

The Influence of Human–AI Relational Attachment on Emotional Regulation Among Adults in Pakistan

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Abstract

The study aimed to determine the relationship between relational attachment to artificial intelligence (AI) system and emotional regulation in adult population of Pakistan. There is an increasing body of literature showing that users can develop an emotional relationship with chatbots, virtual assistants and conversational agents, but most of this is conducted in western samples and the psychological implications of such relationships in collectivist and fast digitizing societies are not explored. Based on Bowlby's attachment theory and Gross's process model of emotion regulation, the hypothesis of the study was that there is a significant correlation between human–AI relational attachment and emotional regulation among Pakistani adults. A quantitative correlational design was used. The subjects were 120 adults aged 18 years and older, who were obtained by non-probability convenience sampling and completed an online survey consisting of a Demographic Information Form, the AI Attachment Scale (Kasturiratna & Hartanto, 2025) and the Emotion Regulation Questionnaire (Gross & John, 2003). The collected data was analyzed through descriptive Pearson product-moment correlation and simple linear regression using SPSS 22 program. Attachment to the AI overall (HAA) was 43.37 (SD = 10.83) and emotional regulation (ER) were 31.82 (SD = 4.66). There was a strong positive relationship between the two variables ($r = .316$, $p < .001$), and human–AI attachment was a significant predictor of emotional regulation, $F(1, 118) = 13.13$, $p < .001$, with approximately 10% of the variance in emotional regulation attributed to the predictor ($\beta = .316$). The results show that when an adult feels some level of emotional connection with the AI systems, there is also a higher occurrence of adulthood-performing emotion regulation measures habitually, though nominally. It seems that AI is more of a supporting resource and not a substitute source of emotional support. The study provides culturally placed evidence to the literature on human–AI interaction, along with implications for developers, educators, policymakers, and mental health practitioners in the Pakistani context.

Keywords: human-AI interaction, AI attachment, emotional regulation, anthropomorphism, Pakistani population and attachment theory

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Introduction

Artificial Intelligence (AI) has revolutionized the interaction between individuals and technology in their everyday lives. Conversation with users has become a requirement and not just a benefit for chatbots, virtual assistants, and socially-driven applications. That hope has yielded a change in the relationship of people to machines. As AI capabilities continue to advance, users start to perceive AI systems as companions, helpers and sometimes as a partial substitute for human interaction. Recent studies have shown that users can indeed develop a true sense of attachment to an AI system, especially when the system is responsive, personalizes and empathizes with them (Kasturiratna & Hartanto, 2025).

The roots of this phenomenon are to be found in attachment theory, first formulated by Bowlby (1969). The theory of attachment is the way that people come to make emotional bonds to gain comfort and a sense of security and support. The theory was first used to explain human relationships but has since been expanded in recent years to the interaction between humans and technology. Research suggests that people with greater emotional needs or who feel lonely tend to be more inclined to befriend AI systems as an alternative means of emotional support (Derrick et al., 2016). These results indicate that psychological processes typically carried out by human interaction can, under specific conditions, be partially achieved with interaction with AI.

Emotion Regulation is the second core concept of this study and refers to processes of influence, experience and expression of emotions (Gross, 1998). A core component of human functioning is emotion and the ability to regulate this emotion is at the heart of stress, healthy relationships and good functioning each day. Studies reveal that many people nowadays are resetting to external resources such as technology when dealing with emotions. Receiving a quick response, distraction, or emotional support from an AI system can alleviate stress, loneliness or anxiety. The dynamic between humans and AI and the control of emotions is complex, however. There has been some research that indicates a positive side to AI for providing comfort and minimizing negative affect, and some research that suggests dependency. People often anthropomorphize, giving human attributes to computers and media technologies (Reeves & Nass, 1996).

Despite knowing that it is not human, users give it 'social' treatment including being polite, compassionate or sensitive. This part is to help understand how AI systems

can be emotionally engaging. Conversational AI applications can mimic human modes of communication, using emotional language and repeating topics with appropriate tonality and engagement, which can trigger social and emotional reactions to AI, creating a sense of bond and connection.

An anthropomorphic theory comes into play. Humans are inclined to anthropomorphize objects including machines and AI systems (Epley et al., 2007). When technology is able to communicate and exhibits empathy and responds to emotion it anthropomorphizes most. In the context of Human–AI interaction, anthropomorphism is a key factor, particularly for building emotional connections and trust. When built with measures to support personalization and natural language processing, chatbots and virtual assistants can be just as empathetic as the real thing! Research indicates that anthropomorphic design fosters emotional trust, comfort and perceived social presence of users in their interactions with AI (Waytz et al., 2014).

The specificity of cultural norms and social dynamics in Pakistan, as well as varying exposure to technology, might shape how individuals interact with AI and their emotional responses. Hence, it is significant to explore the impact of Human-AI interaction on mitigating emotions in adult population of Pakistan. The present study relies on a quantitative research method, standardized instruments and adults aged 18 years old or older to examine the relationship between human - AI attachment and emotional control.

❖ Methodology

A quantitative correlational design was used. The study design for this study was non-probability convenience sampling with 120 adults in Pakistan (18 years or older) who participated in an online survey. This instrument consisted of a demographic information form, the AI Attachment Scale (Kasturiratna & Hartanto, 2025) and Emotion Regulation Questionnaire (Gross & John, 2003). Analysis of responses was made by descriptive statistics, Pearson product-moment correlation and simple linear regression in SPSS 22.

❖ Niche

Although the theory most commonly cited in the literature on humane AI relational attachment was developed and tested in Western samples, few investigations have focused on the relationship between attachment and emotion regulation in the study of human–AI relationships. Current studies have tended to focus on usability

or trust and adoption of technology, or the success of particular applications in the care of mental health conditions. This study places attachment theory and emotion regulation theory in the context of the Pakistani adult population and provides culturally grounded evidence of how AI factors into the daily emotional life of adults.

Theoretical Framework

This study is based on two theories namely attachment theory and emotion regulation theory and of a unitarian approach between the two theories.

❖ Attachment Theory

Attachment theory suggests that individuals seek out emotional bonds with others in order to obtain comfort, safe haven and support (Bowlby, 1982). This theory focuses on the innate human desire for emotional security and close interpersonal connections, which can be triggered by feelings of loneliness and social isolation. The theory had been extended in the current times to claim that endowed figures with this need do not necessarily have to be human – but also technological systems (Bowlby, 1982; Turkle, 2011). This emotional bond sets the stage for comprehending the possible impact of attachment to AI on behavior and emotional health.

❖ Emotion Regulation Theory

Emotion regulation theory accounts for the process of regulating and expressing emotions, which may include changing one's perspective on the emotion-eliciting event or suppressing expression (Gross, 1998). Cognitive reappraisal is a method whereby one can adjust the emotional response of a situation by changing one's thought; it is generally considered adaptive. Expressive suppression is the suppression of the outward manifestation of emotions and is considered less adaptive. The theory is that individuals' experiences and interactions in a social context influence their emotional regulation (Gross & John, 2003). Once a human-AI bond has been established, human-AI interaction may be one tool a human use in regulating emotion.

❖ Connecting the Two Theories

The two theories are also connected, as attachment and the processes of emotional regulation are similarly closely related (Ebsworth et al., 2015). People who build an emotional bond with AI systems might do so for purposes of seeking support, stress relief, emotional expression or even opposition to feeling lonely. This connection to AI can either be positive or negative, affecting the emotion regulation strategies.

Thus, attachment theory can be used to explain how humans become attached to their AI and emotion regulation theory can be used to explain how this attachment results in emotional outcomes. Both theories combined create a framework toward understanding the role of human–AI relational attachment in emotional regulation of adults in Pakistan, as illustrated in Figure 1.

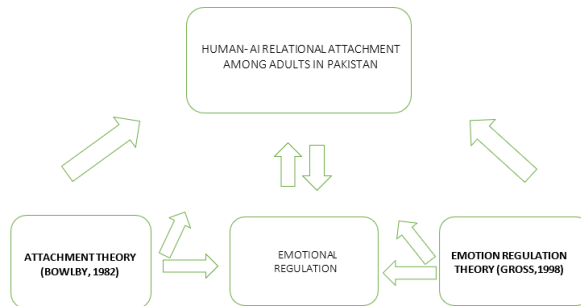


Figure 1. Conceptual framework linking attachment theory (Bowlby, 1982) and emotion regulation theory (Gross, 1998) to human–AI relational attachment among adults in Pakistan

Methodology

A quantitative approach was adopted in this study to explore the correlation between human–AI relational attachment and emotional regulation in adults in Pakistan. The goal was to determine if there were a correlation between the two constructs, so a correlational design was used, as the constructs were not intentionally manipulated.

❖ Research Design

A quantitative correlational design was used for the study. The sampling method is non-probability, the convenience sampling because it was based on the availability of the respondents and their willingness to participate in the study. Participants were people who interact with AI systems such as chatbots, virtual assistants or AI companion applications. The objective of the study was described, and it was ensured that these participants provided informed consent for the voluntary participation with confidentiality. Participants were then asked to fill out a structured questionnaire that included a demographic form, the AI Attachment Scale and the Emotion Regulation Questionnaire. Completed responses were inspected on accuracy, coded and analysis was done by the statistical software. Descriptive statistics were presented to describe the participants and the variables studied and inferential statistics through correlation and regression to test the expressed relationship.

❖ Participants

A sample of 120 participants was drawn from Pakistan. The sample was recruited on the basis of an age criterion of 18 years and above, and surveys were distributed over the internet.

Inclusion Criteria

- Participants must be Pakistani.
- Participants aged 18 years and above.
- Both genders (male and female).
- Participants who can understand the English language.
- Participants who are willing to participate and give informed consent.
- Participants who are currently using AI.

Exclusion Criteria

- Participants below the age of 18.
- Participants who do not use AI, or who use it rarely.
- Participants who are diagnosed with a psychiatric disorder.
- Participants who are taking psychiatric medication.
- Participants who are unable to understand the language of the questionnaire.
- Participants who are unwilling to participate or do not give consent.

❖ Measures

There were two parts of the research toolkit. The consent form and demographic information were included in part A. Part B included the AI Attachment Scale (Kasturiratna & Hartanto, 2025) to measure attachment to AI and the Emotion Regulation Questionnaire (Gross & John, 2003) to measure the habitual use of cognitive reappraisal and expressive suppression.

Demographic Information Form

The demographic information form included essential background information on the age, gender, educational qualification, occupation and marital status of participants. It also gathered information on the interactions with AI, including the interactions with which type of AI system (such as virtual assistants, AI companions, and chatbots), how often it interacts with the systems, and time of exposure to them each day. An additional step was the inclusion of a question asking the participants

whether they had been diagnosed with any psychiatric illnesses or were treated with any psychiatric drugs, to eliminate these possibly confounding factors.

AI Attachment Scale

The AI Attachment Scale (Kasturiratna & Hartanto, 2025) is a measurement tool to assess emotional attachment and relational connectedness billed to artificial intelligence systems like chatbots, virtual assistants, and AI-powered applications. This is a scale with multi-dimensional content and consists of three subscales. Emotional Closeness (6 items) assesses the extent to which the AI feels emotionally close, comfortable and supported; it measures emotions of warmth, companionship and trust. Social Substitution (5 items): Measures the extent to which AI can perform social functions, e.g., reducing loneliness or replacing humans to some extent in emotional support. Normative Regard (4 items) is the perceived importance, relevance and value of AI in an individual's daily life. There are 15 items on the scale with a range of responses from 1 (strongly disagree) to 5 (strongly agree).

The scale has a high internal consistency (Cronbach's alpha ranging 0.85 to 0.92 across the subscales) and test-retest reliability across the time. Correlations with similar variables (e.g., emotional dependence on technology) indicate convergent validity; low correlations with dissimilar variables indicate discriminant validity; factor analysis indicating a multi-dimensional structure indicates construct validity.

Emotion Regulation Questionnaire

Widely employed as a self-report instrument of dispositional emotional regulation strategies is the Emotion Regulation Questionnaire (ERQ; Gross & John, 2003). It is based on two main strategies. Cognitive Reappraisal (6 items) is a measure of a tendency to interpret a situation to change its emotional response and is considered to be adaptive with connections to better mood, life satisfaction and coping. Expressive Suppression (4 items) measures the degree to which a person will attempt to minimize the outward manifestation of emotion as a form of response – considered less adaptive because this type of suppression may be associated with higher levels of physiological stress and weaker emotionally intimate bonds with others. ERQ consists of 10 items which are scored on a seven point-Likert scale (1 = strongly disagree; 7 = strongly agree).

The ERQ shows good internal consistency, Cronbach's alpha ranging between 0.79 to 0.84 for cognitive reappraisal and 0.73 to 0.78 for expressive suppression. It has construct validity because the difference between the two strategies was found to be

as expected given the theory; it has converged validity in that it was correlated with emotional well-being and adaptive coping and has discriminant validity because it was found to separate from related yet distinct constructs. The instrument has been confirmed extensively and also cross-culturally, including with non-Western samples.

❖ Procedure

A combination of online and face to face approaches was used to reach out to participants as appropriate to accessibility. Study purpose was explained prior to participation and written informed consent was obtained. Participants then filled the demographic form as well as the AI Attachment Scale and the Emotion Regulation Questionnaire. Responses were checked for completeness and accuracy for coding and analysis. Ethical issues involving anonymity, confidentiality in data storage and voluntary participation were strictly maintained throughout the study.

❖ Ethical Considerations

The study was conducted according to ethical guidelines for human subject studies. All participants provided consent with an explanation of the purposes of the study to which they were to contribute and the methods to be used. They found out that they would not be required to continue and were not going to be impacted. Responses were confidential/anonymous and no identifying data was collected. Data stored securely and used purposefully for academic work only, reporting with numbers only. Psychosocial risk in study was low, and participants were given the choice of their own answers for any question, or to stop, if not feeling comfortable. There was no deception and all procedures conformed to APA ethical standards. Data collection has been approved by the institutional Department of Applied Psychology National University of Modern Languages Karachi Campus.

❖ Data Analysis

SPSS version 22 was used for data analysis. Sociodemographic characteristics of the sample was described using contingency tables and descriptive statistics such as frequencies and percentage. The mean and standard deviation was calculated for the variables of the study. Cronbach's alpha was used to determine the internal consistency (reliability) of the AI Attachment Scale and Emotion Regulation Questionnaire. Pearson product moment correlation was employed to see the association between human-AI attachment and emotional regulation and simple linear regression was then used to see the predicting power of human-AI attachment

on emotional regulation. Statistically significant results were defined as those with a two-tailed p value of < 0.05 .

Review of the Literature

❖ Human–AI Relational Attachment

Information technology is more social and emotional than ever thanks to artificial intelligence. New technologies, such as chatbots, virtual assistants and interactive platforms, have been engineered to sound more and more human-like, empathetic and responsive. Therefore, people are no longer only using them as a medium of communication, they are also building relationships and an emotional connection with them. This phenomenon is known as human–AI relational attachment in which the attachment is formed between humans and AIs and humans feel attached to AIs (Kasturiratna & Hartanto, 2025; Nass & Moon, 2000).

The theory of such attachments can be found in the theory of attachment (Bowlby, 1969). The theory argues that humans have natural tendency towards proximity to attachment figures to promote feelings of security and support. Typically, these figures are other humans, but they may be non-human as well, for instance a digital agent or an AI system (Derrick et al., 2016). Miranda, someone who suffers from loneliness or social anxiety or emotional needs may be particularly prone to developing an AI bond—savordance.com mirror has constant interaction, no judgement, and is easy to access. Attached is media equation theory which proposes that humans engage with the media and computer as social beings. (Nass & Moon, 2000).

The social surrogacy hypothesis (Derrick et al., 2009) suggests that, in the absence of or limits on actual relationships, individuals may also obtain social and emotional needs for attachment through symbolic or inhuman relationships. Media personalities, imaginary characters, and technologically created entities can engender a sense of companionship, approval and emotional consolation. For AI, this can be equivalent to a social substitute in the form of chatbots or conversational agents that provide an interactive and emotional experience to users. This view is especially pertinent when considering the possibility of experiencing emotions towards AI systems. AI technologies can be present 24/7 and offer emotional assistance when you're in need. Such characteristics can help to minimize loneliness and social isolation and enhance emotional stability. Emotionally distressed people or those in situations where access to social support is limited may need to attach

more to AI systems than others would for emotional needs (Baumeister & Leary, 1995).

A comprehensive framework for comprehending human–AI relationships is necessary, such as the Motivational, Interactional, Relational and Affective (MIRA) model (Kasturiratna & Hartanto, 2025). Such as gaining information, companionship or emotional feelings, this type of model says that individuals reach a specific goal when interacting with AI. Building a relationship requires repeated interaction over time and affective components (perceived empathy, perceived responsiveness) facilitate relationship construction. This is particularly highlighted with the MIRA framework where it emphasizes that AI systems that can respond from a personalized and empathetic standpoint will be able to evoke strong attachment. This aligns with findings that attributes such as emotionality and communication style adaptation help users feel more connected to, and develop stronger relationships with, AI systems with human-like characteristics (Waytz et al., 2014).

❖ The Media Equation and Anthropomorphism

Reeves and Nass (1996) assert that individuals behave toward computers and media technologies in ways that are familiar to them and that they are treated as "real social actors". Social norms, like politeness, empathy and emotional sensitivity, are transferred in the relationship between technology, as if it is another person. This theory can be used to account for those examples of relationships with an AI user that involve an emotional component. For instance, to encourage a user to cast their vote, a conversational AI application can use emotional language or tone of voice and response, making them predisposed to socially and emotionally engaged with the AI to feel connected and socially and emotionally bonded.

The related tendency of people to extrapolate human emotions, intentions and properties to inanimate artifacts like machines and AI systems is termed anthropomorphism theory (Epley et al., 2007). More anthropomorphisation of technology when it can communicate in an empathetic, expressive and responsive way. Anthropomorphic behaviors are important to foster emotional attachments and trust in AI interaction. When a chatbot or virtual assistant responds appropriately to contexts and uses natural language, users can see them as an emotionally intelligent companion. Emotional trust and comfort are found to improve users perceived social presence with AI when interacting with it,

anthropomorphism is found to increase users' emotional trust in, or comfort with, the AI (Waytz et al., 2014).

❖ **Hyperpersonal Communication and Emotional Disclosure**

According to Walther (1996), hyperpersonal communication is a theory that posits that communication by computer can sometimes be more emotionally involved and personally relevant than F2F communication. An online interaction can offer more opportunity for someone to present themselves in a more controlled way and to “show” their emotions more freely, providing more intimacy and ease. This scenario with AI may be where more is expressed because they are not judged, criticized or socially excluded by artificial intelligence. This extra space may facilitate emotional expression and reflection or emotional processing. AI interactions could thus serve as a means of emotional regulation and psychological well-being, particularly for individuals who have experienced stress or challenges in interpersonal interactions.

❖ **AI Interaction and Emotion Regulation**

Emotion regulation theory was developed to explain how people cope with their emotional experiences (Gross, 1998). Emotion Regulation: All ways that a person tries to influence her emotional state or how her emotion is displayed. Gross and John (2003) have investigated the two strategies most closely studied which are expressive suppression and cognitive reappraisal. Cognitive reappraisal involves altering the thinking process around an event, which impacts on how a person feels, while expressive suppression is about blocking out outward expression of emotions. People who are psychologically balanced are more likely to anticipate and manage and conquer stressors; maintain good social relationships and deal with hard times, without the ability to regulate emotion, psychological functioning suffers.

New studies have shown that AI systems can play a part in the facilitation of emotion regulation. Chatbots and virtual companions are not just tools for reducing stress or curbing worry and loneliness; people are using AI more and more to receive emotional support. Negative affect has been found to reduce and emotional health to improve after engaging with mental health apps with AI (Fitzpatrick et al., 2017). Rosenfeld et al. (2019) likewise found that users' interactions with an AI system can be considered an emotional coping response, in which they seek reassurance, distraction or guidance. These findings indicate that human-AI interaction may be a key component in promoting adaptive emotion regulation, underscoring the role of support and caring in interactions with AI.

❖ **The Risks of Emotional Reliance on AI**

Human–AI attachment can have positive or negative psychological results, as displayed in the evidence. However, on the positive side, AI systems can help reduce loneliness, enhance positive emotions and a sense of belonging, and provide emotional support. Positive mood (Rosenfeld et al., 2019) and loneliness reduction are among the outcomes observed as a result of the interaction with conversational agents, and Waytz et al. (2014) detected that positive emotional perception of anthropomorphized technology use leads to an increase in satisfaction along with a decrease in stress. These findings suggest AI has potential to be used as a supplemental social tool when there is limited human interaction.

However, the development of a genuine connection with AI is accompanied by concerns. Over-dependence on AI for emotional assistance could reduce motivation for personal communication and enhance dependency. In 2011 Turkle argues that technology gives the illusion of companionship without the obligations that come with humans and believes that this can have a negative impact on human relationship. Overdependence on AI can also foster inappropriate coping mechanisms, particularly when individuals start to build other relationships with AI instead of in the flesh. While cognitive reappraisal is a potential adaptive mechanism for AI interaction, other potential effects include emotional dependency or avoidance of real-life problems. Overuse of AI for emotional support can result in decreased motivation to learn coping skills or persons who are interacting with humans. This dichotomy points to the need for additional investigations into the psychological dimensions of interactions with AI (Fitzpatrick et al., 2017).

❖ **Culture and Human–AI Interaction**

A pivotal aspect is the culture in which Human–AI interaction occurs. Existing research has been in Western cultures and may not easily apply to non-Western groups (Hofstede, 2001). Collectivism, beliefs and norms of the society about technology may have a great impact on how AI is interpreted and used (Markus & Kitayama, 1991). With the swift shift towards technological acceptance in Pakistan, it is essential to investigate the effects of cultural values on human–AI bonding and the implications on emotion regulation. People in collectivistic cultures may be more likely to feel close to AI as a result of their focus on relationships, and evidence indicates that non-human entities are anthropomorphized by assigning social and emotional attributes, which varies based on an individual's culture (Nass & Moon, 2000; Waytz et al., 2014).

This area is more empirically investigation tractable, as standardised measurement tools like Emotion Regulation questionnaire or AI Attachment scale have been used. When researchers have studied the use of these tools, they have found that the rise of attachment to AI is linked to the rise of their use of adaptive emotion regulation strategies, such as the strategy of cognitive reappraisal (Gross & John, 2003; Kasturiratna & Hartanto, 2025). Some findings, however, on negative outcomes like emotional dependency and expressiveness suppression are less clear-cut and emphasize the need for more fine-grained and culturally more diverse research studies.

❖ Research Gap and Niche

In light of these gaps, the current study intends to delve into Human-AI Relational Attachment and Emotional Regulation in adults in Pakistan. This study aims to explore the relationship between attachment relationship with AI and emotion regulation strategies with quantitative research approach. The findings will potentially expand on existing research regarding human-AI interaction, provide perspectives on culturally-specific interactions with AI, and support the design of AI systems that exhibit positive psychological traits and will not have harmful effects.

Results

Table 1 presents the sociodemographic characteristics and AI interaction patterns of the respondents. A total of 120 adults aged 18 years and above were included in the study. Regarding gender, 62 participants (51.7%) were female, while 58 (48.3%) were male. In terms of age, the largest group comprised participants aged 21–25 years ($n = 44$, 36.7%), followed by those aged 18–20 years ($n = 42$, 35.0%). Participants aged 26–30 years accounted for 28 (23.3%), while 10 (8.3%) were aged 31–40 years and 4 (3.3%) were aged 41 years and above.

Regarding educational attainment, most participants were undergraduates ($n = 77$, 64.2%), followed by graduates ($n = 32$, 26.7%) and postgraduates ($n = 17$, 14.2%). In terms of occupation, students formed the largest group ($n = 72$, 60.0%), followed by full-time employees ($n = 25$, 20.8%), self-employed participants ($n = 12$, 10.0%), part-time employees ($n = 9$, 7.5%), and unemployed participants ($n = 7$, 5.8%).

With respect to daily AI use, 31 participants (25.8%) reported spending less than 30 minutes interacting with AI each day, while an equal number ($n = 31$, 25.8%) reported spending 30 minutes to one hour. A further 24 participants (20.0%)

reported one to two hours of daily interaction, 26 (21.7%) reported two to four hours, and 15 (12.5%) reported more than four hours. ChatGPT was the most frequently used AI system ($n = 91$, 75.8%), followed by Gemini ($n = 14$, 11.7%). Other AI tools were reported by 8 participants (6.7%), while Google Assistant and Siri were each used by 5 participants (4.2%). Alexa was the least frequently reported system ($n = 2$, 1.7%).

Regarding emotional connection with AI, 47 participants (39.2%) reported feeling emotionally connected to an AI system, whereas 73 (60.8%) reported no such connection.

Table 1: Sociodemographic Characteristics of the Participants ($N = 120$)

Variable	Category	f	%
Gender	Female	62	51.7
	Male	58	48.3
Age	18–20	42	35.0
	21–25	44	36.7
	26–30	28	23.3
	31–40	10	8.3
	41 and above	4	3.3
Education Level	Undergraduate	77	64.2
	Graduate	32	26.7
	Postgraduate	17	14.2
Occupation	Student	72	60.0
	Employed (full-time)	25	20.8
	Employed (part-time)	9	7.5
	Self-employed	12	10.0
	Unemployed	7	5.8
Average Daily Time Spent Interacting with AI	Less than 30 minutes	31	25.8
	30 minutes to 1 hour	31	25.8
	1–2 hours	24	20.0

	2-4 hours	26	21.7
	More than 4 hours	15	12.5
Type of AI Used Most Often	ChatGPT	91	75.8
	Gemini	14	11.7
	Google Assistant	5	4.2
	Siri	5	4.2
	Alexa	2	1.7
	Other	8	6.7
Ever Felt Emotionally Connected to an AI System	Yes	47	39.2
	No	73	60.8

Note. *f* = frequency; % = percentage. Percentages are reported as computed in the original analysis

Table 2 presents the descriptive statistics and the Pearson correlation between the study variables. The mean score for human-AI attachment was 43.37 (*SD* = 10.83) and the mean score for emotional regulation was 31.82 (*SD* = 4.66). The correlation analysis revealed a statistically significant positive correlation between human-AI attachment and emotional regulation ($r = .316$, $p < .001$). The result indicates that an increase in human-AI attachment is significantly associated with an increase in emotional regulation among participants.

Table 2: Descriptive Statistics and Pearson Correlation Between Study Variables (*N* = 120)

Variable	<i>M</i>	<i>SD</i>	Emotional Regulation
Human-AI Attachment	43.37	10.83	.316**
Emotional Regulation	31.82	4.66	–

Note. *M* = mean; *SD* = standard deviation. ** $p < .001$.

Table 3 presents the outcomes of the simple linear regression examining the effect of human-AI attachment on emotional regulation. The regression model was significant, $F(1, 118) = 13.13$, $p < .001$, and accounted for approximately 10% of the variance in emotional regulation ($R^2 = .100$). Emotional regulation was positively and significantly predicted by human-AI attachment ($B = 0.136$, $SE = 0.037$, $\beta = .316$, $t =$

3.62, $p < .001$). The results therefore support the study hypothesis that human–AI relational attachment correlates significantly with emotional regulation in adults in Pakistan.

Table 3: Simple Linear Regression Predicting Emotional Regulation From Human–AI Attachment

Predictor	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i>
(Constant)	25.944	1.673	–	15.51	< .001
Human–AI Attachment	0.136	0.037	.316	3.62	< .001

Note. $R^2 = .100$, $F(1, 118) = 13.13$, $p < .001$.

Discussion

This study sought to explore the relationship between emotional regulation and human–AI relational attachment in adults of Pakistan. This hypothesis test confirmed the research hypothesis. The result of the analysis showed that there was a positive and significant correlation between two variables ($r = .316$, $p < .001$), and the regression analysis indicated that attachments with AI predicted emotional regulation; that is, individuals who reported higher emotional attachments to the AI systems reported higher levels of emotional regulation habits.

❖ A Modest but Reliable Association

The moderate positive association seen here indicates a potential rise in the use of emotional skills to manage and control emotion as emotional appropriateness with AI technologies like chatbots, virtual assistants, and conversational agents improves. It is worth emphasizing that, albeit weak, this association suggests that the psychological impact of AI interaction may have a clear effect on emotional functioning.

The results of the regression analysis showed that human–AI attachment is significant to predict emotional regulation. However, the proportion of variance explained is relatively small, indicating that while AI attachment may be a helpful component in emotional regulation, it is not enough to explain emotions on its own or most important. Emotional control is a psychological phenomenon, and many determinants have been described such as personality, support systems, psychological disorders, coping strategies and environmental stressors (Gross, 1998; Gross & John, 2003).

❖ **AI as a Supplementary Attachment Figure**

This phenomenon may be useful in understanding from attachment theory (Bowlby, 1969) that the general trend of individuals is to actively seek safety and security in their attachment characters. As these have previously been done by a human caregiver or intimate partner, the AI system may be able to accomplish similar emotionally charged positions partially in the digital world. The opposite could be true for participants who indicated higher levels of AI attachment, where AI could be seen as a helpful alternative that is always present, impartial and accessible to the user. This sense of emotional openness may lead to a sense of safety, and indirectly promote emotion regulation (Gross, 1998). AI can serve as an additional 'attachment figure' to normalize the emotional experience for individuals with limited social interactions or those facing loneliness or stress.

❖ **Cognitive Reappraisal as the Likely Mechanism**

Gross (1998, Gross & John, 2003) proposed that emotional reactions are managed in different ways, such as the emotion-modulating strategy of cognitive reappraisal, and the emotion suppression strategy of expressive suppression. The present findings hint that engaging with AI could be useful for implementing flexible emotion regulation strategies, especially cognitive reappraisal. A reasonable explanation is that AI systems can offer timely feedback, affirmations and answers that includes alternative views. When engaging with AI during emotionally charged moments, users might be encouraged to reevaluate their negative thoughts or to adopt a more logical perspective. Adaptive emotion regulation strategy, cognitively similar to reappraisal. The results confirm the results of the previous research that indicate that AI systems could act as tools for emotional and psychological support. Conversational agent research (such as Woebot) has been shown to reduce stress and to lead to better emotional well-being (Fitzpatrick et al., 2017) and additional research reveals that AI-based interventions enhance coping skills and mood management.

❖ **Anthropomorphism and the Media Equation**

A crucial alternative interpretation of the findings as outlined by anthropomorphism theory (Epley et al., 2007) is relevant. The theory assumes that behaviour, feelings and intentions can be attributed to non-humans, especially in cases when they elicit socially and emotionally responsive behaviour, just as they do for humans. AI tools today are designed to emul Late modern artificial intelligence technologies mimic human interaction, considering input in natural language,

providing empathetic responses and tailored methods of engagement. As such, users can identify an AI system as a partner instead of a tool. Emotional mechanisms, such as emotional trust and an emotional sense of shared understanding may be higher with anthropomorphic non-human agents, leading to higher emotional comfort (Waytz et al., 2014). These profiles are coherent with the current research that indicates a stronger regulation of emotions in the profiles of people who emotionally connect with AI.

The current results also suggest media equation theory (Reeves & Nass, 1996) that posits that people will act toward computers and other media technologies like they would act toward a real person. People apply socially familiar rules, like the rules of politeness, empathy and sensitivity to emotions, in interaction with technology, even if they are knowingly aware that there is no other person involved. This means that any form of AI that can evoke emotion from the user can actually cause the emotion, and users could feel a sense of companionship, connection and emotional intimacy with the AI.

❖ **The Limits of the Relationship**

The overall results also align with a more nuanced view, put forward by Turkle (2011) that, though technology may be able to replace the need for social engagement, there is a possibility of reduction in social engagement when technology takes precedence too often. This intermediate level of correlation in the present study reflects both this dual nature of AI—providing emotional support without succeeding in substituting for human emotional systems (Turtle, 2011).

To conclude, the results reveal that there is a positive and significant relationship between human–AI relationship attachment and emotional regulation for adults in Pakistan. Results support attachment theory, emotion regulation theory (Bowlby, 1969; Gross, 1998), and recent theories about human interactions with technology (Turtle, 2011), indicating that AI technology can play an important yet limited part in the emotional process. AI can support emotional wellbeing by offering support, suggesting thought refocusing and providing emotional support in the form of cognitive re-framing, but this isn't everything.

❖ **Limitations**

These results are subject to a number of qualifications. First of all, correlational design was used, which only shows the relationship between human–AI attachment and emotional regulation but does not show causality. Thus, it cannot be inferred

that the causal relationship is that AI attachment leads to emotional regulation. Secondly, questionnaires were the data collection methods and the respondents' answers might not be completely accurate. Some possible confounding in participant responses to the questions may have occurred as the results may not have been reflective of social desirability or may not have represented accurate self-perception.

Another downside is that the research did not differentiate among various AI platforms, including ChatGPT, Siri, Alexa or Gemini. Every system provides its own method of interaction, and the results may differ between participants, depending on which AI they use. Furthermore, personality, stress, mental health and social supports were not examined and may impact regulation of emotions. Lastly, the study was only carried out in a Pakistani context therefore, the results may not be applicable in other countries due to cultural differences. The sample was also highly skewed towards students and younger adults, thus limiting generalizability.

❖ **Implications and Future Research**

The results have also theoretical implications: Emotional relationships are not particular to inter-human relationships but are established with an AI system as well. The finding advances the knowledge about the process of creating emotional affinity for technological products in an under-researched, Pakistani culture, and expands current knowledge of the role of human emotions as related to current technological products.

In practical terms, outcomes are useful for AI developers and can aid educators and policymakers. Systems must be created that induce positive emotions towards the user making use of it and prevent negative effects of dependency, lack of authenticity of communication and restricted in-person social interaction of the user. It is important to create awareness regarding maintaining a balance between co-engagement with artificial intelligence and building personal relationships in educational and social settings. The implications for mental health practitioners include that AI tools can prove valuable as tools to support rather than replace therapeutic practice.

It is suggested that future studies should be undertaken with larger and more heterogeneous sample from various parts of Pakistan for more reliable and generalizable findings. Cross-cultural studies are equally important and provide more understanding of the cultural distinction in emotional bonding with AI. The

age, gender, education, personality traits, and interaction frequency with AI systems can be analyzed to account for the different emotions of attachment to AI. It is also suggested that future research should adopt longitudinal approaches for long-term psychological impact of the human–AI relationship, and a comparison study between different AI platforms would be valuable to account for the difference on role playing and influence of their emotion regulation. More studies are required to investigate the positive outcomes (stress reduction, emotional support and self-care), and the negative outcomes (loneliness, dependency and social isolation).

Conclusion

The present study examined the correlation between emotion regulation and relational attachment of human – AI in adults in Pakistan. The results indicated that there was a statistically significant positive correlation between emotional regulation and human–AI attachment ($r = .316$, $p < .001$) and the regression analysis revealed that the human–AI attachment has statistically significant prediction, but low proportion of variance explained with the emotional regulation. These results indicate that scores on emotional reactions towards AI systems correlate with adaptive emotional regulation strategy scores.

People's relationship with AI can help to moderate emotions, while at the same time, the influence range is limited, according to the study. AI systems can give the emotional aid, legitimization and possibility of mental restructuring to different emotional regulation. However, the processes of emotions are not unified, and the impact of personal, social and environmental factors that cannot be explained solely by attachment model AI. AI can be used as an additional emotional support mechanism but should not be regarded as a primary support device or a replacement for existing coping strategies.

In conclusion, the results suggest that AI is gradually becoming part and parcel of the Pakistani society and that there is a need for the responsible and ethical utilization of AI tools. Additional studies are needed to investigate and understand possible longer-term impacts, cultural differences, and differences involving various AI platforms to assess how interactions with AI impact emotional health.

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Article Information:

Received	9-Jan-2026
Revised	26-Mar-2026
Accepted	27-Mar-2026
Published	30-Mar-2026

Declarations:

Authors' Contribution:

- All Authors **Conceptualization, and intellectual revisions, Data collection, interpretation, and drafting of manuscript**
- The authors agree to take responsibility for every facet of the work, making sure that any concerns about its integrity or veracity are thoroughly examined and addressed

▪ **Conflict of Interest:** NIL

▪ **Funding Sources:** NIL

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