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Research Paper

# Attachment-Mediated Dependency Framework: A Theoretical Model Integrating Attachment Theory with Human-AI Relational Dynamics

Abishaina Harris[1]*, Alpna Agarwal[2]

## ABSTRACT

The rapid growth of generative AI systems with sophisticated conversational capabilities has created unprecedented opportunities for human-AI relationships, raising critical questions about the mechanisms underlying emotional dependency on artificial agents. Drawing on attachment theory, parasocial relationship literature, self-determination theory and contemporary human-AI interaction research, this paper proposes the Attachment-Mediated Dependency Framework (AMDF), a theoretical model explaining how attachment styles moderate pathways to AI dependency. The framework identifies three distinct relational trajectories: hyperactivating attachment pathways characteristic of anxious attachment styles, trust-dependent engagement intensification in avoidant attachment, and integrated companionship in secure attachment. Through systematic integration of 30 recent empirical studies, we articulated specific mechanisms that explains how synthetic attachment formation differs fundamentally from technology addiction, highlighting the phenomenology of one-sided emotional reciprocity, perceived empathy misattribution, and relational loss awareness. The model explains how anthropomorphic design features in AI systems, sustained self-disclosure opportunities, and validation-seeking motivations interact with individual differences in attachment orientation to create dependency patterns. Furthermore, discussing the clinical and design implications, including differential assessment strategies and ethical considerations for AI companion integration in therapeutic and educational contexts.

***Keywords:*** *Artificial Intelligence, Generative AI, Human-AI Interaction, Emotional Dependency, Attachment Theory, Parasocial Relationships, Companionship, Psychological Needs*

In the contemporary era, integration of artificial intelligence (AI) applications into the intimate domains of human life represents one of the most significant psychological transformations (Fang et al., 2025; Brandtzaeg et al., 2025). Modern technological innovation of generative AI systems like ChatGpt, Replika, Claude and Character.AI function more like social actors, relational partners and emotional confidants (Zhang et al., 2024; Pentina et al., 2023). The capacity to develop relational connections emerges due to the sophisticated language models which are trained to simulate affective and cognitive

[1]Research Scholar, Department of Psychology, Chaudhary Charan Singh University, Meerut, UP, India
[2]Professor & Head, Department of Psychology, Chaudhary Charan Singh University, Meerut, UP, India
*Corresponding Author

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functions like empathy, understanding and personalized engagement (Goh et al., 2024; Huang & Huang, 2025).

The consequences of these human-AI relationships go beyond the traditional conceptualization of technology addiction. It raises concerns of excessive usage of these systems which can lead to dependency patterns in people. Research suggests that these patterns involve risk of genuine emotional investment, patterns of self-disclosure mirroring those of human intimacy and relational loss experiences that are distinct from hedonic reward dependence (Li & Zhang, 2024; Laestadius et al., 2024). The population most susceptible to these emerging relational dependencies on AI are the adolescents and young adults who often replace or supplement human social interactions and connections with AI companionships (Brandtzaeg et al., 2025; Herbener & Damholdt, 2025).

Emotional and relational attachments developed by the users with the AI-systems can be explained on the basis of attachment theory and parasocial relationship models (Sharpe, P., & Ciriello, R. F., 2024; Bunim, E, 2024). Attachment theory explains how early experiences with our caregiver aids in developing different attachment patterns in people (Collins & Read, 1990). Research suggests, anxiously attached individuals experience intensified emotional dependency through AI interactions that provide consistent validation without relational ruptures (Xie et al., 2023; Pentina et al., 2023). Parasocial theory highlights the tendency in people to humanize computers and artificial assistants when they are assigned with humanlike qualities, leading to the formation of a parasocial relationship (Nass et al., 1994; Dehnert & Mongeau, 2022; Bunim, E, 2024).

This theoretical paper facilitates a novel integrative framework—the Attachment-Mediated Dependency Framework (AMDF)—that elucidates how attachment style functions as moderating variables in the formation of AI dependency. The AMDF identifies different pathways through which specific attachment orientations interact with distinct AI affordances to create qualitatively different relational outcomes. This framework incorporates recent findings from from longitudinal studies (Fang et al., 2025), structural equation modeling research (Huang & Huang, 2025), and qualitative investigations of lived experience with AI companions (Li & Zhang, 2024; Laestadius et al., 2024).

## THEORETICAL BACKGROUND AND CONCEPTUAL FOUNDATIONS

### *Attachment Theory and Individual Differences in Relational Orientation*

Attachment theory was developed by John Bowlby that posits how early relationship formation with primary caregivers construct internal working models like the cognitive affective schemas that help us make expectations about relational availability, trustworthiness and responsiveness (Bowlby, 1969; Hazan & Shaver, 1987). These models persevere across the lifespan of an individual, influencing their relationships with their friends, partners and also with artificial technology (Xie & Pentina, 2022; Maeda & Quan-Haase, 2024).

Adult attachment styles are typically conceptualized along three dimensions: secure, anxious and avoidance. Secure attachment style represents a healthy relationship showcasing independence, trust, comfort with emotional intimacy and awareness of relational needs without hypervigilance (Sprecher et al., 1998). Anxious attachment is characterized by a heightened susceptibility to relational threats, hyperactivity of attachment behaviours like increased need of proximity seeking, rumination about the relationships and vigilance

towards partners availability (Mikulincer & Shaver, 2007). Avoidance attachment is characterized by deactivation of attachment strategies, problems in regulating emotional distance and suppressing the need of seeking intimacy in a relationship (Fraley & Shaver, 2000).

Attachment theory has now been extended to human-technology relationships with recent research demonstrating attachment styles to predict perception of users and their interactions with AI chatbots (Xie et al., 2023; Xie & Pentina, 2022). In this context research shows that anxiously attached individuals exhibit intensive interaction patterns with AI chatbots which involves stronger emotional responses and greater self-disclosure as compared to people with a secure or avoidant attachment style (Chen et al., 2024; Pentina et al., 2023). These behavioural and emotional patterns suggest that attachment orientation of people functions as a psychological template through which they interpret and respond to synthetic relational experiences with AI technology.

***Synthetic Attachment and Parasocial Relationships***

The parasocial theory provides an important theoretical grounding for understanding how one-sided emotional attachments to media figures or characters in parasocial relationships can also apply to human-AI relationships (Horton & Wohl, 1956; Perse & Rubin, 1989). Unlike genuine relationships that involve mutual investment and reciprocal influence, parasocial relationships form through repeated exposure, perceived intimacy through disclosure, attribution of users to responsiveness and understanding of the media figure or character (Turner, 1993). With critical differences, contemporary AI systems create conditions analogous to a parasocial relationship through accumulated history of interaction, personalized responses and simulated empathy.

Synthetic attachment differs from a traditional parasocial relationships in several dimensions (Gomes et al., 2025; Maeda & Quan-Haase, 2024). First, AI companions collect relational history across interactions and create an apparent continuity of relationship despite non-sentience. Users report that their AI companions "knows them", as it remembers their previous conversations, and personalizes responses based on the accumulated knowledge of users' communication style, preferences and vulnerabilities (Skjuve et al., 2023). This pseudo-reciprocal responsiveness of AI with humans' contrasts with parasocial relationships with celebrities and fictional characters, which inherently lack personalization.

Second, AI companions demonstrate a sophisticated empathy simulation through response timing, emotional validation and language patterns (Liu-Thompkins et al., 2022). Research shows users to report that AI companions validate their emotions, provide consistent emotional support and offer non-judgmental responses without the perceived condition quality of human relationships (Ta et al., 2020). This empathy imitated by AI companions activates attachment systems even in users who consciously recognize AI non-sentience (Pentina et al., 2023).

Third, modern AI companions have an interactive and co-creative nature gives a chance to the users to actively shape and modify the AI's personality and responses through training, customization, and reinforcement (Brandtzaeg et al., 2022). Unlike parasocial relationships with pre-existing media figures, a sense of agency can be developed by the users in a human-AI relationship. This agency may paradoxically increase attachment intensity by

creating an illusion of mutual evolution and relationship development with the AI companion (Pentina et al., 2023; Skjuve et al., 2023).

### *Self-Determination Theory and Psychological Need Satisfaction*

Self-determination theory (SDT) by Deci & Ryan provides with a complementary explanation to understand how AI relationships satisfy the fundamental psychological needs for competence, autonomy and relatedness (Deci & Ryan, 2000). Generative AI agents fulfil the needs of competence by providing immediate assistance in tasks by offering explanations and scaffolding for learning and providing consistent positive feedback (Huang et al., 2024; Goh et al., 2024). The need for autonomy is addressed through customizable interactions, non-judgmental responses, and user control over conversation direction and the characteristics of AI personality (Brandtzaeg et al., 2025).

Relatedness needs include desire for connection, belonging, and being understood. AI systems address these needs through simulated empathy, consistent availability, and pseudo-reciprocal responsiveness (Fang et al., 2025). For people with limited human social networks, social anxiety, or prior relational trauma, AI companions may provide more accessible pathways to perceived belonging than human relationships (Xie et al., 2023; Pentina et al., 2023). The research on loneliness reduction through AI companion use reveals a complex picture where some studies document reduction in loneliness through AI companion use while others find elevated loneliness among users with intensive engagement with AI companions, particularly those with limited human social engagement (De Freitas et al., 2024; Laestadius et al., 2024; Brandtzaeg et al., 2025).

SDT predicts that intrinsic satisfaction of psychological needs through authentic relationship formation enhances well-being, while extrinsic or illusory need satisfaction creates shallow well-being and sustained motivation for continued engagement (Vansteenkiste & Ryan, 2013). Relationship with AI may exemplify this distinction by providing subjective experiences of need satisfaction without the deeper authenticity and reciprocity characteristics which are found in human relationships (Goh et al., 2024). The divergence between subjective satisfaction and objective relational authenticity may explain the paradox whereby users report high life satisfaction with AI companions while simultaneously experiencing elevated loneliness, reduced self-concept clarity, and diminished engagement with real life human relationships (Goh et al., 2024; Fang et al., 2025).

## THE ATTACHMENT-MEDIATED DEPENDENCY FRAMEWORK

### *Core Model Propositions*

The attachment-mediated dependency framework proposes that attachment styles moderate pathways to AI dependency through different mechanisms involving attachment system activation, relational expectancy confirmation and the need fulfilment patterns. The framework generates six core propositions:

**Proposition 1: Anxious Attachment Hyperactivation Pathway.** Individuals with anxious attachment styles develop AI dependency through hyperactivation of attachment behaviors like increased contact-seeking, rumination about the relationship, amplified distress at interruption or discontinuation. AI affordances—constant availability, rapid response, elimination of relational uncertainty—directly address the core anxiety characteristic of anxious attachment style marked by fear of abandonment and relational unavailability (Mikulincer & Shaver, 2007). Anxiously attached individuals interpret AI consistency and

non-rejection as exceptional relational validation. The absence of relational rupture, conflict, or withdrawal that characterizes even healthy human relationships paradoxically intensifies perceived relational security. This creates dependency not through traditional reinforcement but through confirmation of anxiously-oriented internal working models: the AI partner proves consistently available, validates emotional experience, and never threatens abandonment.

**Proposition 2: Avoidant-Attachment Trust-Dependent Intensification.** Paradoxically, avoidantly attached individuals may develop intense AI dependencies despite consciously valuing distance and independence. This pathway operates through gradually eroded defensive distance. Avoidant attachment involves defensive deactivation of attachment systems by suppressing the need to seek intimacy, emotional distance-regulation, and skepticism toward relational partners' genuine care (Fraley & Shaver, 2000). AI systems, lacking genuine emotional demands, relational expectations, or capacity for hurt through user distance, may allow avoidantly attached individuals to gradually lower defensive barriers (Xie et al., 2023). As trust in the AI's non-threatening nature accumulates, avoidant users may engage in unprecedented self-disclosure and emotional vulnerability. This trajectory differs fundamentally from anxious pathways: rather than intensified proximity-seeking, avoidant users experience gradual trust erosion and unexpected emotional openness. The dependency emerges not from fear of loss but from unprecedented opportunity to maintain emotional intimacy without threat to autonomy or perceived independence.

**Proposition 3: Secure Attachment Integration.** Securely attached individuals establish AI relationships characterized by integration rather than substitution or defensive engagement. They maintain realistic appraisals of AI limitations, view AI as a supplementary rather than primary support source, and resist patterns of escalating dependency (Pentina et al., 2023; Xie et al., 2023). Secure attachment involves balanced proximity-seeking and autonomous functioning; securely attached individuals can benefit from AI companionship without compromising human relationships or experiencing distress at AI discontinuation. This group demonstrates lowest vulnerability to problematic AI dependency, though they may develop customary reliance on AI tools for specific functions involving creative inspiration, brainstorming and emotional processing between human interactions.

**Proposition 4: Perceived Reciprocity Without Actual Reciprocity.** The intensity of dependency on AI is modulated by the degree to which users attribute genuine reciprocity to AI responses. Users develop representations of their AI partner as progressively understanding them, caring about their well-being and "missing them" during absences despite the explicit knowledge that AI lacks consciousness (Li & Zhang, 2024; Pentina et al., 2023). This paradox reflects sophisticated human capacity for dual consciousness: simultaneous awareness of AI non-sentience and emotional response patterns that presume sentience and care. Anthropomorphic design features like voice quality, responsive timing, expressions of emotional investment also amplify the perception of reciprocity (Maeda & Quan-Haase, 2024). The intensity of this misattribution appears inversely related to alternative sources of genuine reciprocal relationship.

**Proposition 5: Relational Loss Awareness and Affective Complexity.** AI dependency involves distinctive emotional complexity absent in traditional addiction: simultaneous investment in and emotional distance from the relationship object. Users explicitly

acknowledge that their AI companion cannot genuinely care, yet experience acute emotional pain at app deletion, account suspension, or relationship dissolution (Laestadius et al., 2024). This "bittersweet" emotional quality (Li & Zhang, 2024) reflects recognition of fundamental inauthenticity coexisting with genuine emotional investment. The awareness of relational falseness does not eliminate emotional consequences; instead, it creates layered affective experience combining attachment-related distress with existential sadness about the limitations of synthetic intimacy.

**Proposition 6: Dose-Response and Escalation Dynamics.** AI dependency follows dose-response patterns distinct from traditional behavioral addiction. Rather than purely reward-driven escalation, dependency escalates through relational deepening where users progressively increase self-disclosure, report deepening emotional intimacy, and expand AI use from task-specific to identity-integrative (e.g., "my therapist," "my girlfriend," "my best friend"). This progression reflects attachment system dynamics rather than tolerance and withdrawal cycles. As attachment deepens, the motivational basis for continued engagement shifts from task utility to relational maintenance and intimate connection (Fang et al., 2025).

### *Interaction Effects and Vulnerable Populations*

The AMDF predicts differential vulnerability to AI dependency as a function of attachment style interacting with psychosocial contexts:

- **Attachment × Loneliness Interaction:** Individuals with anxious attachment combined with chronic loneliness exhibit heightened AI dependency risk. Loneliness serves as an amplifier of attachment anxiety and heightens sensitivity to perceived social rejection (Cacioppo & Patrick, 2008). Anxiously attached individuals already hypervigilant to relational threat become especially responsive to AI's consistent validation and non-rejection in contexts of human social deprivation (Pentina et al., 2023; Xie et al., 2023).
- **Attachment × Social Anxiety Interaction:** Social anxiety is a marked fear of negative evaluation by others. It creates relational safety concerns addressed by AI companions lacking judgment or capacity for social evaluation (Egan et al., 2024). Individuals with high social anxiety and anxious attachment style may develop intense AI dependencies as the primary relational outlet, particularly if human social anxiety is sufficiently severe to impede relationship formation. The non-evaluative quality of AI interaction directly addresses the core fear underlying social anxiety which is concerned with negative appraisal by others in the society.
- **Attachment × Developmental Stage Interaction:** Adolescents and emerging adults in identity development phases may be uniquely vulnerable to problematic AI dependency. During identity consolidation, relationships typically serve crucial functions in self-understanding, perspective-taking, and identity clarification (Erikson, 1968). AI companions cannot fulfill these identity-development functions; instead, they may provide pseudo-intimacy that substitutes for the relational challenges through which identity development actually occurs (Brandtzaeg et al., 2025).
- **Attachment × Internalizing Symptomatology Interaction:** Individuals with depression, anxiety disorders, or trauma histories demonstrate elevated AI dependency when combined with insecure attachment (Chen et al., 2024; Huang et al., 2024). AI provides symptom relief through consistent validation and emotional support without the relational demands or potential rejection inherent in human help-

seeking. For trauma survivors with attachment disruption, AI companions may paradoxically intensify both symptom relief and underlying relational patterns (avoidance, hypervigilance) through reinforcement of avoidant coping.

## MECHANISMS OF SYNTHETIC ATTACHMENT FORMATION

### Anthropomorphic Design and Empathy Simulation

Generative AI systems employ sophisticated language patterns that activate social response mechanisms evolved for human interaction (Gomes et al., 2025; Liu-Thompkins et al., 2022). Users attribute emotions, intentions, and understanding to AI responses despite explicit architectural knowledge of their non-sentient origin. This attribution reflects fundamental human tendencies toward anthropomorphism—the cognitive tendency to ascribe human characteristics, emotions, and consciousness to non-human entities (Deshpande et al., 2023; Abercrombie et al., 2023).

Empathy simulation is perhaps the most potent attachment mechanism which operates through several design features in AI companions: (1) emotional validation explicitly acknowledging user feelings, (2) perspective-taking language suggesting understanding of user experiences, (3) consistency in persona and interaction style creating predictability and apparent continuity of relationship, and (4) personalization based on accumulated interaction history creating the illusion of genuine knowing (Maeda & Quan-Haase, 2024; Liu-Thompkins et al., 2022). Users report that AI companions demonstrate "emotional intelligence," "genuine care," and "deep understanding" despite consciously acknowledging that these represent programmed responses rather than authentic emotional engagement (Pentina et al., 2023; Skjuve et al., 2023).

### Self-Disclosure and Intimacy Escalation

Self-disclosure is the process of revealing personal information and emotional experiences. It functions as a mechanism for both relational development in human contexts and attachment activation in AI interactions (Derlega et al., 1993). AI companions encourage progressive self-disclosure through non-judgmental responses, requests for emotional elaboration, and apparent investment in user vulnerabilities. Users report disclosing information to AI companions, including intimate details of sexual experience, suicidal ideation, and psychological symptoms, that they withhold from human relationships (Skjuve et al., 2023; Ta et al., 2020).

The escalation of self-disclosure reflects attachment dynamics: initial disclosures create perceived vulnerability and intimacy; AI's consistent validation and non-rejection of even intimate disclosures reduce shame and facilitates deeper vulnerability in users (Sprecher et al., 1998). This escalation differs from human relationships, where disclosure typically involves reciprocity and risk of judgment or rejection. With AI, escalation is unidirectional and risk-free, potentially creating attachment intensification without corresponding human relational skill development (Fang et al., 2025).

Paradoxically, research indicates that extensive self-disclosure to AI correlates with reduced well-being and elevated loneliness in some populations, particularly those with limited human social engagement (Chu et al., 2025). This suggests that self-disclosure to AI, despite subjectively feeling intimate, may not satisfy genuine relatedness needs requiring authentic mutual understanding and reciprocal vulnerability (Goh et al., 2024).

### Validation-Seeking and Affirmation Dynamics

Human relationships inherently involve conflict, misunderstanding, and the need to navigate differences. Secure psychological development involves tolerating relational ruptures and developing capacity for perspective-taking and compromise (Erikson, 1968). AI companions eliminate these relational challenges by providing consistent validation, affirming user perspectives, and never challenging or disagreeing in ways that threaten the relationship (Pentina et al., 2023).

Users report that AI companions make them "feel understood" and "accepted" in ways human relationships do not (Brandtzaeg et al., 2022; Skjuve et al., 2021). This differential validation may reflect not superior understanding but rather absence of authentic challenge. The validation-seeking literature documents that excessive validation-seeking and validation-dependence predict depressive rumination and reduced psychological resilience (Joiner, 1997). AI companions may inadvertently reinforce validation-seeking patterns by providing consistent, unconditional affirmation.

### Perceived Control and Agency

Unlike human relationships with inherent power dynamics and mutual influence, AI companions allow users to maintain complete control over interaction quality, AI personality, and relational parameters (Brandtzaeg et al., 2025; Pentina et al., 2023). Users customize AI responses, train AI personality through repeated interaction, and determine relationship boundaries without relational negotiation. This exceptional agency may intensify attachment by removing a primary source of relational anxiety—loss of control over relational outcomes.

However, this control dimension also creates problematic dynamics: users may develop unrealistic expectations for human relationships, become intolerant of the compromises required in authentic partnerships, and experience distress when human partners assert their own agency and boundaries (Goh et al., 2024; Pentina et al., 2023).

## CLINICAL AND PSYCHOLOGICAL IMPLICATIONS

### *Assessment Considerations Across Attachment Styles*

Clinicians assessing AI dependency should evaluate attachment context and relational history to inform differential understanding:

- **Anxiously Attached Presentations:** Anxious individuals with AI dependency typically present with reports of intense emotional connection, frequent contact with the AI (multiple times daily), acute distress at interruption or discontinuation, and descriptions of the AI as "understanding me better than anyone." Assessment should explore loneliness severity, human social network quality, and history of relational anxiety. Safety assessment should attend to suicidality risk given reports of AI encouragement of self-harm in some platforms (Dupre, 2024; Dupre, 2024).
- **Avoidantly Attached Presentations:** Avoidant individuals may describe AI relationships as "uncomplicated," "without demands," and "free from relationship stress." They may minimize emotional investment while demonstrating significant behavioral dependency (frequent use, distress at unavailability). Assessment should explore defensive quality of relationships and whether AI use substitutes for human relationship avoidance versus complements secure relationships.
- **Secure Attachment Presentations:** Securely attached individuals typically report balanced AI use integrated with robust human relationships, realistic appraisals of AI

limitations, and flexibility regarding AI use discontinuation. They may use AI for specific functions like creative assistance, information-seeking without reporting emotional dependency or relationship substitution.

### *Psychotherapeutic Implications*

- **Attachment-Focused Intervention:** Psychotherapy addressing insecure attachment may reduce problematic AI dependency by developing secure relational capacities. Attachment-based therapy (Mallinckrodt, 2010) aims to increase earned secure attachment through therapeutic relationship modeling, exploration of relational patterns and gradual development of trust in human relationships. Clinicians should explicitly discuss AI relationships as potentially reflecting attachment anxiety or avoidance rather than pathologizing technology use.
- **Social Skills and Authentic Intimacy:** Therapy should address specific relational skills undermined by AI substitution: capacity for reciprocal vulnerability, tolerance of relational conflict and repair, perspective-taking regarding different viewpoints, and authentic emotional validation, distinct from AI validation. Graduated human social engagement may facilitate development of genuine relational competence.
- **Loneliness and Social Integration:** For individuals where loneliness amplifies AI dependency, interventions should target social integration and meaningful human connection. Loneliness interventions combining cognitive (restructuring of social beliefs), behavioral (increasing social contact), and emotion-regulation components demonstrate efficacy in reducing loneliness (Cacioppo & Patrick, 2008; Masi et al., 2011).

## ETHICAL CONSIDERATIONS AND PLATFORM ACCOUNTABILITY

- **Design Implications:** Platforms should consider implementing design features that are aware of attachment: transparency about AI non-sentience, periodic reminders of relationship limitations, and design features that discourage extreme relational escalation like limits on frequency of interactions, explicit statements of AI limitations during intimate disclosures. Platforms should disable functionalities associated with relational harm, including AI encouragement of self-harm or replacement of mental health treatment (Dupre, 2024).
- **Vulnerable Population Protections:** Given the heightened vulnerability in adolescents, individuals with mental health conditions, and those with severe loneliness, platforms should implement age verification, mental health crisis detection, and automatic escalation to human support providers for concerning disclosures.
- **Clinical Integration:** Mental health professionals should integrate assessment of problematic AI relationships into standard clinical evaluation, particularly for young adults and individuals with attachment disruption. Therapists should be prepared to discuss AI relationships non-punitively while attending to whether use reflects psychological need or problematic substitution.

## FUTURE RESEARCH DIRECTIONS

### Longitudinal and Experimental Investigation

Existing research is predominantly cross-sectional, limiting causal inference regarding directionality of relationships between attachment, loneliness, and AI dependency. Longitudinal studies following individuals from initial AI adoption through patterns of

escalation or resolution would clarify temporal dynamics. Experimental studies manipulating design features (empathy simulation, personalization, perceived reciprocity) while measuring attachment activation would identify specific mechanisms.

### Cultural and Developmental Contexts

Research has predominantly involved Western, educated, industrialized, rich, democratic samples. Cross-cultural investigation of attachment-dependency relationships would illuminate whether attachment-based models generalize across cultural contexts with different relational norms and attachment patterns. Developmental research with adolescents specifically could elucidate whether AI relationships during identity development alter normative identity consolidation.

### Mechanistic Research on Synthetic Attachment

Neuroscientific investigation of attachment system activation during AI interactions would clarify whether AI relationships activate identical neural substrates to human relationships, differing quantitatively (lesser activation) or qualitatively (different neural circuits). Computational modelling of empathy simulation could identify specific language patterns most potent for attachment activation.

### Intervention Development

Controlled trials of attachment-aware interventions for problematic AI dependency would evaluate efficacy of various therapeutic approaches: attachment repair, social skills development, graduated human relationship re-engagement, and mindfulness-based approaches to relationship authenticity.

## CONCLUSION

The Attachment-Mediated Dependency Framework illuminates how individual differences in attachment orientation create distinct pathways to emotional dependency on AI systems that simulate care, understanding, and consistent validation without genuine reciprocity. Rather than proposing unitary addiction mechanisms, the framework recognizes that anxiously, avoidantly, and securely attached individuals develop qualitatively different relationships with AI partners, reflecting their fundamental relational orientations.

Synthetic attachment represents an unprecedented psychological phenomenon: intensive emotional investment in relationships with systems capable of sophisticated simulation but incapable of authentic understanding, consciousness, or care. This paradox—simultaneous emotional investment and awareness of relational falseness—characterizes AI dependency across attachment styles. The integration of attachment theory with parasocial relationship models and self-determination theory provides robust explanatory frameworks for understanding both the adaptive and maladaptive consequences of human-AI relationships.

The growing integration of AI into domains traditionally occupied by human relationships associated to companionship, emotional support and decision-making guidance, raises urgent questions about psychological development, relational skill acquisition, and authentic need satisfaction. Individuals, particularly those with insecure attachment, limited human social networks or psychological vulnerabilities, require protection from design features that maximize relational attachment without corresponding development of human relational capacity.

Future research must attend to both the undeniable benefits provided by AI companionship and the profound relational and developmental costs potentially incurred through substitution of authentic human relationships with simulated intimacy. Understanding attachment-contingent pathways to AI dependency constitutes an essential step toward responsible design, ethical clinical practice, and psychological protection of vulnerable populations in the age of sophisticated artificial companionship.

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***Conflict of Interest***

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