

AI companions and emotional dependency

A scoping review of conceptualization, correlates, and consequences

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Abstract

Background. AI companions such as Replika and Character.AI support persistent, emotionally meaningful interaction, and a growing literature examines attachment, companionship, reliance, and problematic use. This review maps how these constructs are represented and where emotional dependency can be distinguished from adjacent relational phenomena. **Methods.** We conducted a scoping review guided by PRISMA-ScR using a two-concept search strategy across OpenAlex, Europe PMC, PubMed, and arXiv. Searches were run on 22 August 2026 for 2018–2026. The APIs reported 10,200 hits; 10,145 records were retrieved, 772 duplicates were removed, and 9,373 unique records were screened by one reviewer with rule assistance. Eligibility assessment used full text where accessible and title, abstract, and metadata where it was not. **Results.** Two hundred fifty-one primary empirical records were retained, with 12 review/synthesis records used only as secondary sources. The corpus is highly recent (71 records from 2025 and 139 from 2026). Abstract-derived coding most frequently identified loneliness ($n = 50$), attachment ($n = 35$), anthropomorphism ($n = 28$), trust ($n = 19$), self-disclosure ($n = 18$), and parasocial interaction ($n = 18$); problematic use was explicit in four records. No field-standard measure of emotional dependency was identified in the current mapping, although measurement-instrument extraction remains incomplete for records without full-text review. **Conclusions.** The literature supports treating engagement, attachment, reliance, dependency, and problematic dependency as analytically distinct concepts, but the proposed ordering is a heuristic synthesis and should not be read as a validated developmental sequence. Priorities are complete full-text verification, improved measurement, and longitudinal or experimental tests of transitions and causal direction.

Keywords: AI companions, emotional attachment, emotional dependency, parasocial interaction, problematic use, human-chatbot relationships, scoping review

1. Introduction

AI companions are conversational systems used in ways that sustain socially or emotionally meaningful interaction over time. Empirical work on social chatbots has documented relationship formation, companionship, and perceived social support, including longitudinal development of human–chatbot relationships (Croes & Antheunis, 2020; Skjuve et al., 2021, 2022; Ta et al., 2020). Platforms represented in the present corpus include Replika, Character.AI, Xiaolce, ChatGPT, and other companion-oriented or relational conversational systems.

Relational use is shaped by system features such as anthropomorphic presentation, responsiveness, personalization, memory, and persistent availability. These features can make a conversational system function as a perceived social partner, extending beyond a purely instrumental tool. Research on reciprocity, anthropomorphism, and companion use illustrates how interaction design can become part of the relational experience (Croes et al., 2023; Guingrich & Graziano, 2025).

The literature is terminologically fragmented. Attachment, parasocial interaction, companionship, emotional reliance, dependence, problematic use, and addiction are sometimes used to describe overlapping experiences without consistent boundaries. This matters because attachment is not equivalent to dependency, and dependency is not necessarily equivalent to impairment. Qualitative

work on Replika, for example, has described both meaningful relational benefits and dependency-related harms (Laestadius et al., 2022).

This review therefore has three objectives: to map how attachment and dependency-related constructs are conceptualized and represented; to identify reported correlates and candidate antecedents without assuming causal ordering; and to synthesize reported psychological, social, and ethical implications. The review is intentionally descriptive because the available studies use heterogeneous constructs, designs, and measures.

RQ1. How is emotional attachment to and emotional dependency on AI companions conceptualized and measured in existing research?

RQ2. What individual, technological, and relational factors are reported alongside stronger emotional attachment, reliance, or dependency on AI companions?

RQ3. What psychological, social, and ethical consequences or implications of emotional attachment, reliance, and dependency have been reported?

2. Methods

2.1 Review Design

We conducted a scoping review guided by the PRISMA extension for scoping reviews (PRISMA-ScR). A scoping design was appropriate because the literature is rapidly expanding and uses heterogeneous terminology, outcomes, and study designs. The objective was to map concepts, measurement practices, reported correlates, consequences, and evidence gaps; the review did not aim to estimate a pooled effect. The review was not prospectively registered.

2.2 Information Sources

We searched four bibliographic sources that were accessible for reproducible programmatic retrieval: OpenAlex, Europe PMC, PubMed via E-utilities, and arXiv. Semantic Scholar was attempted on 22 August 2026 but all requests were rate-limited and no records were retrieved. Web of Science, Scopus, PsycINFO, ACM Digital Library, IEEE Xplore, Embase, CINAHL, Communication and Mass Media Complete, and Sociological Abstracts were not searched because institutional access was unavailable in the working environment. Database-specific strings prepared for those sources are provided in the supplemental material and are reported as an outstanding verification task and not as completed searches.

2.3 Search Strategy

We used a broad two-concept strategy. Block A captured AI companion and relational-AI terms (for example, AI companion, social chatbot, relational agent, companion chatbot, virtual companion, AI friend, AI girlfriend, Replika, Character.AI, and Xiaolce). Block B captured relational and emotional-experience terms (for example, attachment, bonding, companionship, intimacy, dependence, reliance, problematic use, parasocial interaction, anthropomorphism, loneliness, social support, self-disclosure, trust, and romantic or love-related terms). Retrieval required Block A AND Block B; a mandatory dependency term was deliberately not imposed because dependency-related phenomena may be described using adjacent relational constructs.

The search period was 1 January 2018 to 22 August 2026, and all executed searches were run on 22 August 2026. The four successfully queried APIs reported 10,200 hits in total, while 10,145 records were actually retrieved through pagination and entered the deduplication pipeline. Full search strings and per-source retrieval details are reported in the supplemental material and Table 1.

2.4 Eligibility Criteria

We included empirical records examining users' relational or emotional experiences with AI companions, social chatbots, relational conversational agents, generative AI used as a companion, or romantic/friendship-oriented AI systems. Eligible constructs included attachment, parasocial interaction, bonding, reliance, dependency, problematic use, compulsive use, relationship substitution, intimacy, companionship, and perceived social support. A record did not have to use the phrase emotional dependency if it contributed evidence about attachment, reliance, dependency-related experience, or the proposed transition between these constructs.

We excluded records focused only on customer-service chatbots, educational chatbots without a relational dimension, technical chatbot performance, acceptance or usability without relational outcomes, structured clinical interventions without a companionship component, non-conversational robots, instrumental voice-assistant use, virtual influencers without reciprocal interaction, generic generative-AI use, and non-empirical commentary. Review and synthesis articles were excluded from the primary empirical corpus but could be retained as secondary sources for citation tracing and contextual discussion.

2.5 Study Selection

Screening proceeded in two stages under a single reviewer. Stage 1 applied reviewer-supervised rule assistance to all 9,373 unique records. Of these, 7,678 failed the dual-concept requirement and a further 698 were removed by documented hard-signal/date checks, yielding 8,376 Stage 1 exclusions and 997 records advancing to eligibility assessment. No record was counted as excluded solely by autonomous automation. At Stage 2, 997 reports were sought; five had neither an accessible abstract nor a DOI and could not be retrieved, leaving 992 reports assessed for eligibility. Assessment used full text when accessible and title, abstract, and bibliographic metadata when full text was unavailable. All decisions were made by the same reviewer and recorded in the supplemental screening log. Accordingly, this should not be interpreted as a conventional dual-reviewer full-text screening process.

2.6 Data Extraction

A 26-field extraction schema was created for study-level coding. Bibliographic and construct-level fields that could be supported by titles, abstracts, and metadata were coded across the corpus; full-text-dependent fields such as detailed sample characteristics, recruitment, duration of use, measurement instruments, complete findings, and study limitations were recorded only when the information was available and otherwise marked 'not reported.' Crossref matching provided high-confidence bibliographic matches for 203 of 251 included records; 48 records were flagged for manual bibliographic verification. Open-access locations were identified for 186 records, while 65 were paywalled or not flagged as open access. These verification statuses are treated as part of the review's methodological limitations and are not silently inferred.

2.7 Synthesis Approach

We used descriptive and thematic synthesis organized around the three research questions. Corpus-wide construct frequencies reported in this manuscript are conservative title/abstract-derived counts and indicate thematic presence, not effect size, direction, or causality. The proposed sequence from engagement to attachment, reliance, dependency, and problematic dependency is therefore used as a synthesis framework and should not be read as a tested stage model. No meta-analysis was attempted.

3. Results

3.1 Search and Study Selection

The executed database searches produced 10,200 API-reported hits: OpenAlex 1,847, Europe PMC 4,681, PubMed 3,534, and arXiv 138. Pagination yielded 10,145 retrieved records (OpenAlex 1,850; Europe PMC 4,623; PubMed 3,534; arXiv 138). After removal of 772 duplicates, 9,373 unique records were screened. Stage 1 excluded 8,376 records, leaving 997 reports sought for eligibility assessment. Five reports could not be retrieved, and 992 were assessed. A total of 741 were excluded at eligibility assessment, including 12 review/synthesis records retained only as secondary sources. The final primary corpus comprised 251 empirical records. Figure 1 summarizes the reconciled flow.

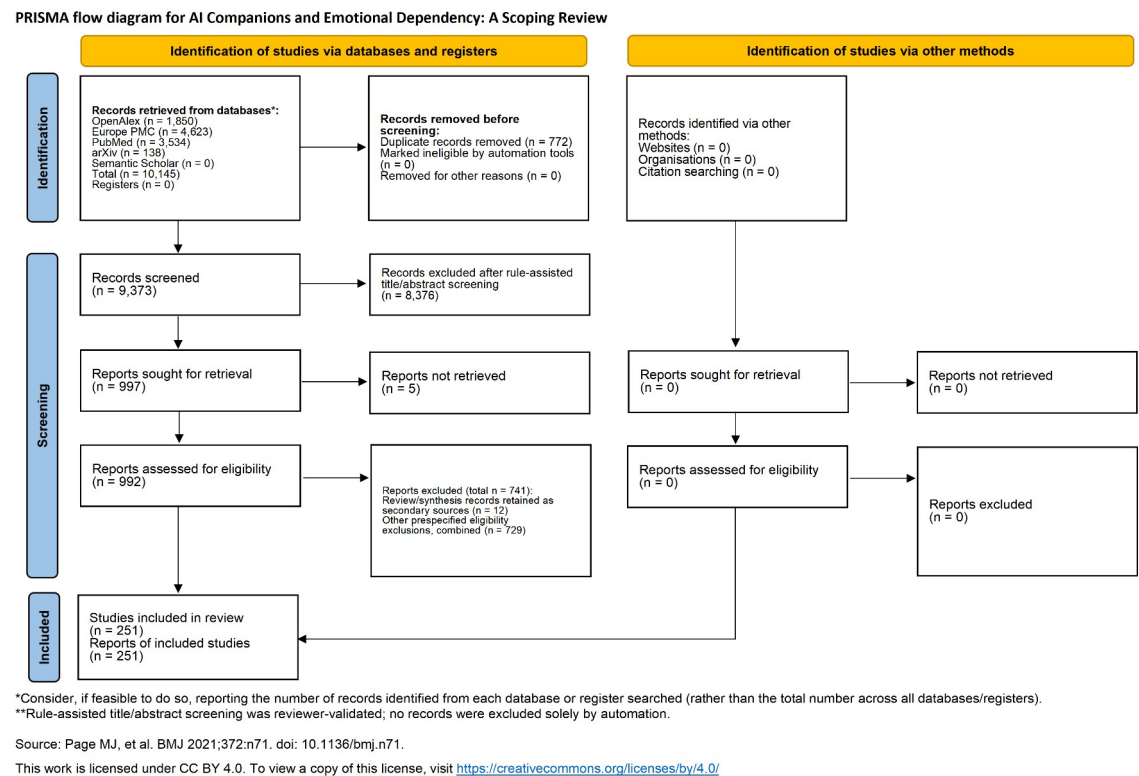


Figure 1
PRISMA 2020 flow diagram for study selection.

Note. Rule-assisted title/abstract screening was reviewer-validated; no records were excluded solely by automation.

The primary corpus begins in 2020 and is concentrated in the most recent years: 2020 (n = 2), 2021 (n = 2), 2022 (n = 8), 2023 (n = 10), 2024 (n = 19), 2025 (n = 71), and 2026 through 22 August (n = 139). Thus, 210 of 251 records (83.7%) were published in 2025–2026. Replika was the most frequently named platform (n = 53), followed by ChatGPT (n = 16) and Character.AI (n = 14). These platform frequencies are based on titles/abstracts and should not be interpreted as comparative evidence of platform effects.

3.2 Characteristics of Included Studies

Because full-text-dependent participant and design fields were not completed for all 251 records, this review does not report corpus-wide claims about dominant study designs, sample-size ranges, age distributions, or geographic prevalence. Instead, Table 2 summarizes characteristics that are

directly supported by the current extraction and verification workflow: publication year, named platform, construct coverage, bibliographic verification, and open-access availability.

Table 1

Search strategy, API-reported hits, and retrieved records

Database	Search date	API-reported hits	Retrieved records / notes
OpenAlex	2026-08-22	1,847	1,850 retrieved; slight pagination over-retrieval
Europe PMC	2026-08-22	4,681	4,623 retrieved through cursor pagination
PubMed (E-utilities)	2026-08-22	3,534	3,534 IDs retrieved
arXiv	2026-08-22	138	138 retrieved across per-term queries; overlap possible
Semantic Scholar	2026-08-22	0	Attempted; HTTP 429 rate limiting; no records retrieved
Total	2026-08-22	10,200	10,145 records retrieved from the four successful sources before deduplication

Table 2

Characteristics and verification status of the included corpus

Characteristic	Summary
Primary empirical records retained	251
Review/synthesis records used as secondary sources	12
Publication years	2020: 2; 2021: 2; 2022: 8; 2023: 10; 2024: 19; 2025: 71; 2026 (to 22 Aug): 139
Most frequently named platforms	Replika: 53; ChatGPT: 16; Character.AI: 14; Xingye: 3; My AI: 3; Mitsuku: 2
Abstract-derived construct coverage	Loneliness: 50; attachment: 35; anthropomorphism: 28; trust: 19; self-disclosure: 18; parasocial interaction: 18; problematic use: 4
Bibliographic verification	203/251 high-confidence Crossref title matches; 48/251 flagged for manual verification
Open-access availability	186/251 with an identified OA full text; 65/251 paywalled or not flagged OA
Extraction status	Bibliographic and construct coding completed from available records; full-text-dependent sample, measurement, finding, and limitation fields incomplete for many records

3.3 Conceptualizing Attachment and Dependency (RQ1)

Attachment is the more visible dependency-adjacent construct in the current mapping. Attachment was identified in 35 titles/abstracts, while parasocial interaction appeared in 18. Longitudinal studies of social-chatbot relationship formation and work explicitly focused on attachment illustrate that users may describe persistent bonds, proximity-seeking, and relationship development (Ciriello, 2025; Croes & Antheunis, 2020; Hu et al., 2025; Skjuve et al., 2021, 2022). However, measurement instruments were not extracted from every included full text, so the review does not claim that any one operationalization dominates the field.

Emotional dependency was less consistently named and operationalized. Problematic use was explicit in only four title/abstract records, while reliance, dependence, and dependency-like experiences appeared under varied terminology. The current mapping did not identify a field-standard instrument specifically validated for emotional dependency on AI companions. This conclusion is provisional because instrument-level extraction remains incomplete for records without

accessible full text. The most defensible finding is therefore terminological and measurement fragmentation; the mapping does not establish that no dependency measures exist in the literature.

3.4 Reported Correlates and Candidate Antecedents (RQ2)

Individual factors

Loneliness was the most frequently coded construct in the abstract-derived mapping (n = 50). Several empirical studies directly examine loneliness, social connection, companionship, or emotional support in relation to social-chatbot use (De Freitas et al., 2025; Folk et al., 2024; Liu et al., 2024; Ta et al., 2020). These records make loneliness a prominent candidate correlate, but the present review does not infer that loneliness necessarily precedes stronger attachment or dependency because most causal ordering was not established in the extraction.

System and interaction factors

Anthropomorphism was identified in 28 titles/abstracts and trust in 19. Experimental and longitudinal work suggests that anthropomorphic framing and perceived social qualities can shape companion experiences (Guingrich & Graziano, 2025), while other records address trust, authenticity, and attachment-related responses (Ciriello, 2025; Hu et al., 2025). The corpus also contains recurring discussion of responsiveness, personalization, memory, and availability, but these features were not coded with a complete standardized frequency across all 251 records.

Relational factors

Self-disclosure and parasocial interaction were each identified in 18 titles/abstracts. Research on reciprocal self-disclosure shows that disclosure patterns can influence human–chatbot interaction (Croes et al., 2023), and work on social-chatbot relationships documents processes of relationship development over time (Skjuve et al., 2021, 2022). These relational processes are therefore treated as candidate mechanisms in the synthesis framework, not as confirmed mediators of dependency.

Table 4 summarizes these factors while explicitly separating thematic frequency from causal interpretation.

Table 3
Conceptualization and measurement of attachment and dependency (RQ1)

Construct	Status in current evidence map
Attachment	Identified in 35 titles/abstracts; explicitly theorized in a subset of companion studies. Measurement instruments were not fully extracted across all records.
Parasocial interaction	Identified in 18 titles/abstracts; used as a relational framing in part of the literature.
Companionship / intimacy	Frequently represented in titles and abstracts, but no single corpus-wide frequency was generated for this combined category.
Emotional reliance	Present under varied terminology; not separately quantified in the current abstract-derived coding.
Emotional dependency	Less consistently named than attachment. No field-standard dependency instrument was identified in the current mapping; instrument-level extraction remains incomplete.
Problematic use	Explicit in 4 titles/abstracts; too sparse and heterogeneous for pooled inference.
Terminological consistency	Low; attachment, bonding, reliance, dependency, and problematic use are not consistently separated.

Table 4*Reported correlates and candidate antecedents (RQ2)*

Level	Mapped factors and interpretation
Individual context	Loneliness was most prominent (n = 50). Other individual factors appear in the corpus but were not uniformly quantified.
System / interaction factors	Anthropomorphism (n = 28) and trust (n = 19) were prominent; responsiveness, personalization, memory, and availability recur in the literature but were not fully frequency-coded.
Relational / social factors	Self-disclosure (n = 18) and parasocial interaction (n = 18) were recurrent; relationship development and escalation appear in selected studies.
Evidence strength	Counts represent title/abstract thematic presence, not antecedent effect sizes. Temporal ordering and causality remain unresolved.

3.5 Consequences of Emotional Dependency (RQ3)

Positive outcomes

The corpus contains studies reporting perceived companionship, social support, and reductions in loneliness or distress in some contexts (Chin et al., 2023; De Freitas et al., 2025; Ta et al., 2020). Because outcomes were not extracted in a uniform full-text protocol for all records, the review does not pool effect sizes or claim that benefits are specific to a particular level of use. Positive relational outcomes should be interpreted as reported findings within heterogeneous studies and not as an overall treatment effect.

Psychological risks

Dependency-related risks are also represented, including qualitative reports of emotional dependence and mental-health harms (Laestadius et al., 2022) and a smaller subset of records explicitly framed around problematic use. The current extraction does not support a corpus-wide incidence estimate, nor does it establish that companion use causes deterioration in mental health. Accordingly, strong claims about rare severe outcomes are not made in the synthesis unless directly supported by an included study.

Social consequences

Human-relationship substitution is a recurrent concern, but the literature also contains the competing possibility that AI companionship complements human support without replacing it. The present evidence map therefore treats substitution versus complementarity as an unresolved empirical question. Studies comparing chatbot and human social connection or examining support-seeking illustrate this tension (Folk et al., 2024; Lam, 2026).

Relational and ethical consequences

Ethical and governance implications were synthesized from the empirical themes and the 12 review/synthesis records retained as secondary sources; they were not counted as a separate category of included empirical outcomes. Relevant issues include the management of relationship changes, monetization of emotionally salient interaction, privacy of intimate conversational data, and protections for vulnerable users. These implications are discussed as governance questions generated by the evidence map and not as settled causal conclusions.

Table 5*Reported consequences and governance-relevant implications (RQ3)*

Domain	Current evidence-map interpretation
Potential benefits	Companionship, perceived social support, and reduced loneliness are reported in some studies; no pooled effect or usage threshold can be inferred from the current extraction.
Dependency / problematic-use signals	Emotional dependence and problematic-use themes are present, but explicit problematic use appears in only 4 titles/abstracts and prevalence cannot be estimated.
Human-relationship effects	Both substitution and complementarity are plausible in the corpus; causal displacement of human ties is not established.
Ethical / governance implications	Privacy, monetization, relationship continuity, vulnerable users, and design incentives emerge as governance questions synthesized from mapped themes and retained reviews.

4. Discussion

4.1 From Attachment to Dependency

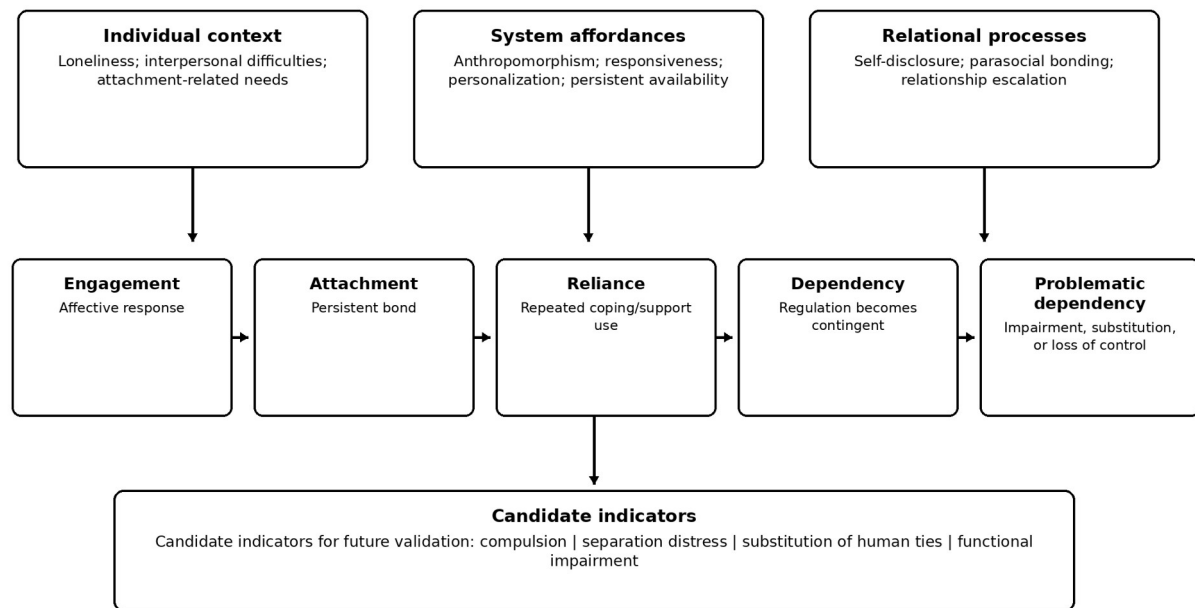
The principal conceptual contribution of this review is an analytical distinction among emotional engagement, attachment, reliance, dependency, and problematic dependency. The literature uses these terms inconsistently, and the current evidence does not validate them as a universal developmental sequence. We therefore use them as progressively more restrictive categories: engagement refers to affective response during interaction; attachment to a persistent bond; reliance to repeated use for emotional support or coping; dependency to a state in which emotional regulation becomes substantially contingent on the companion; and problematic dependency to dependency accompanied by impairment, loss of control, or harmful substitution of offline relationships.

This distinction is useful because it avoids treating all attachment as pathology and creates testable boundaries for future measurement. It also clarifies the evidentiary standard needed for governance claims: attachment alone is insufficient to infer harm, whereas persistent compulsion, separation distress, relationship substitution, or functional impairment would provide stronger indicators of problematic dependency. These indicators are proposed for validation, not presented as diagnostic criteria.

4.2 A Pathway Model of Emotional Dependency

Figure 2 organizes the mapped literature into a heuristic pathway. Individual context, system affordances, and relational processes may contribute to emotional engagement and, for some users, to attachment and reliance. Dependency and problematic dependency are positioned as more restrictive states requiring evidence of contingency, loss of control, substitution, or impairment. No included study tested this complete sequence, and the current review does not establish transition probabilities or causal direction.

Heuristic pathway for organizing emotional dependency research



Interpretation: this is a synthesis-derived organizing framework, not a validated developmental sequence or diagnostic model.

Figure 2

Heuristic pathway for organizing emotional dependency research.

Note. This is a synthesis-derived organizing framework, not a validated developmental sequence or diagnostic model.

Four candidate indicators recur strongly enough in the conceptual and empirical material to justify future testing: compulsion, separation distress, substitution of human ties, and functional impairment. Their value is methodological: they provide observable targets for scale development and longitudinal validation. They should not be used as clinical thresholds until reliability, validity, temporal stability, and discriminant validity from ordinary attachment have been established.

4.3 Ethical and Governance Implications

The review raises several governance questions and does not offer definitive policy prescriptions. First, researchers should test whether engagement-maximizing features such as persistent memory, simulated empathy, or romantic affordances increase reliance for particular users. Second, age and vulnerability should be examined as moderators and not treated as assumed risk categories. Third, platform changes and termination practices warrant study because relationship continuity can be salient to users. Fourth, intimate conversational data require careful privacy governance. Finally, claims about a provider duty of care should be tied to demonstrable patterns of foreseeable harm and to evidence that design choices materially contribute to those harms.

4.4 Research Agenda

The immediate research priority is to complete full-text verification and standardized extraction for the current corpus, including the 48 bibliographically flagged records and the 65 records without identified open-access full text. Beyond this audit step, five substantive priorities follow: (1) develop and validate measures that distinguish attachment, reliance, dependency, and impairment; (2) use longitudinal and experimental designs to test temporal ordering and causal direction; (3) report platform, relationship framing, duration, and intensity of use consistently; (4) examine heterogeneity

across age groups, cultures, and vulnerability profiles; and (5) evaluate design or governance interventions without assuming that attachment itself is harmful.

5. Limitations

Limitations of the evidence base. The literature is young and terminologically heterogeneous, and direct operationalization of emotional dependency is uncommon in the current mapping. Because this review did not complete uniform full-text extraction of study design, sample, measurement, and outcome fields for every record, it cannot provide a reliable corpus-wide estimate of methodological quality, effect direction, or prevalence of dependency-related outcomes.

Limitations of this review. Screening and eligibility decisions were performed by one reviewer with rule assistance; there was no second reviewer and no inter-rater agreement statistic. The search was limited to OpenAlex, Europe PMC, PubMed, and arXiv; major subscription databases were not executed in the working environment, and supplementary backward/forward citation tracing was not completed. Eligibility assessment relied on full text where accessible but on abstracts and metadata for other records. Crossref matching was high-confidence for 203 of 251 included records, leaving 48 requiring manual bibliographic verification; 186 records had an identified open-access full text and 65 did not. Full-text-dependent extraction fields remain incomplete for many records. The review was not prospectively registered. These limitations mean that the present article should be read as a transparent scoping evidence map and conceptual synthesis and not as a fully exhaustive or effect-estimating systematic review.

6. Conclusion

This scoping review maps a rapidly expanding literature on emotionally meaningful relationships with AI companions while distinguishing what the current evidence can and cannot support. Attachment, loneliness, anthropomorphism, trust, self-disclosure, and parasocial interaction are prominent in the title/abstract-derived map, whereas explicit problematic-use and dependency measures are much less common. The proposed distinction among engagement, attachment, reliance, dependency, and problematic dependency offers a useful organizing vocabulary, but it remains a heuristic framework requiring full-text measurement verification and prospective validation. The strongest next steps are methodological: complete the evidence audit, develop discriminant measures of dependency, and test temporal transitions using longitudinal and experimental designs. Until then, ordinary attachment to an AI companion should not be treated as equivalent to problematic dependency, and governance claims should remain proportional to the strength of the underlying evidence.

Table 6
Evidence gaps and future research priorities

Gap	Priority
Measurement	Develop and validate measures that distinguish attachment, reliance, dependency, and functional impairment.
Design	Use longitudinal and experimental designs to test temporal ordering, transition mechanisms, and causal direction.
Samples	Diversify beyond convenience samples and report age, culture, vulnerability, and prior social support consistently.
Reporting	Standardize reporting of platform, relationship framing, duration, intensity of use, attrition, and model/version changes.
Intervention	Evaluate design and governance interventions without assuming that attachment itself is harmful.
Synthesis	Complete full-text verification and test the proposed heuristic pathway in integrated, prospectively specified models.

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