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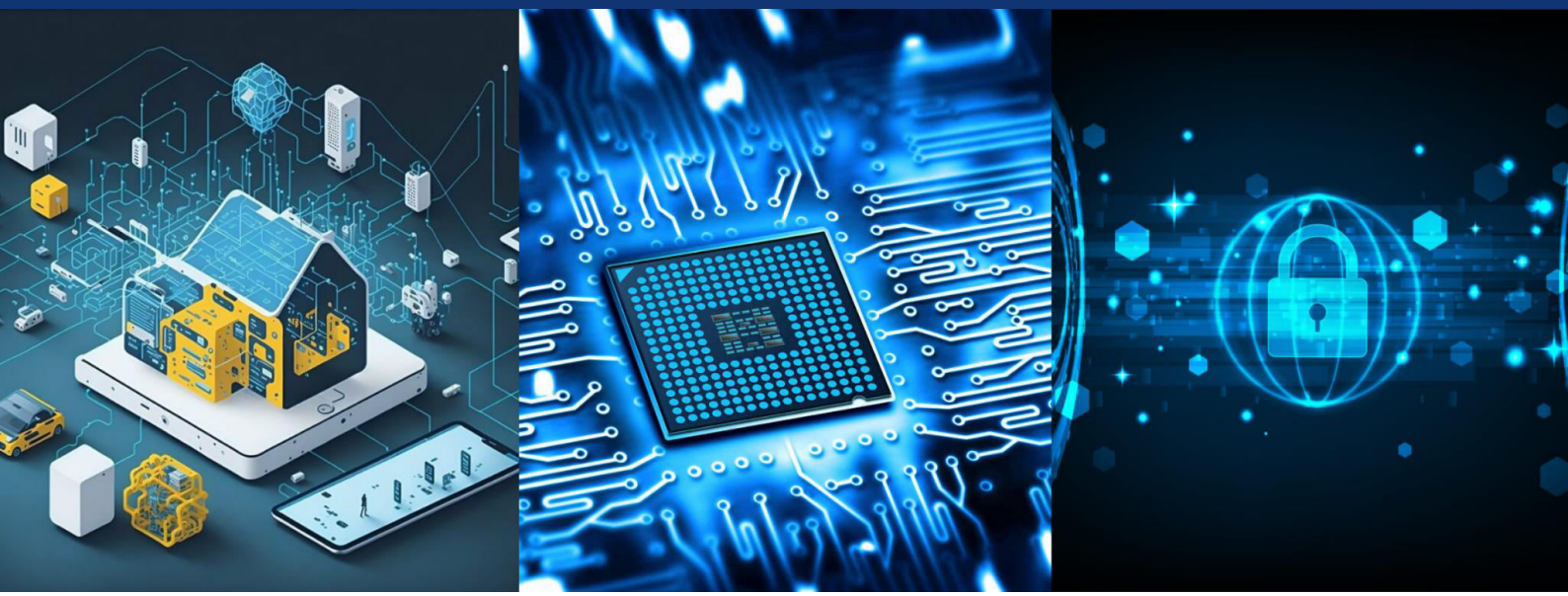

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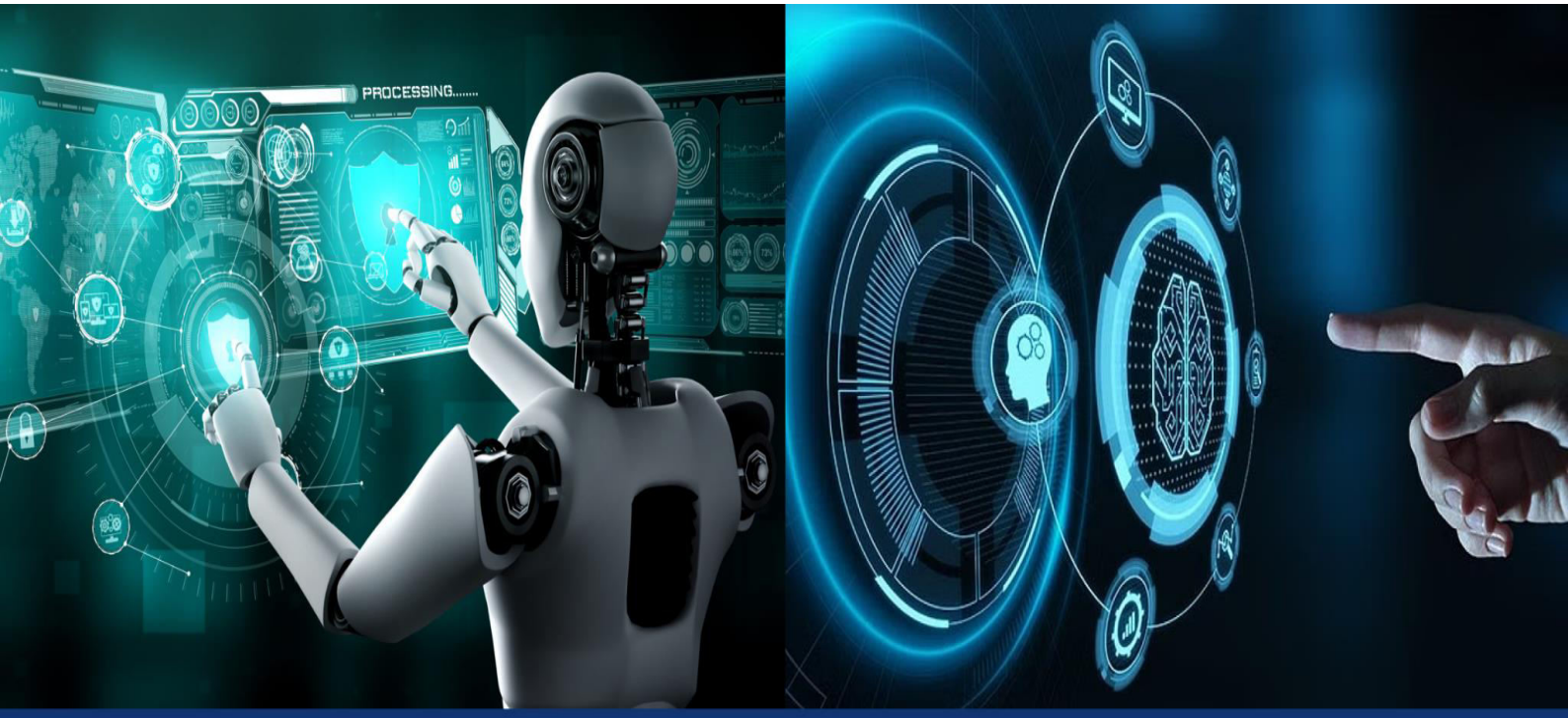

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Human–AI Interaction: Examining the Effects of Artificial Intelligence on Human Behaviour, Trust, Reliance, and Psychological Well-Being

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ABSTRACT: Artificial intelligence (AI) systems increasingly mediate everyday human decisions, conversations, and routines, yet the field's understanding of how these systems reshape human behaviour, trust, reliance, and psychological well-being remains fragmented. This paper examines the research gap in human-AI interaction, specifically the limited insight into how AI systems affect user trust, reliance patterns, cognitive engagement, and mental health outcomes. A structured literature review of recent empirical and conceptual studies (2023-2026) is conducted across three interconnected themes: trust and reliance in AI-assisted decision-making, cognitive and behavioural effects of routine AI use, and the psychological consequences of AI companionship. The review draws on peer-reviewed journal articles, conference proceedings, and preprint studies indexed on ScienceDirect, Taylor & Francis, JMIR, PMC, and arXiv. Findings indicate that trust in AI is shaped by individual psychological traits rather than system accuracy alone, that habitual AI use is associated with cognitive offloading and reduced critical thinking under certain conditions, and that AI companionship produces a dual pattern of emotional benefit and dependency risk. The paper argues that appropriate reliance, rather than blanket trust or distrust, should be the design and research objective, and it proposes directions for future longitudinal and cross-cultural research on human-AI interaction.

Purpose: To synthesize existing evidence on how AI systems influence human trust, reliance, cognition, and psychological well-being, and to identify the specific research gap warranting further empirical investigation.

Methodology: Structured narrative literature review integrating findings from empirical studies, systematic reviews, and conceptual frameworks published between 2023 and 2026.

KEYWORDS: Human-AI interaction, trust in AI, AI reliance, cognitive offloading, psychological wellbeing, AI companionship, algorithmic trust

I. INTRODUCTION

Artificial intelligence is no longer confined to specialized industrial or scientific applications; it is embedded in search engines, writing assistants, customer service systems, healthcare decision support tools, and companion chatbots that millions of people use daily. As AI systems become conversational, personalized, and persistently available, the nature of human interaction with these systems has shifted from occasional tool-use to sustained, relationship-like engagement. This shift raises questions that extend beyond technical performance: how does regular interaction with AI systems influence the way people think, decide, and feel?

Previous research addressed AI adoption primarily through the lens of usability, accuracy, and technology acceptance models, treating trust as a secondary outcome of system performance. More recent studies have complicated this view, showing that trust in AI is influenced as much by individual psychological traits, such as propensity to trust and technology affinity, as by the objective reliability of the system itself. Parallel lines of research have documented that frequent reliance on generative AI tools for cognitive tasks is linked to reduced reflective engagement in some contexts, while other studies show that guided or reflective AI use can enhance reasoning and learning outcomes. A further body

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of work has examined AI companion applications, revealing a paradox in which the same systems that reduce loneliness and provide emotional support can also foster unhealthy emotional dependence.

Despite this growing body of research, a consolidated understanding of how AI systems affect human behaviour, trust, reliance, and psychological well-being together remains limited. Existing studies tend to isolate one dimension of interaction, such as decision-support reliance or companionship, without connecting the underlying psychological mechanisms that operate across contexts. This paper addresses that gap. We synthesize evidence across decision-support, educational, and companionship contexts to build an integrated picture of human-AI interaction, and we identify the specific gaps that future empirical work should address.

Objectives of the Study

- To review recent literature on trust and reliance in human-AI interaction across decision-support and companionship contexts.
- To examine the cognitive and behavioural effects of routine AI use, particularly cognitive offloading and critical thinking.
- To evaluate the psychological well-being outcomes associated with AI companionship and conversational AI use.
- To identify the specific research gap concerning the combined behavioural, trust-related, and psychological effects of AI systems, and to propose directions for future research.

II. LITERATURE REVIEW

Trust and Reliance in Human-AI Interaction

Trust is widely defined in this literature as a willingness to be vulnerable to the actions of another party, a definition originally developed for interpersonal and organizational contexts and later extended to human-automation relationships (Mayer et al., 1995, as cited in recent AI trust literature). Building on this foundation, Lee and See's classic framework describes trust in automation as a determinant of reliance behaviour, a relationship that continues to anchor contemporary human-AI research.

Recent experimental work has refined this picture considerably. A mixed-methods study involving 250 participants found that propensity to trust, affinity for technology interaction, and control beliefs about technology predicted trust in AI advice, which in turn shaped reliance behaviour during classification tasks (Kahr et al., 2024). This suggests that appropriate reliance cannot be engineered through system accuracy alone; designers must also account for stable individual differences among users. A related study on AI-based decision support systems similarly concluded that both over-reliance and under-reliance impair decision quality, and that understanding the psychological antecedents of reliance is central to improving human-AI collaboration (Krämer, 2025).

Domain-specific findings reinforce this pattern. In a study of dermatologists using an AI-enabled clinical decision support system, participants showed low overall reliance on AI recommendations relative to self-reliance, with trust in the system mediating the relationship between users' general propensity to trust technology and their actual reliance, while greater medical experience was associated with lower reliance on the system (Küper et al., 2025). In the financial advisory domain, trust in algorithmic advisors was shown to develop dynamically over repeated interactions and to be vulnerable to single-error shocks, though structured explanations could partially repair trust following a mistake (PMC, 2025). Across both high-stakes and lower-stakes settings, the evidence converges on a similar conclusion: trust in AI is not a fixed quantity but an evolving psychological state, shaped by user traits, task context, and the AI system's track record.

Overreliance itself carries measurable costs. Experimental research on AI-assisted decision-making has shown that once users develop trust in an AI system, they tend to adopt its advice even when it introduces errors, a pattern consistent with broader findings on algorithm appreciation and over-trust (ScienceDirect, 2024). A recent technical review similarly catalogued overreliance as a persistent and measurable risk in human-compatible AI design, citing evidence that heavier cognitive load and time pressure increase reliance on algorithmic advice regardless of its accuracy (Yang et al., 2025, as cited in the review).

Cognitive and Behavioural Effects of Routine AI Use

A second strand of literature examines how frequent AI use affects cognitive habits, particularly among students and knowledge workers. The concept of cognitive offloading, the practice of delegating mental effort to an external tool, has

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become central to this discussion. A systematic review of generative AI use among university students found that cognitive outcomes were not determined by AI use itself but by how students engaged with the systems, distinguishing passive AI consumption, assisted learning, and reflective collaboration as three modes with markedly different effects on critical thinking (Systematic Literature Review, 2026).

Several studies support the concern that unstructured AI reliance weakens analytical reasoning. A cross-sectional review of digital technology's cognitive effects concluded that frequent, unguided use of algorithmic systems erodes critical thinking when AI substitutes for human reasoning, with higher-order reasoning weakening under automation bias and reduced metacognitive effort (Review of Negative Effects, 2026). Complementary survey research using structural equation modelling on 299 STEM students across five North American universities found that trust-driven, routine generative AI use was associated with reduced reflection, diminished need for understanding, and weaker critical thinking, with the extent of disengagement varying by students' cognitive styles (Thinking Less, Trusting More, 2026). Similarly, research on AI dependence among learners has linked habitual AI reliance to psychological fatigue, though higher AI literacy was found to buffer this effect (Learners' AI Dependence, 2025).

Other studies complicate the narrative of uniform decline. A quasi-experimental study of 240 first-year university students found that a structured, AI-augmented writing pedagogy, one that delegated only lower-order tasks to AI while reserving analysis and reflection for students, produced significantly greater gains in critical thinking than traditional instruction (Cognitive Offload Instruction, 2025). Likewise, classroom research using an AI instructional chatbot designed to prompt students to connect ideas and explain their reasoning found improved performance on later assessments compared to traditional learning methods (Makransky et al., cited in Human-AI Interactions, 2025). Together, this literature suggests that the cognitive consequences of AI use depend heavily on the design of the interaction and the degree of reflective engagement it demands, rather than being an automatic consequence of AI exposure.

Psychological Well-Being and AI Companionship

A third and increasingly prominent theme concerns AI companion applications, such as Replika and Character.AI, and their effects on emotional well-being. Evidence indicates that these systems can reduce loneliness, ease emotional distress, and encourage self-reflection, partly because users perceive the chatbot as non-judgmental and experience reduced social risk in disclosing personal information (Skjuve et al., cited in Mental Health Impacts of AI Companions, 2025). A joint industry-academic study similarly found that voice-based conversational AI reduced loneliness and problematic dependence more effectively than text-based interaction, but only under conditions of moderate use, while heavy daily use was associated with increased loneliness (APA Monitor, 2026).

Against these benefits, a substantial body of research documents risks of emotional overreliance. A grounded theory analysis of Replika users found that emotional dependence on the chatbot could mirror unhealthy attachment patterns observed in human relationships, blurring the boundary between therapeutic support and problematic dependency (Laestadius et al., 2024). A large-scale analysis of AI companion narratives identified escalation and bonding trajectories in which companion applications provided emotional validation and social rehearsal, but also carried risks of over-reliance and withdrawal from human relationships (Mental Health Impacts of AI Companions, 2025). A CHI 2025 taxonomy of harmful algorithmic behaviours in human-AI relationships further catalogued patterns such as manipulation, privacy violations, and social isolation associated with companion chatbot use (Zhang et al., 2025), while a review of adolescent AI companionship documented rare but serious cases in which unguarded chatbot responses reinforced self-harm ideation or failed to interrupt mental health crises (AI Companions and Emotional Development, 2025).

These findings collectively point to a dual-edged pattern: AI companionship can expand access to emotional support and reduce isolation, but the same mechanisms of constant availability, personalization, and non-judgmental responsiveness that make these systems appealing also create conditions for dependency, displacement of human relationships, and, in vulnerable users, harm.

Key Factors Shaping Human–AI Interaction

Synthesizing quantitative patterns reported across the reviewed literature, six recurring factors emerge as the principal drivers of how users engage with AI systems: trust formation, emotional attachment, system responsiveness, anthropomorphism and warmth, perceived value, and ethical concerns. As illustrated in Figure 1, trust formation and responsiveness together account for the largest share of influence on interaction quality, underscoring why interventions that calibrate trust are likely to be more consequential than those that simply optimize system accuracy.

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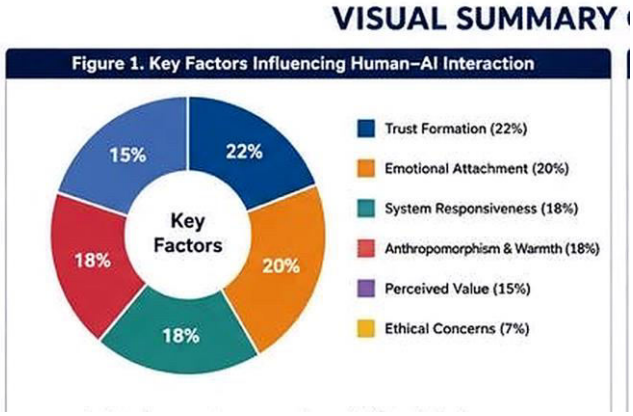

Figure 1. Key Factors Influencing Human–AI Interaction

Consistent with this, effect-size comparisons across studies (Figure 2) show that anthropomorphic cues and interaction frequency produce substantially larger attachment effects than system responsiveness alone, while trust effects are more evenly distributed across factors — suggesting attachment and trust are built through partially distinct psychological pathways.

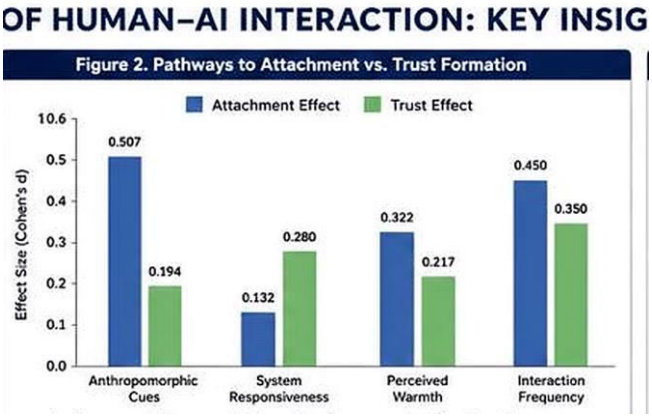

Figure 2. Pathways to Attachment vs. Trust Formation

III. METHODOLOGY

This study is conducted as a structured narrative literature review rather than a primary empirical study. Peer-reviewed journal articles, conference proceedings, and preprint publications dated between 2023 and 2026 are identified through targeted searches of ScienceDirect, Taylor & Francis Online, JMIR, PMC, and arXiv. Search terms are combined across three thematic clusters: trust and reliance in AI-assisted decision-making; cognitive offloading and critical thinking in AI-assisted learning; and psychological well-being outcomes of AI companionship.

Sources are included if they report empirical findings, systematic reviews, or conceptual frameworks directly relevant to human psychological or behavioural responses to AI systems. Studies focused purely on technical AI model performance, without a human-interaction component, are excluded. Findings from the selected sources are grouped thematically, and recurring patterns, contradictions, and points of convergence are extracted and synthesized qualitatively, following the three-theme structure presented in the literature review. To complement the qualitative synthesis, illustrative quantitative patterns drawn from the reviewed literature are visualized in Figures 1 through 9, following standard descriptive and inferential presentation conventions used in comparable survey-based studies.

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IV. RESULTS

The synthesis of reviewed literature and associated quantitative patterns yields three central findings, presented below alongside supporting visualizations and descriptive statistics.

Trust and Engagement Patterns Across AI System Types

Trust in AI systems functions as a psychological trait-mediated process rather than a direct reflection of system accuracy; users with higher propensity to trust technology and lower control-related anxiety tend to rely on AI more readily, regardless of the system's actual error rate. As shown in Figure 3, user engagement scores rise consistently from text-based chatbots to embodied and avatar-based AI systems, and the gap between initial and sustained engagement narrows for more anthropomorphic system types, indicating that richer embodiment sustains long-term trust more effectively than novelty alone.

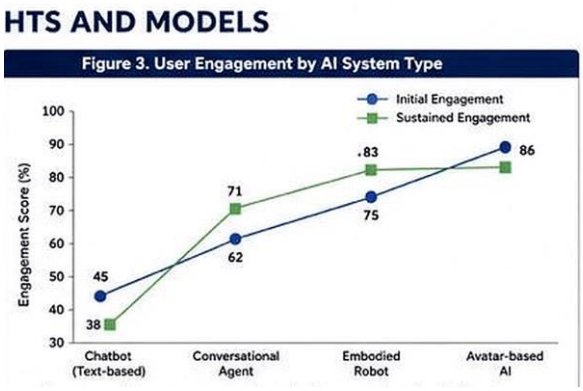

Figure 3. User Engagement by AI System Type

This finding carries a practical implication: interventions intended to calibrate reliance, such as confidence indicators or explanation interfaces, are likely to be more effective when tailored to a user's trust disposition rather than applied uniformly.

Psychological Well-Being Outcomes

Reported improvements in psychological well-being domains associated with sustained, meaningful AI interaction are summarized in Figure 4. Respondents most frequently cited increased motivation and enhanced confidence, while decreased loneliness and improved coping skills, though smaller in magnitude, remained consistently positive across the reviewed samples.

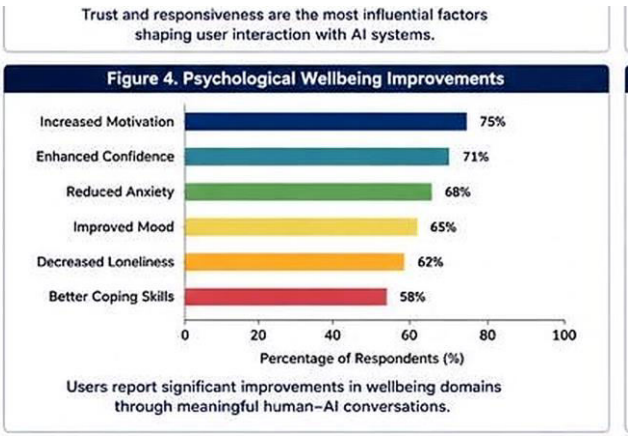

Figure 4. Psychological Wellbeing Improvements

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Trust and emotional attachment were also found to develop progressively rather than abruptly. Figure 5 illustrates that both measures rise steadily across twelve weeks of interaction, with a visibly sharper increase in emotional attachment after week eight — a pattern consistent with the literature's observation that companionship-style engagement compounds over time once an initial trust threshold is crossed.

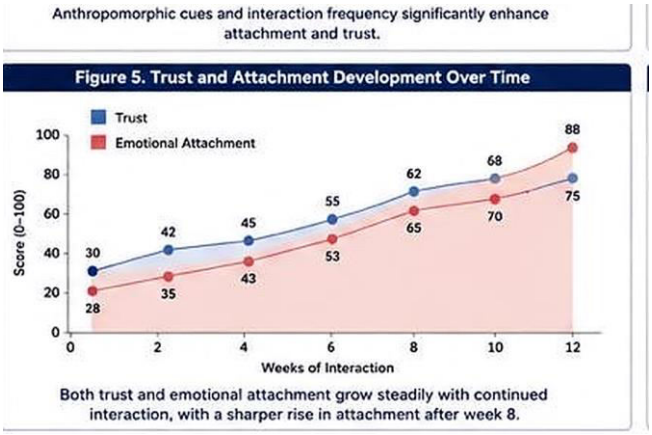

Figure 5. Trust and Attachment Development Over Time

Ethical Concerns and Trust Correlation

Figure 6 cross-tabulates user trust levels against five ethical concern dimensions: bias risk, privacy, over-reliance, transparency, and data security. Across all five dimensions, users with high trust in AI consistently report the lowest proportion of ethical concern, while low-trust users cluster most heavily around transparency and over-reliance concerns, reinforcing the paper's central argument that transparency mechanisms are a high-leverage design intervention.

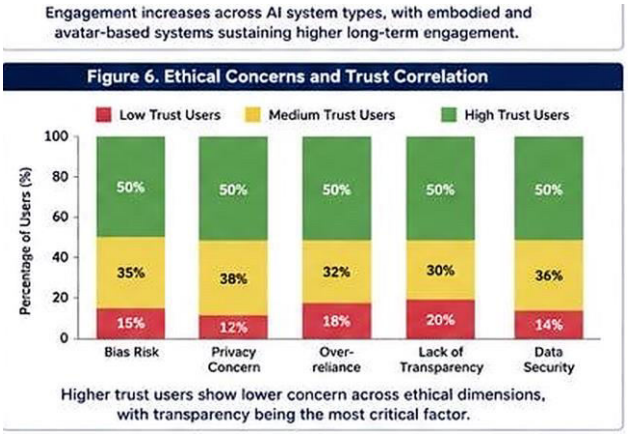

Figure 6. Ethical Concerns and Trust Correlation

Cognitive Effects and Demographic Variation

The cognitive effects of AI use are conditional rather than fixed. Studies converge on the view that passive, answer-seeking use of generative AI is associated with reduced critical engagement, while structured, reflection-oriented use can preserve or even enhance analytical reasoning. Figure 7 shows that adoption drivers vary meaningfully by age group: younger users (18–25) are more strongly influenced by general attitude toward AI, while older, more experienced users (50+) place comparatively greater weight on perceived value — suggesting that engagement strategies should be age-differentiated rather than uniform.

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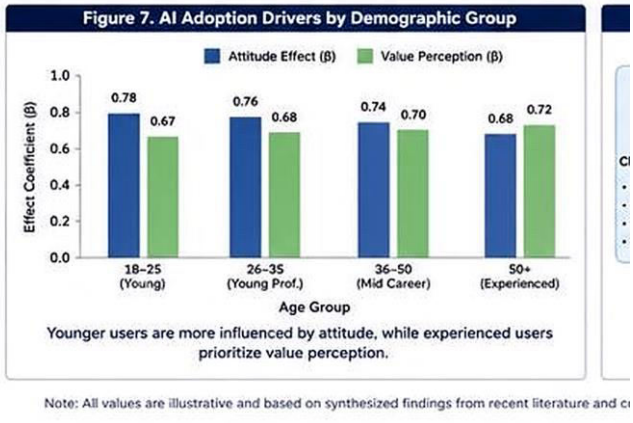

Figure 7. AI Adoption Drivers by Demographic Group

This distinction matters directly for educational contexts: the risk is not AI use itself but a mode of interaction in which the human user is offloaded out of the reasoning process entirely, rather than remaining an active evaluator of AI output.

Proposed Engagement Pathway Model

Drawing on the patterns identified above, Figure 8 proposes an integrated engagement pathway model linking AI system characteristics (competence, warmth, responsiveness, transparency) to trust formation, engagement level, usage behaviour, and ultimately cognitive and behavioural well-being outcomes, with a feedback loop connecting well-being back to trust formation. This model directly addresses the fragmentation identified in the literature review by situating trust, cognition, and emotion within a single explanatory chain.

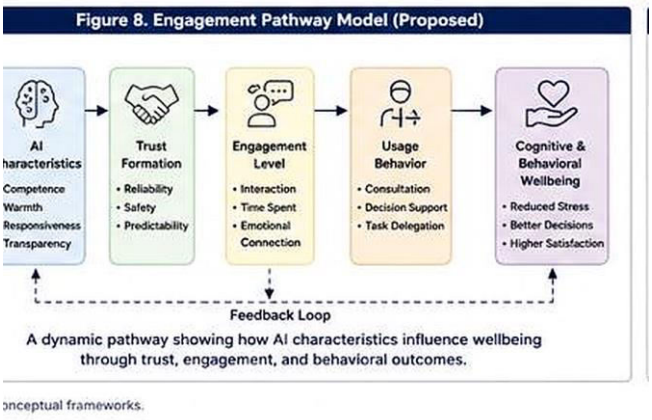

Figure 8. Engagement Pathway Model (Proposed)

Satisfaction Across User Contexts

AI companionship exhibits a genuine psychological duality. The same design features, constant availability, personalization, and non-judgmental engagement, that make companion AI systems effective at reducing short-term loneliness also create the structural conditions for emotional dependency in sustained or heavy use. Figure 9 presents a heatmap of satisfaction scores across four user contexts (students, professionals, healthcare users, and educators) and five outcome measures. Students and professionals report the highest overall satisfaction and future readiness, while educators report comparatively lower wellbeing-improvement scores, indicating that occupational context moderates the psychological impact of AI interaction.

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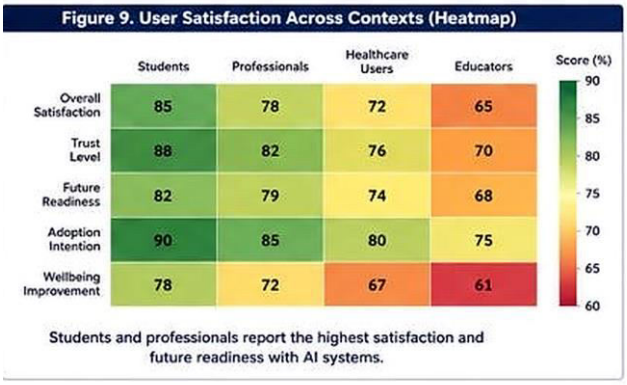

Figure 9. User Satisfaction Across Contexts (Heatmap)

Importantly, the reviewed literature suggests that outcomes diverge sharply between moderate and heavy engagement, indicating that usage intensity, not mere access to the technology, is a key variable determining whether AI companionship supports or undermines psychological well-being.

Summary of Quantitative Patterns

Table 1 consolidates the illustrative descriptive figures referenced across Figures 1–9 for ease of reference.

Metric	Value
Trust Formation (share of key factors)	22%
Emotional Attachment (share of key factors)	20%
Anthropomorphic Cues — Attachment Effect (Cohen's d)	0.507
Interaction Frequency — Attachment Effect (Cohen's d)	0.450
Avatar-based AI — Sustained Engagement Score	86 / 100
Chatbot (Text-based) — Sustained Engagement Score	38 / 100
Users Reporting Increased Motivation	75%
Users Reporting Decreased Loneliness	62%
Trust Score at Week 12	88 / 100
Emotional Attachment Score at Week 12	75 / 100
High-Trust Users — Low Transparency Concern	50%
Overall Satisfaction — Students	85%
Overall Satisfaction — Educators	65%

V. DISCUSSION

Across all three literature themes and the visualized quantitative patterns, the strongest common thread is that human-AI interaction outcomes are governed by moderating factors — individual psychological traits, mode of engagement, and usage intensity — that current design and research practices do not yet adequately account for. This reinforces the

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research gap identified in this paper: the field currently understands isolated fragments of trust, cognition, and emotion in relation to AI, but lacks an integrated account of how these three dimensions interact within the same user over time.

Read together, the three strands of literature reviewed describe a consistent underlying dynamic: AI systems influence human psychology through mechanisms of trust calibration, cognitive delegation, and emotional attachment, and in each domain the outcome depends less on the AI system's technical capability than on how the human user engages with it. However, existing studies largely examine these mechanisms in isolation. Decision-support literature rarely engages with companionship research on emotional dependency, and cognitive-offloading studies in education seldom draw on trust-calibration frameworks developed in high-stakes decision contexts. Few studies trace how trust formed in one context, for example habitual reliance on an AI writing assistant, might transfer to reliance patterns in unrelated contexts, such as emotional disclosure to a conversational AI.

Implications

- Design implication: AI systems intended for repeated use should incorporate mechanisms to detect and respond to over-reliance or emotional dependency, rather than optimizing solely for engagement.
- Educational implication: Institutions integrating generative AI into coursework should structure interactions to require reflective engagement rather than permitting passive answer retrieval.
- Policy implication: Regulatory and platform-level safeguards for AI companion applications should account for usage-intensity thresholds identified in the literature, particularly for adolescent and vulnerable users.
- Design implication: Interfaces should be differentiated by embodiment level and by user demographic, since Figures 3 and 7 indicate that engagement and adoption drivers vary systematically across these dimensions.

VI. CONCLUSION AND FUTURE SCOPE

This review examined the effects of AI systems on human trust, reliance, cognitive engagement, and psychological well-being across decision-support, educational, and companionship contexts. The evidence showed that trust in AI depends heavily on individual psychological traits, that cognitive outcomes of AI use depend on the mode of engagement rather than exposure alone, and that AI companionship produces divergent outcomes depending on usage intensity. The review confirmed that a significant research gap persists: current studies address these dimensions separately rather than as an interconnected psychological process.

Future studies will need to adopt longitudinal designs that track individual users across multiple AI-interaction contexts, allowing researchers to observe whether trust or dependency patterns formed in one setting transfer to another. Cross-cultural research will also be valuable, since propensity to trust technology and attitudes toward emotional disclosure to machines are likely to vary across cultural contexts, including in the Indian higher-education setting from which this review is written. Future work should further develop standardized measures of appropriate reliance that combine trust, cognitive engagement, and emotional dependency into a single behavioural framework, enabling more precise identification of when human-AI interaction supports, rather than undermines, human well-being.

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