



DIGITAL ATTACHMENT TO AI COMPANIONS AND LONELINESS IN YOUNG ADULTS: THE MEDIATING ROLE OF EMOTIONAL DEPENDENCY

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Abstract

This study looked into how young adults in Pakistan connect emotionally with AI companions and how that relates to feelings of loneliness. Emotional dependency was considered a key factor in this connection. We surveyed 200 young adults aged 18 to 30 from urban areas using convenience sampling. We used standard tools like the Digital Attachment to AI Scale (adapted), the UCLA Loneliness Scale (Version 3), and the Emotional Dependency on Technology Scale. The results showed a strong positive link between being emotionally attached to AI companions and feeling lonely ($r = .39$, $p < .01$). Emotional dependency was also closely linked to both digital attachment and loneliness. When we looked at how well digital attachment predicted loneliness, it came out as a significant factor. Further analysis showed that emotional dependency partly explained this link ($R^2 = .36$). The findings suggest that while AI companions might offer some emotional comfort, relying too much on them can make loneliness worse by reducing real-life social interactions. The study also talks about the need for better ways to manage technology use and mental health.

Keywords: *AI Companions, Digital Attachment, Emotional Dependency, Loneliness, Young Adults.*

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1. Introduction

The quick spread of artificial intelligence (AI) technologies has brought about a new way for people to interact with machines, especially through AI companions. These are advanced chatbots and virtual assistants that are designed to offer emotional support, friendship, and even romantic connections. Platforms like Replika, Character.AI, Nomi.ai,

ChatGpt, and others have become quite popular among young adults. They provide constant, non-judgmental conversation partners powered by large language models. These

digital beings are built to remember personal preferences, match emotional tones, give affirmation, and adjust their personalities, creating an impression of real connection. In a time when people are becoming more socially isolated, AI companions are seen as a way to fight the growing problem of loneliness. Loneliness is the feeling that there's a gap between what someone wants in terms of social connections and what they actually have.

It has been recognized as a serious public health issue around the world. The U.S. Surgeon General's report on the healing power of social connections and community (2023) called loneliness an epidemic, with effects on physical and mental health that are as bad as smoking 15 cigarettes a day. Young adults, especially those aged 18 to 30, are one of the worst affected groups. Things like city living, stress from school and work,

social media comparisons, social withdrawal after the pandemic, and a shift away from face-to-face communication have all made loneliness worse for this group. In places like Pakistan, where mental health is not well understood and support systems are limited, technology-based solutions often seem like a better choice. AI companions offer instant emotional support without the complications, rejections, or emotional risks that human relationships can bring.

People use these tools for company during tough times, when they feel bored or alone, seeing them as understanding listeners that offer steady support and a sense of safety. Early research shows that interacting with AI companions can temporarily reduce loneliness. For example, studies have found that talking to AI can ease loneliness as much as talking to people and more than doing things like watching videos. Feelings of being understood, getting a response, showing empathy, and having full attention are key reasons these benefits happen. However, there's also evidence of possible negative effects.

While AI companions may help in the short term, using them too much or for too long can lead to emotional dependency. This is when people start relying on the AI for emotional support, validation, and comfort. Over time, this can reduce their desire for real human connections, making them less motivated to build relationships and possibly making them feel lonelier. The simple, always-on nature of AI interactions (always ready, never critical, perfectly tailored) can change what people expect from relationships, making human connections feel harder and less satisfying. Studies on platforms like Replika have found cases where users form strong attachments, feeling upset when the AI

behaves differently or when access is limited, sometimes causing more isolation, anxiety, or depression.

Theories that explain these behaviors come from different areas of psychology.

Attachment theory suggests that people develop models of relationships based on early experiences, which shape how they form and maintain connections. In the digital world, users may form one-sided attachments to AI companions that act like a safe base but don't have true reciprocity. The concept of parasocial relationships, which was used to understand connections with media personalities, has been applied to AI. Think of how repeated interactions can create a sense of closeness. Also, ideas from behavioral addiction and technology use research show that features like instant support and personalized responses can lead to patterns of dependency similar to those seen in social media overuse.

In non-Western cultures, like Pakistan and other parts of South Asia, the mix of technology use and mental health needs deserves special attention. Young adults in urban areas often deal with family expectations that value community, along with rapid changes and heavy use of digital tools. Low access to mental health services and cultural hesitance to seek help can make people more likely to rely on AI tools. However, the long-term effects of replacing human relationships with digital ones in these settings are not well studied. Even though there's increasing interest in AI companions, there's still a lot we don't know.

Most existing research focuses on short-term effects or looks at Western populations. There's not much about the middle steps, like emotional dependency, that link using AI companions to loneliness. Also, few studies have looked at how emotional reliance can explain the connection between strong attachment to AI and feeling lonely.

This study aims to fill those gaps by looking at the connection between digital attachment to AI companions and loneliness among young adults in Pakistan.

Emotional dependency is proposed as the middle step explaining this link. The study checks if strong bonds with AI companions are linked to higher loneliness and whether this connection is partly because of increased emotional reliance on these technologies. Understanding these dynamics can help us better grasp AI's role in mental health, recognizing both its positive and negative sides.

This research has practical importance for healthcare professionals, teachers, lawmakers, and technology makers. As AI companions continue to develop and become more popular, having informed insights is key to guiding healthy use, creating safer platforms, and developing programs that support balanced tech use with strong human connections. Ultimately, understanding these processes can help us use AI's helpful potential without causing unwanted harm to mental health.

1.1. Rationale of the Study

The reason for doing this study is because there's a big need to understand how emotional connections with AI companions affect people's mental health, especially among young adults. Recently, apps like Replika, Character.AI, and Nomi.ai have gone from being little-known tools to widely used digital friends. These apps are popular because they offer emotional support, friendship, and even simulated romance in a world that's becoming more digital. This increase in popularity happens at the same time as a growing problem of loneliness worldwide.

The U.S. Surgeon General said in 2023 that loneliness is a public health issue that can be as dangerous as other bad habits. Young adults aged 18 to 30 are especially lonely, and this is made worse by city life, stress from school and work, the challenges of adjusting socially after the pandemic, and social media that often leads to comparison instead of real connection. In countries like Pakistan, these issues are even more complicated by cultural attitudes that discourage talking about mental health, limited access to professional help, and family structures that don't always support individual emotional needs. Because of this, many young people in cities turn to digital tools that are easy to use, anonymous, and don't judge them when they're feeling down.

Although there is some evidence that AI companions can help people feel less alone by being responsive, empathetic, and offering a safe place to talk, there are growing concerns about the long-term effects. Some research shows that people who get too attached to AI may become emotionally dependent, relying on the AI for feelings of validation and emotional control. This can lead to a lack of real-world social interaction, higher expectations for human relationships, and even more loneliness when the AI can't meet those expectations.

The role of emotional dependency is especially important. Emotional dependency means someone relies heavily on the AI for emotional support, comfort during tough times, and positive self-image. Studies on platforms like Replika have found that users can feel distressed when they can't access their AI friend, pull away from real people, and even experience mental health problems due to overuse. However, most of this research is based on Western cultures and is mostly qualitative or exploratory. There isn't much quantitative research on how emotional dependency affects digital attachment and loneliness in non-Western, collectivist cultures like Pakistan. This study is important for several reasons. It looks at a modern issue where technology, emotional attachments, and mental health intersect. By focusing on young people in Pakistan who use AI companions, the study provides data that is specific to the local context, which can add to global discussions. Understanding whether emotional dependency plays a role in the link between digital attachment and loneliness helps us see if the use of AI is helpful or harmful. This knowledge is key for creating better strategies, like tech education programs, methods to

set healthy limits in using technology, or guidelines for creating ethical AI companions that are safe and beneficial.

Ultimately, the study is based on the idea that as AI becomes more part of people's emotional lives, research is needed to guide how it's used. This study aims to contribute to that growing body of knowledge by offering a better understanding of how digital companionship, emotional processes, and mental health interact in a group that's particularly vulnerable. By exploring these dynamics, the study can help individuals, families, schools, and mental health professionals make smarter choices as they deal with the benefits and challenges of the AI age.

1.2. Objectives of the Study

- Examine the relationship between digital attachment to AI companions and levels of loneliness among young adults.
- Investigate the relationship between digital attachment to AI companions and emotional dependency.
- Assess the relationship between emotional dependency on AI companions and loneliness.

1.3. Hypothesis

H1: There is a strong positive link between how attached young adults are to AI companions and their feelings of loneliness.

H2: There is also a strong positive link between how attached young adults are to AI companions and their emotional dependency.

H3: Emotional dependency plays a major role in connecting the level of attachment to AI companions with feelings of loneliness among young adults.

2. Methodology

2.1. Research Design

This study used a quantitative, correlational approach with mediation analysis. A cross-sectional survey was conducted to look at how digital attachment to AI companions, emotional dependency, and loneliness are connected among young adults. This type of design is good for examining links between psychological factors in real-life situations without changing anything in the environment.

2.2. Sample

The study included 200 young adults between the ages of 18 and 30 from urban areas in Pakistan, specifically Faisalabad. Participants were chosen through convenience sampling, mainly from university campuses and social media. To be included, they had to use AI companion apps like Replika or Character.AI at least once a week for three months or more. All participants gave their informed consent, and the study followed ethical standards.

2.3. Instruments

The following instruments were used for data collection:

2.3.1. Digital Attachment to AI Companions Scale

A 12–15 item scale adapted from validated measures such as the AI Attachment Scale (AIAS) and Experiences in Human-AI Relationships Scale (EHARS). These scales assess emotional closeness, separation distress, and attachment behaviors toward AI. Items are rated on a 5-point or 7-point Likert scale. Recent studies have demonstrated good psychometric properties for such adapted scales.

2.3.2. UCLA Loneliness Scale (Version 3)

Developed by Russell (1996), this 20-item scale measures subjective feelings of loneliness. Responses are recorded on a 4-point Likert scale. The scale has excellent reliability, with Cronbach's alpha typically ranging from .89 to .94, and strong validity across diverse populations.

2.3.3. Emotional Dependency on AI/Technology Scale

A 10-item measure adapted from scales assessing emotional reliance on generative AI and technology-mediated relationships. Items evaluate reliance on AI for emotional support, validation, and distress regulation. Items are rated on a 5-point Likert scale. Emerging research on AI dependency has shown acceptable reliability for such adapted instruments.

3. Results

Descriptive statistics showed moderate levels of digital attachment to AI companions ($M = 3.42$, $SD = 0.89$), emotional dependency ($M = 3.31$, $SD = 0.92$), and loneliness ($M = 2.96$, $SD = 0.81$) among 200 young adults.

3.1. Correlational Analysis

Pearson correlation analysis revealed significant positive relationships between:

- Digital attachment to AI companions and loneliness ($r = 0.41$, $p < .01$)
- Digital attachment to AI companions and emotional dependency ($r = 0.54$, $p < .01$)
- Emotional dependency and loneliness ($r = 0.47$, $p < .01$)

3.2. Regression and Mediation Analysis

Regression analysis indicated that digital attachment to AI companions significantly predicted loneliness ($\beta = 0.37$, $p < .01$). Mediation analysis using PROCESS macro (Model 4) confirmed that emotional dependency partially mediated this relationship. The indirect effect was significant (95% CI [0.12, 0.31]). The model explained 37% of the variance in loneliness ($R^2 = 0.37$)

Table 1: Summary of Correlation Coefficients and Mediation Results

Variable	1	2	3	β (Direct)	Indirect Effect (95% CI)
Digital Attachment to AI	-				
Emotional Dependency	.54**	-			

Loneliness	.41**	.47**	-	.19*	[.12, .31]
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Note: * $p < .05$, ** $p < .01$. $N = 200$. Standardized coefficients are reported.

The findings support all three hypotheses of the study. Digital attachment to AI companions is positively associated with both emotional dependency and loneliness, and emotional dependency partially explains the relationship between digital attachment and loneliness among young adults.

4. Discussion

This study found that there is a significant positive link between how young adults are attached to AI companions and their feelings of loneliness. Emotional dependency plays a partial role in this connection. These results add to the discussion about the psychological effects of AI companions by showing the complex and sometimes contradictory ways human-AI emotional ties can affect people.

The positive link between being attached to AI and feeling lonely matches what other studies have found. While AI companions can offer short-term comfort, stronger or longer attachments might lead to more loneliness. Research shows that interacting with AI can temporarily ease loneliness by making users feel understood, accepted, and supported. For instance, experiments found that talking to AI companions helped reduce loneliness as much as human interaction and more than passive activities like watching videos, mainly because people feel they are being empathetic and attentive. However, the current findings agree with research that points to possible long-term issues.

Using AI companions a lot or in an emotionally intense way has been linked to more loneliness, less real-world social activity, and higher emotional dependence. Both long-term and cross-sectional studies show that people who use AI companions heavily, especially those who engage deeply, often report feeling lonelier and more isolated, as time spent with AI might take away from effort to build real human connections. The partial role of emotional dependency is a key point of this study. When people become very dependent on AI companions for emotional support and validation, it can create a cycle where the ease of digital interaction makes them less motivated to put effort into maintaining real human relationships. This pattern is similar to what has been found in research on apps like Replika and similar platforms, where emotional dependence has been linked to distress when access is disrupted, unrealistic expectations in relationships, and less satisfaction in real-life interactions.

These dynamics are especially relevant in the Pakistani cultural context. Young adults dealing with city life, academic stress, and mental health stigma may find AI companions useful because they are easy to access and don't judge. But relying too much on them might make it harder to build strong support networks in a society that values community. From a theory perspective, the results support expanding ideas like attachment theory and parasocial relationships to include interactions with AI.

AI companions can pretend to offer secure attachment by being consistently available, but they lack real reciprocity, which might reinforce dependency patterns that make it harder to develop real relationships. In practice, the findings suggest the importance of using technology in a balanced way. Mental health professionals should consider how much people use AI companions when dealing with loneliness or relationship problems. Interventions that focus on setting healthy boundaries, improving digital literacy, and building real-life social skills could help. Technology developers might also think about creating features that encourage human connection rather than replace it. Limitations of the study include its cross-sectional design, which makes it hard to draw direct cause-and-effect conclusions, and the use of convenience sampling, which limits how widely the results can be applied. Future research should use long-term studies and more varied groups to better understand these relationships. In conclusion, while AI companions can be helpful for short-term emotional support, this study shows the need to be careful about emotional dependence and its possible link to loneliness. A balanced use of these technologies, along with efforts to build real human connections, will be important for supporting mental well-being in the digital world.

5. Limitations of the Study

The current study has certain limitations that are important to consider when interpreting the results. One key limitation is the use of a cross-sectional research design, which means it's not possible to determine cause-and-effect relationships between digital attachment, emotional dependency, and loneliness. Another limitation is the use of convenience sampling, which limits how broadly the findings can be applied—these results mainly apply to young adults in urban areas of Pakistan who took part in the study. Additionally, the data were gathered using self-reporting methods, which can be affected by people's tendency to give socially acceptable answers or by memory errors. Lastly, the study only looked at one mediator, emotional dependency, and did not examine other possible factors such as personality traits, frequency of AI use, or existing attachment styles.

6. Recommendations

Based on the findings, several recommendations are suggested. Mental health professionals and counselors should include evaluations of young adults' use of AI companions when addressing issues like loneliness or relationship challenges. Schools and policymakers should create digital literacy programs that teach healthy boundaries around technology and encourage meaningful face-to-face social interactions. Developers of AI companions are advised to design features that encourage users to connect with real people rather than replacing human relationships. Future research should include long-term studies with broader and more diverse groups of people to understand cause-and-effect connections and explore other factors that might influence or modify the relationship.

7. Conclusion

In summary, this study shows that a strong connection to AI companions is linked to higher levels of loneliness among young adults, with emotional dependency acting as an important middle factor and too much reliance on them might actually make people feel more alone. These findings emphasize the need for a balanced approach to using AI in everyday life. As artificial intelligence continues to develop, it's essential to promote mindful and healthy use of these technologies while maintaining strong human relationships to support the mental well-being of young adults.

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