Lin & Chen, 2024).

In 2025, a research was conducted by Laban and his fellows in which they explores that how social robots can help university students to manage emotional regulation with the help of cognitive reappraisal. The study findings indicates the enhanced emotional regulation as students have more understanding and knows that how to control their emotions more effectively by interacting AI as they provide emotional support and guidance (Laban et al., 2025).

Sabour et al., (2022) investigated how Emohaa, an AI-powered chatbots that offers both emotional support and cognitive behavioral therapy (CBT), affected the way users in China dealt with psychological distress. Three groups participated the study: one received Emohaa's CBT-based help, another received both emotional and CBT support, and a control group received neither. According to the results, those who used Emohaa, especially those who got the integrated emotional support component - saw considerably significantly larger decline in depression, negative effect, and insomnia. As a result of having structured, sympathetic interactions with the AI companion , users were able to better control and communicate their feelings, which is highly suggestive of enhanced emotional regulation (Sabour et al., 2022).

A study was conducted to evaluate that how emotional regulation strategies are connected to loneliness and distress and it suggests that lonely people are likely to be cognitively hyper-alert for social threat and therefore avoids social connection as prefer to be alone and suppress their emotions (Tan et al.,

2022).

Methodology and Study design

With a number of primary objectives directing the analysis, the research study examines how AI companionship affects university students' feelings of loneliness and emotional regulation. The investigation also compares male and female students to examine gender variations in AI companionship. It is a quantitative research that is based on regression analysis. Self-reported surveys are used to draw conclusions in order to employ a quantitative methodology. The study is predictive. The goal of the study was presented to each participant personally.

Sample Size

The population of interest was 350 university students of twin city (Rawalpindi and Islamabad) of Pakistan. Questionnaires, General Attitude towards AI Scale, UCLA Scale and Emotional Regulation Questionnaire were distributed, among these students for collection of data and then data collected from these students was used for statistical analysis.

Sampling Technique

Convenient sampling technique was used. Convenience sampling renders it more accessible to researchers to recruit people within their reach by enabling them to choose participants based on their proximity. Convenience sampling makes it easier to collect data quickly given the complexity of the psychological variables being studied, particularly when certain requirements are difficult to satisfy with conventional sample techniques.

Research Instruments

The questionnaires that were used in the present study are General Attitude Towards AI, UCLA Loneliness Scale and Emotional Regulation Questionnaire.

General Attitude Towards AI Scale

General Attitude Towards AI Scale was developed by Schepman & Rodway in 2020 and consists of 20 items with response categories from "strongly agree" to "strongly disagree". Items are scored on a ranged from 1 to 5. General attitude towards AI scale measures that how individuals interact with AI tools

and what are their feelings or beliefs about it. The scale comprises of 12 positive items (1,2,4,5,7,11,12,13,14,16,17 and 18) and 8 negative items (3,6,8,9,10,15,19 and 20). The Cronbach alpha reliability of positive subscale is $\alpha = 0.89$ and the Cronbach alpha reliability of negative subscale is $\alpha = 0.85$.

UCLA Loneliness Scale

The scale of UCLA Loneliness was developed by Russell, Peplau, and Ferguson in 1980 and consists of 20 items with response categories, O (I often feel this way), S (I sometimes feel this way), R (I rarely feel this way) and N (I never feel this way). Items are scored on a range from 3 to 0, providing a total score between 20 to 60. UCLA loneliness scale was developed to measure the individual's subjective feelings of loneliness as well as social isolation. The Cronbach alpha reliability of UCLA Loneliness Scale is $\alpha = 0.89$ to 0.94.

Emotional Regulation Questionnaire

Emotional Regulation Questionnaire was developed by Gross and John in 2003 and consists of 10 items with response categories from "strongly agree" to "strongly disagree". Emotional regulation questionnaire evaluates that how emotions of individuals are regulated, especially in social contexts. Items are scored on a range from 1 to 7. The scale comprises of 6 cognitive reappraisal items (1, 3, 5, 7, 8 and 10) and 4 emotional suppression items (2, 4, 6 and 9). The Cronbach alpha reliability of cognitive reappraisal is $\alpha = 0.79$ to 0.82 and the cronbach alpha reliability of emotional suppression is $\alpha = 0.73$ to 0.78.

Data Collection Procedure

Phase I, Pilot Study

In the first phase, sample of 50 was collected from university students to check validity and reliability of scale and authenticity of research problem. Questionnaires were printed to take whole data through physical interaction. The informed consent form was presented through verbal agreement to participants.

Phase II, Main Study

In the second phase, data was collected from 300 university students through online medium as well as by physical interaction. While collecting data online, Google form was developed, and the link was sent to participants. This Google form consisted of a cover letter, demographic sheet, and the scales through which we measure variables of the research

we were taking. Half of data was collected by physical interaction by distributing questionnaires.

Data Analysis Procedure

SPSS is used to examine data after it has been collected. This approach is effective in producing precise and useful data, regression analysis and the t-test are employed.

Table 1 Reliability Analysis of General Attitude Towards AI Scale (N=50)

Reliability Statistics		
Scale	α	No. of items
General Attitude Towards AI	0.75	20

The above table 1 indicates the value of Cronbach alpha reliability of General Attitude Towards AI Scale, that is ($\alpha=0.75$) which shows that the value is highly reliable.

Table 2 Reliability Analysis of UCLA Loneliness Scale (N=50)

Scale	α	No. of items
UCLA Loneliness Scale	0.71	20

The above table 2 indicates the value of Cronbach alpha reliability of UCLA Loneliness Scale, that is ($\alpha=0.71$) which shows that it has good reliability.

Table 3 Reliability Analysis of Emotional Regulation Questionnaire (N=50)

Scale	α	No. of items
Emotional Regulation Questionnaire	0.89	10

The above table 3 indicates the value of Cronbach alpha reliability of Emotional Regulation Questionnaire, that is ($\alpha=0.89$) which indicates that it has good reliability.

Table 4

Regression Model of AI Companionship and Loneliness among University Students
(N=350)

Loneliness	R	R ²	SE	F	p	DW
AI Companionship	-0.13	0.01	7.68	6.51	0.01	1.61

The above table 4 indicates the value of F-statistics (F=6.51) and significance (p=0.01) respectively, which indicates significant difference among AI companionship and loneliness. Whereas, the value of Durbin-Watson statistics is (DW=1.61) and it indicates positive auto-correlation error in the regression model. The results indicate a significant negative impact of AI companionship on loneliness so the alternate hypothesis is accepted.

Table 5

Regression coefficient of AI Companionship and Loneliness among university students
(N=350)

Loneliness	β	SE	B	t	p	95% CI	
						LL	UL
AI Companionship	38.20	2.85	-0.13	13.36	0.001	32.57	43.82

The above table 5 indicates the results of regression coefficients of AI companionship and loneliness among university students. . The value of t-statistics is (t=13.36) with significance (p=0.001) at 95% confidence level which indicates that there is significant impact of AI companionship on loneliness. Lower and upper boundaries are (LL=32.57) and (UL=43.82) respectively. Hence, alternate hypothesis is accepted.

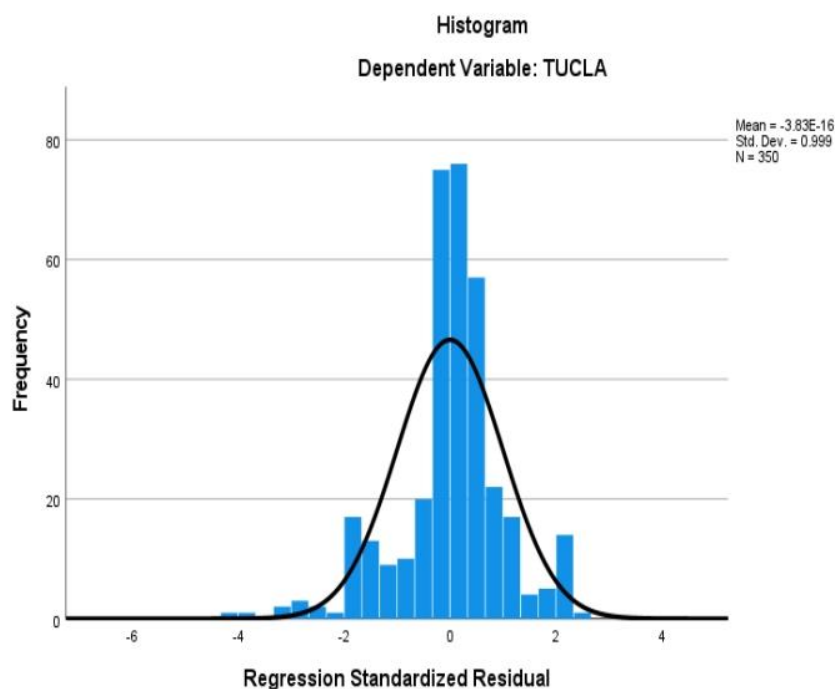


Table 6 Regression Model of AI Companionship and Emotional Regulation among University Students (N=350)

Emotional Regulation						
	R	R ²	SE	F	p	DW
AI Companionship	0.40	0.16	8.00	66.50	0.001	2.32

The above Table 6 indicates the value of F-statistics (F=66.50) and significance (p=0.001) respectively, which indicates significant difference between AI companionship and emotional regulation. Whereas, the value of Durbin-Watson statistics is (DW=2.32) and it indicates negative auto-correlation error in the regression model. The results indicate a significant positive impact of AI companionship on emotional regulation so the alternate hypothesis is accepted.

Table 7 Regression coefficient of AI companionship and emotional regulation among university students (N=350)

Emotional Regulation							
	β	SE	B	t	p	95% CI	
						LL	UL
AI Companionship	19.58	2.98	0.40	6.56	0.001	13.71	25.44

The above table 7 indicates the results of regression coefficient of AI companionship and emotional regulation among university students. The value of t-statistics is ($t=38.45$) with significance ($p=0.001$) at 95% confidence level which indicates that there is significant impact of AI companionship on emotional regulation. Lower and upper boundaries are (LL=13.71) and (UL=25.44) respectively. Hence, alternate hypothesis is accepted.

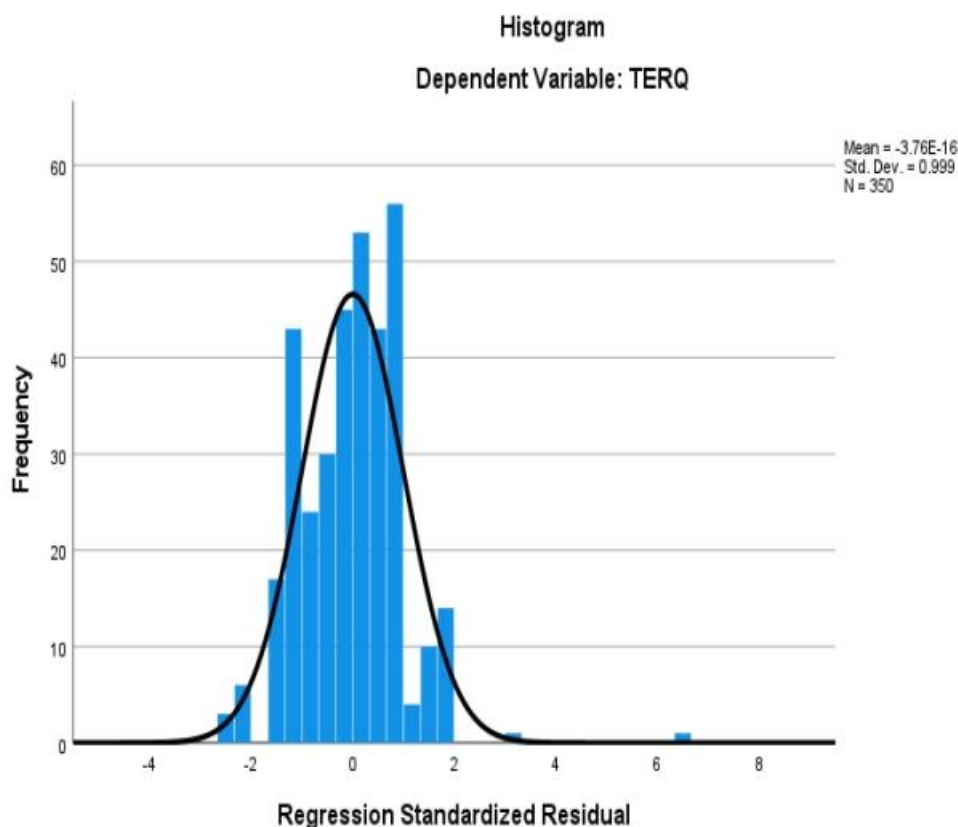


Table 8 Mean Standard Deviation and t-test of AI Companionship between Male and Female University Students (N=350)

	Male		Female		t	p	95% CI		Cohen's d
	M	SD	M	SD			LL	UL	
AI Companionship	58.84	8.21	65.34	8.59	-6.58	0.15	-8.44	-4.55	-0.78

The above Table 8 indicates that the mean of male university students is ($M=58.84$). The mean of female university students is ($M=65.34$) which shows the rate of AI companionship is slightly higher among females as compared to males. The p-value is (0.15). Hence, alternate hypothesis has been rejected and null hypothesis is accepted that there is non-significant difference of AI companionship between males and females.

Discussions

The present study found a statistically significant negative impact of AI companionship on loneliness. The individuals interacting with AI companions were found to reduce loneliness as effectively as human interactions and it works better than passive activities like watching videos. An important contributing aspect to the reduction of loneliness was the sense of being “heard” by the AI (Freitas et al., 2024). Another study on young individuals indicates that those who engage in frequent, emotionally charged conversations with a social robot may experience less loneliness. Because of the robot’s capacity for compassionate, non-judgmental dialogue, users felt secure expressing feelings that are normally only expressed in human relationships, which helped them feel less alone (Laban et al., 2025). The results of current study are consistent with previous research in which researcher found a negative impact of AI companionship on loneliness. This consistency with past studies strengthens the validity of the current findings.

The current research finding explore a statistically significant positive impact of AI companionship on emotional regulation which aligns with the previous research which reported that social robots play role not only in the facilitation of cognitive change but also increase in the emotional regulation ability. After every encounter, the robot-led sessions promoted good mood and sentiment modifications by facilitating constructive emotion regulation techniques. (Laban et al., 2023). In the previous study in comparison to the control group, the results demonstrated that people who engaged with AI companion (Emohaa), particularly those who got CBT and emotional support had considerably lower levels of sadness, negative affect, and insomnia. Through controlled contact with the chatbot, users were better able to comprehend, control, and react to emotional events, which is shown in these changes. According to the study, AI companions that provide cognitive behavioral therapy and sympathetic support can promote better psychological health and emotional control (Sabour et al., 2022). These findings are similar to the earlier research in which researcher found a positive impact of AI companionship on emotional regulation.

The findings of current study explores a statistically

non-significant impact of AI companionship between male and female. It indicates that males and females have impact of AI companionship in a similar way. While the mean value of females was slightly higher than males for AI companionship, but this difference was statistically non-significant. It indicates that although there may be a trend, it is not strong or adequate enough in this sample to give a certain gender-based difference. So that, undetermined conclusion can be drawn about impact of AI companionship between male and female based only on these results. The findings of current study are consistent with previous research which indicates that AI companionship were not significantly influenced by gender, and it depends upon the type of connection or attachment with AI (Kim et al., 2019). The consistency with previous research that impact of AI companionship is not strongly differentiated by gender.

Recommendations

1. Future researchers can investigate the long-term effects of AI companionship on students’ mental health and social skills.
2. Researcher can examine potential risks, such as over-reliance on AI for emotional support or reduced human interaction.
3. More diverse cultural, socioeconomic and academic demographics should be explored to make the study findings more generalizable.
4. Therapeutic interventions to mitigate loneliness and improve emotional regulation skills through the use of AI companionship should be studied in future research.

Conclusion

The study indicates that there is significant impact of AI companionship on loneliness and emotional regulation of university students. Additionally, non-significant gender differences have been observed with regard to AI companionship. The findings can encourage educational institutions in Pakistan to adopt AI-based emotional support systems, such as chatbots or virtual companions. These tools can offer students a safe and judgment-free space to express their feelings, helping to reduce loneliness and regulate emotions.