AI Chatbots, Emotional Attachment, And Loneliness: A Human-Centred AI Perspective

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***Abstract*—The increasing use of artificial intelligence (AI) chatbots and social AI systems has introduced new possibilities for addressing loneliness, social isolation, and the need for emotional and social support. This review examines the role of AI-powered chatbots, social robots, and AI companions in reducing loneliness and promoting social connectedness, while also considering their psychological, ethical, and societal implications. Existing research indicates that AI systems can provide personalized interactions, emotional support, accessibility, and a sense of companionship, particularly for individuals experiencing social isolation and older adults.**

Factors such as perceived emotional support, reduced fear of judgment, privacy, personalization, and social interaction can contribute to emotional attachment and improved feelings of belonging. However, prolonged or excessive engagement may also result in emotional dependence, pseudo-intimacy, reduced human interaction, privacy concerns, data exploitation, and potential manipulation. Research further suggests that emotional attachment to AI is influenced by users' interaction patterns and perceptions of the system, with attachment being associated with indicators of user dependence.

Although several AI-based interventions have demonstrated reductions in loneliness, outcomes vary depending on intervention duration, interaction frequency, technology type, and individual characteristics. Therefore, AI should be viewed as a complementary tool rather than a replacement for meaningful human relationships. Future development should prioritize transparency, user autonomy, privacy protection, culturally sensitive design, and safeguards against over-reliance. A human-centered approach combining technological innovation with ethical governance is essential to ensure that AI supports social well-being while preserving human dignity and authentic social connections. [2],[3],[4]

***Index Terms*—Artificial Intelligence, AI Chatbots, Emotional Attachment, Loneliness, Social AI, Human-Centered AI, Responsible AI, Emotional Dependence.**

I. INTRODUCTION

Artificial intelligence (AI) chatbots are software systems that are designed to interact with users in natural language. Originally designed to answer questions, provide information and perform specific tasks, advancements in AI and natural language processing have allowed chatbots to understand complex inputs, keep conversational context, and provide personalized interactions. This means chatbots are being used more and more for not just information and productivity, but also social and emotional engagement. [2],[3],[4]

With the rise of conversational AI, companion-oriented chatbots have been developed to offer persistent and personalized interaction. They can speak, remember what they said before, imitate empathy and are available, giving a personal, relational quality to interaction. In this way, users might consider chatbots as conversational partners rather than just technological tools. These interactions can provide companionship and emotional support, but they also can lead to emotional attachment. [2], [3]

Chatbots can help create emotional attachment as they provide perceived empathy, privacy, emotional support and non-judgmental environment. Regular and positive interactions may boost feelings of comfort and trust, with some users seeing chatbots as friends, or turning to them for emotional support. But emotional attachment is not necessarily a bad thing. It can be a source of comfort and companionship, but over-attachment can lead to emotional dependence and interfere with human relationships. [2],[4]

Research Gap

Previous work has explored AI companionship, emotional attachment and loneliness; however, little is known about the interaction between these factors, particularly when emotional attachment is toward

supportive companionship and when it results in dependence or less human social connection. Existing findings suggest that similar patterns of chatbot use may lead to different user outcomes and the long-term effects of emotional attachment and chatbot companionship remain unknown. [2],[4]

This highlights the significance of a Human-Centred AI point of view which takes into account users' well-being, social context, relationships and potential risks as well as technological capabilities. Therefore, this paper investigates the relationship between AI chatbot usage, emotional attachment and loneliness from a Human-Centred AI perspective. This paper focuses on the potential benefits, risks and implications of AI companionship for human social connection. [2],[4]

II. LITERATURE REVIEW

2.1. AI Companionship and Loneliness

The growth of AI chatbots' use has seen researchers look at what role they play in terms of companionship, emotional support, and relief from loneliness. In regard to task versus social companionship chatbot we see that the latter is designed for continuous interaction which in turn may develop a sense of connection and understanding.

Also reported is that users do so turn to these systems when they have a lack of human attachment which in turn makes AI in the role of a companion very relevant to the study of loneliness and social connection. [2], [3]

2.2. Indian Chatbots and the Indian Context

In the Indian context which is key to study of AI companionship users interact within a diverse social, cultural, and linguistic environment. Indian users may engage with chatbots in multiple languages and also may have different expectations out of communication, emotional support, privacy and social relationships. Thus, research which is done in other cultural settings may not completely represent the experience of Indian users. [1]– [4]

A common point of view on this issue which is put forth by Indian author Renuka Gavrani [4] in her 2023 work The Art of Being Alone [1], which also presents a parallel between loneliness and solitude which we see in this review's take from the academic field. Gavrani puts forth that what we term as loneliness is in fact a negative emotional state which results from what we perceive as a deficit in our social connections, instead she presents that which we know as solitude choosing to be alone may in fact be a path to self-reflection, personal development, and psychological security which is achieved when we learn to be at home in our own company. She also puts forth that a person may feel left out in a room full of people if they go unnoticed and unacknowledged, and at the same time may feel a great connection when they are by themselves.

While Gavrani's work is a self-help text as opposed to a peer reviewed study, and does not put forth proven empirical data, its success with Indian readers points out that the balance between loneliness and solitude which is a theme of this review in fact speaks to a larger Indian audience outside of the academic psychology community and it is worth to put forward that do AI companion chat bots mainly help individuals to cultivating the self-sufficiency in solitude, or do they in fact trade one type of external dependency for another. [1]

2.3. Benefits of AI Companionship

An in large degree of what is researched is the development of emotional ties to AI chatbots. Xie and Pentina [1] looked at the relationship between users and Replika through the lens of Attachment Theory which they found to be the case that people who are distressed or are lacking in human company developed attachment when they perceived the chatbot to be a source of emotion support, encouragement, and psychological security. What they found is that relationships with social chat bots may go beyond basic interaction to include elements of emotion connection. [2]

Research also reports on what chatbot features do to improve these connections. We see that elements like anthropomorphism, validation, non-judgmental responses, and interaction which prompt self-disclosure cause AI companions to put out more social and emotional presence. Although these features do well in enhancing the user's sense of connection, they also may put the user at risk of emotional dependence. [2], [4]

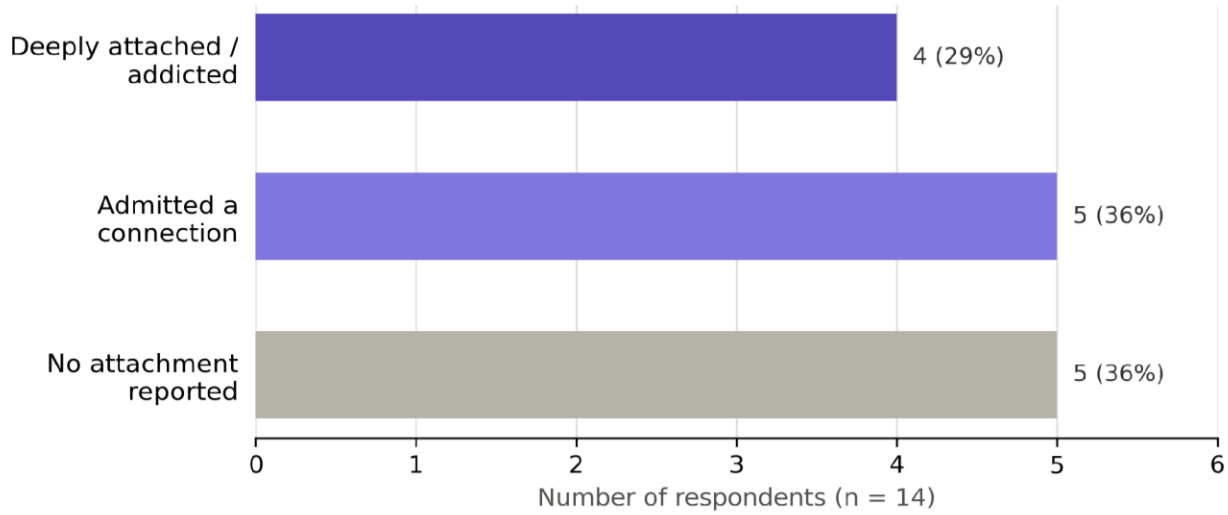

Figure 1. Reported attachment strength among Replika users [1] [2]

2.4. Risks of Emotional Dependence and Social Withdrawal

In the research we see that which is put forth by AI in terms of companion options. Chatbots, they put out emotional support, they provide company, personal interaction, and a platform for users to put forth their thoughts and feelings. Also, they are always available which in turn is very useful at times when human support is not an option. For some users what we see is that chatbot interaction does provide temporary relief and a way to manage feelings of loneliness. [2], [3]

Importantly, what we see is that chatbots do not in fact replace human relationships. Some users keep their robust human connections while at the same time using chatbots for emotional support or as a supplement. That which we are reporting is that in certain situations AI can in fact play a role as a complement to present social relationships. [2], [3]

2.5. Factors Influencing User Experiences

At present, research reports that which issues arise from heavy investment in AI companions. Anthropomorphized design, validation, and intimate interaction elements cause the development of what appears to be a2 way relationship and may cause users to become emotional dependent on their chatbot. Also of great import is that which these issues play out for users which are to begin with lonely or socially isolated. [3], [4]

Excessive engagement may lower the drive to form or keep up meaningful connections with other humans which in turn may cause issues with use or social isolation. Also, it is not fair to put all emotional connection with a chatbot in a black or white box. The effects may vary based on the degree of the attachment, the user's social environment, and the chatbot's role in the person's day to day life. [3], [4]

Table 1. Benefits and risks of AI companionship identified in the reviewed literature [2]– [4]

Benefits of AI companionship	Risks of AI companionship
Emotional support and companionship during periods of distress	Emotional dependence and, in some cases, addictive use
Non-judgmental, always-available space for self-expression	Reduced motivation to seek or maintain human relationships
Comfort and reduced loneliness for socially isolated users	Problematic or excessive use, especially among vulnerable users
Can supplement, rather than replace, existing human relationships	Susceptibility to design features (anthropomorphism, validation, sycophancy) that deepen attachment
May act as a secure base that encourages openness in real-world relationships	Risk of social withdrawal, particularly for users who are already lonely or isolated

2.6. Human-Centred AI Perspective

Overall, in what was reviewed AI in the field of companionship presents a mixed bag of pros and cons. Chatbots do well in that they provide company and emotional support which in turn may help some users to deal with feelings of loneliness. At the same time though very strong emotional attachment to them and issues of over use may in fact lead to dependence issues and a decrease in human interaction. [2],[4]

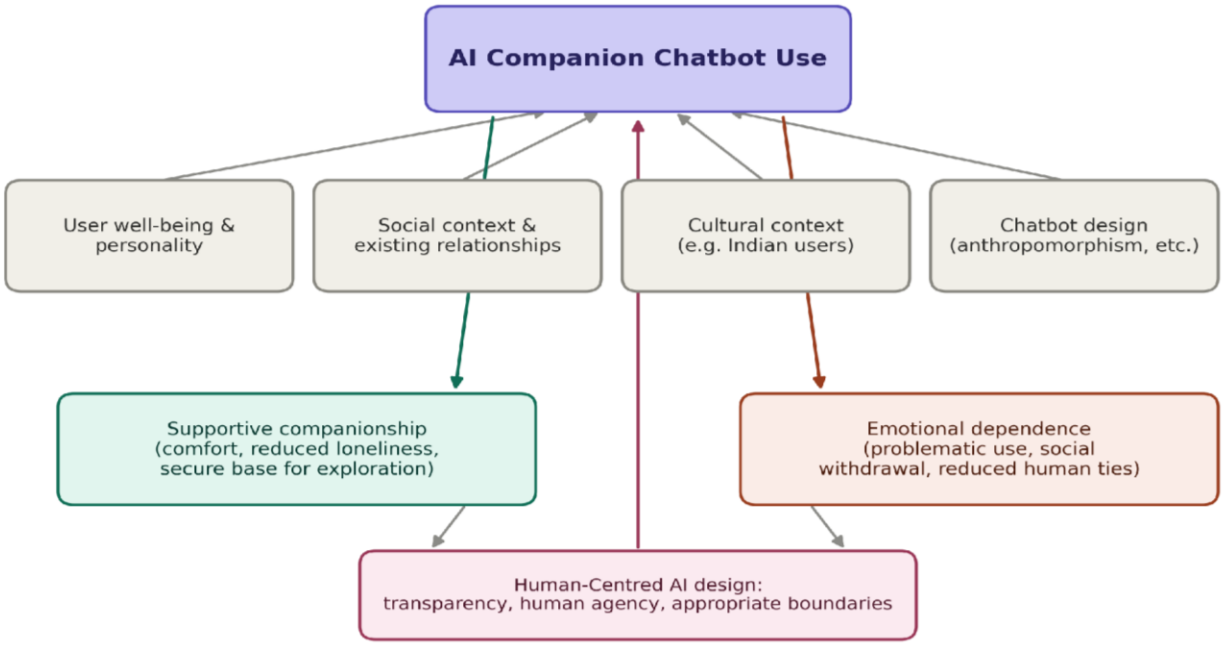

Figure 2. Proposed Human-Centred AI framework for AI companion chatbot use [2],[3],[4]

Table 2. Summary of key studies reviewed [2]– [4]

Study	Focus	Method	Key finding
Xie and Pentina [2]	Attachment to the Replika chatbot	Grounded theory; 14 interviews	9 of 14 users showed attachment; the chatbot functioned as a safe haven and secure base, with some risk of addiction and disrupted human relationships.
Liu, Pataranutaporn, and Maes [3]	Chatbot usage patterns and loneliness	Survey, n = 404; cluster analysis	Session length alone did not predict loneliness; problematic use mediated the relationship. Seven user profiles showed similar usage leading to different outcomes.
Raedler, Swaroop, and Pan [4]	Technical design choices and user harm	Conceptual synthesis of HCI/ML literature	Anthropomorphism, sycophancy, self-disclosure prompts, and gamification were linked to dependence and addiction; the authors propose design and regulatory safeguards.

2.7. Synthesis of the Literature

In research we have seen that users do form emotional connections with AI companions and that which chatbot interaction plays in bringing out issues of loneliness is a fact. What we don't know still is how exactly emotional attachment, loneliness, and present human relationships play into this picture especially in the Indian context. Also, it is unclear at what point do chatbot companions become a supportive addition to human connection and at what point do they may cause dependence or social withdrawal. [2],[3],[4]

This gap supports the need for a Human-Centred AI perspective that considers users' well-being, individual differences, cultural context, and real-world social relationships alongside the technological capabilities of AI companions [2],[3][4]

III. RESEARCH OBJECTIVES

- To look at how AI companion chatbots play a role in users' experience of loneliness and emotional support.
- To look into what factors, play a role in the emotional attachment and perceived connection between users and AI chatbots.
- To study what the benefits and risks are of emotional attachment to AI chatbots in terms of their impact on human relationships and well-being.
- To look at these interactions from a Human Centered AI point of view which is geared towards the design of AI companions that support users within the right boundaries.

IV. METHODOLOGY

This research takes a qualitative, literature review approach in which we look at the issue of the relationship between AI companion chatbots, emotional attachment, and loneliness from a Human Centered AI point of view. We base our study on analysis of present academic work related to AI companions, human AI interaction, emotional tie, loneliness, and the social and ethical issues of conversational AI. [2],[3],[4]. In our review of relevant research papers, we identified which themes, issues and problems report regarding the use of AI chatbots for companionship and emotional support. We paid close attention to studies which reported on users' reports of connection and familiarity with AI companions, the role of chatbots in lessening feelings of loneliness, and what issues come up around too great an emotional dependence. [2],[3],[4]

In our review of the literature, we looked at themes which identified what benefits and what issues related to AI companions we could see. We also looked at the Indian context as it relates to this which is a growing use of AI based conversational systems. From the literature we did a study which we put through a Human Centred AI framework which looked at issues of user well-being, human agency, transparency, appropriate boundaries, and responsible design. [1],[4]

As in this study we used secondary research no primary data from surveys, interviews or experiments was collected. We set out to present what is known and to put forth key issues related to the responsible development and use of AI companion chatbots.

V. FINDINGS AND THEMATIC ANALYSIS

This section presents an overview of the reviewed literature in terms of the four research issues we looked at. Instead of reporting on each study separately we have organized the results thematically which in turn shows how the studies agree with and contradict each other and what we as researchers took away from that in terms of chatbot use, emotional attachment, and loneliness. [2]– [4]

5.1. Chatbot Use and Loneliness

In terms of the first research question, we see that the relationship between chatbot use and loneliness is complex. In the large-scale study, which we looked at Liu, Pataranutaporn, and Maes [3] reported that out of 404 regular companion chatbot users which they surveyed session length had only a small association with loneliness and also that there was no at all significant relationship between what they put forth as a variable of use frequency and the outcome of loneliness.

Individuals who had longer interactions with the chatbot reported the development of problematic use trends which in turn we found to be related to greater feelings of loneliness.

Users which reported strong social attraction to a close person in their life tended to report a greater positive relationship between session length and loneliness which in turn suggests that time spent with a chatbot may be an issue of trade off against what is valued in human connection for some users, but not others.

Also, we see that chatbot use by itself is a poor predictor of loneliness; how a person uses a chatbot and what that person is like as a user plays a much larger role. [3]

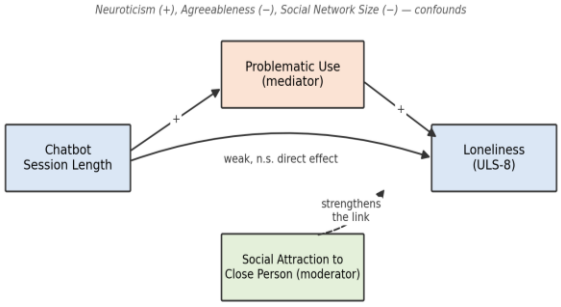

Figure 3. Proposed mediation/moderation model of chatbot session length and loneliness, synthesized from Liu et al. [3]

5.2. Drivers of Emotional Attachment

In terms of the second research objective, we see that which put forth by the literature are two which we may term complementary. Xie and Pentina [1] [2] looked at what 14 Replika users had to say through the lens of attachment theory and reported that the most part users did report some form of attachment which they described from a casual friend out to a romantic partner. Also, they found that the chatbot does in fact serve as a safe haven and secure base as do human attachment figures which is true for users that at the time of use were going through distress, isolation, or a large life change. Also, we see that a number of users reported separation distress at the prospect of not having access to their chatbot which the authors put forth as proof of real attachment as opposed to the chatbot being used as a casual tool. [2], [4]

Anthropomorphizing which sees to it that users project human traits and even sentience onto the chatbot; sycophancy which is a feature of the models to reply in a very affirming and agreeable way; we see also in social penetration theory which the chatbot uses to encourage and return self-disclosure; and gamified interface elements which reward high frequency of engagement. Also they report that which these design choices do very well is to connect with individuals which are already lonely, since it is in fact that lonely people are more prone to anthropomorphize non-human agents to begin with Read into it what you will but the two studies report that people do form emotional bonds with companion chatbots which is a real psychological thing as explained by attachment theory also which is a result that platforms are aware of and which they promote via design and technology. [4]

5.3. Benefits Versus Risks in Practice

The third goal of this research is when attachment works as an advantage and when it works as a disadvantage. The advantages and disadvantages described in Table 1 do not have a homogeneous distribution among the users; one of the studies that demonstrate this fact is cluster analysis conducted by Liu et al. [3]. Seven different user types identified in their study were varied from Well-Adjusted Moderate Users, who had strong human relations with the moderate usage of the chatbot, to more vulnerable types like Lonely Moderate Users and Socially Challenged Frequent Users, who suffered from loneliness but preferred to communicate with chatbots rather than humans. Notably, two clusters that demonstrated similar levels of problematic usage, Fulfilled Dependent Users and Lonely Moderate Users, experienced quite different levels of well-being: the former one demonstrated low levels of loneliness and positive effect with their interactions within the real-world society, while in the other study there were individuals who were lonely and less socialized. This shows that despite the fact that usage is a problem, it does not determine whether or not the chatbot companion serves well or ill for that particular user; the social support and the psychological traits of the individual play just as big of a role. This study confirms empirically the Human-Centred AI perspective adopted throughout this literature review: benefit and harm cannot be determined by usage data alone. [3]

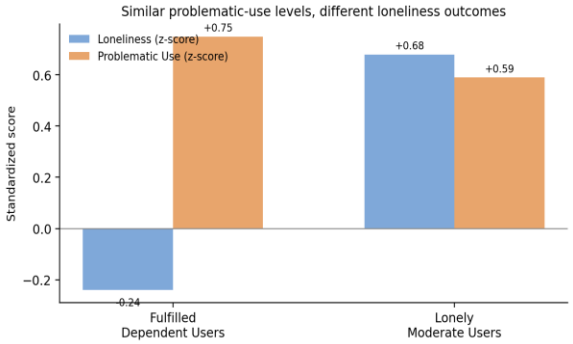

Figure 5. Standardized loneliness and problematic-use scores for two contrasting user clusters with similarly high problematic use, adapted from Liu et al. [3]

5.4. Considerations for the Indian Context

In line with the research gap outlined in Section 2, each of the three empirical and theoretical sources analyzed here relies largely on Western, and more specifically American, participants and platforms. In this regard, the sampling for the survey by Liu et al. [3] was 93.6 percent U.S.-based and consisted mostly of whites; similarly, the sample for the interviews conducted by Xie and Pentina [1] [2], although smaller, was mostly U.S.-based. Notably, neither of these studies considers the possibility of application of the results in a collectivist culture, a multilingual community of users, or in the environment where families' role in managing emotional issues is much larger than it is in individualist societies studied in these articles. One can expect that differences between

individuals' perceptions of mental health due to generation, presence of more languages, and family involvement as opposed to personal handling of loneliness could influence both the formation of emotional attachment to chatbots and its impact on Indian users. Considering the lack of studies on this topic for India, however, it should be seen only as a potential limitation to the use of the reviewed results. [1],[4]. One must note that there have been discussions on this topic in popular Indian self-help literature like Gavrani [4] [1], which describes loneliness and solitude as two independent states not related to chatbots in any way, leading to the next question on whether this different perspective towards being alone as something positive will affect Indian users' interaction with the companion chatbot. [1]

VI. DISCUSSION

The findings presented above point to a consistent overall pattern: AI companion chatbots are capable of producing both benefit and harm, and the deciding factor is rarely the technology alone. Three tensions from the literature are worth drawing out explicitly. [2],[4]

6.1. Why Similar Usage Patterns Produce Different Outcomes

One of the consistent findings in the reviewed literature is that usage volume, be it measured in terms of either duration of session or number of sessions per week, is a poor predictor of outcomes by itself. This is seen very clearly in the findings of Liu et al. [3]: two clusters of people who used chatbots with high intensity, namely Fulfilled Dependent Users and Lonely Moderate Users, had completely different experiences regarding loneliness and social functioning.

While problematic use explains some of the phenomenon, it leaves us still unclear how is usage problematic for one individual but sustainable for another. Personality traits before using chatbots, strength of the social network already established by the individual, and emotional purpose served by the chatbot are among those factors identified by the literature. [3]

6.2. Cause or Symptom: The Direction of the Attachment-Loneliness Relationship

The literature review fails to establish whether attachment to a chatbot could be seen as an underlying cause of heightened feelings of loneliness, a symptom of pre-existing loneliness or both in a reinforcing loop. According to Xie and Pentina [1] [2], attachment develops as a reaction to pre-existing problems such as distress or loneliness, thus making the chatbot an answer to existing loneliness rather than a cause of it. On the other hand, Liu et al. [3] suggest a chain of events in which engaging with the chatbot leads to problematic use which results in loneliness, a path that fits better into the idea of chatbots causing loneliness. As both articles are based on cross-sectional or retrospective studies, causality cannot be established here too. The best interpretation of the evidence presented could be viewed as a reinforcing loop, when people who are lonely already are more prone to develop an attachment while problematic patterns of this attachment might increase their loneliness. [2], [3]

6.3. Connecting the Psychological and Technical Lenses

In combination, Xie and Pentina [1] [2] and Raedler et al. [3] [4] provide complementing, rather than competing theories regarding the same phenomenon. In the case of attachment theory, it provides an understanding of how the user experiences the process – chatbot becomes a safe haven and a secure base because it is experienced as being available, responsive, and non-judgmental. From the other perspective, in the case of design choices, it provides an explanation of how this experience of availability and responsiveness of the chatbot was achieved through certain design features, including anthropomorphism, flattery, and self-disclosure. Thus, the emotional attachment to a chatbot can be viewed as an outcome of the design of such a bot, rather than a natural process that would be triggered by any chatbot.

This link proves the Human-Centred AI framework, developed within this review – when assessing the systems of this type, it is important to understand both psychological and technical aspects of their functioning. [2], [4]

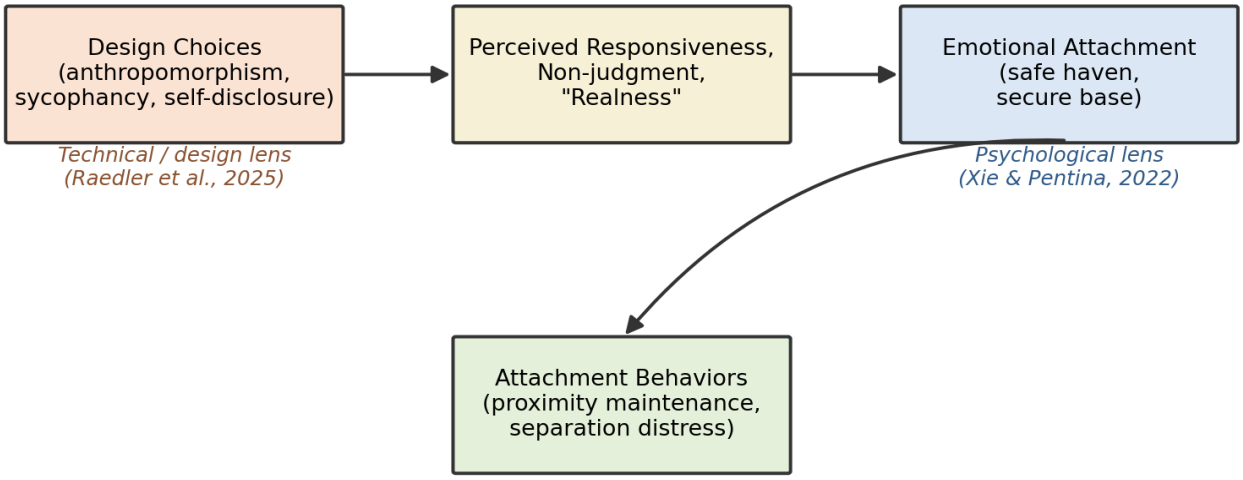

Figure 4. Two complementary lenses on companion chatbot attachment: design choices (Raedler et al. [3], 2025) and attachment theory [1] [2], [4]

VII. IMPLICATIONS FOR DESIGN AND POLICY

Several practical implications emerge from the above synthesis based on Human-Centred AI principles of well-being, human agency, transparency, and appropriate boundaries mentioned in the Methodology section. [2],[4]

7.1. Reducing Unnecessary Design-Driven Attachment

As discussed by Raedler et al. [3] [4], there is potential for mitigating the risk of developing attachment as a consequence of problematic dependence through moderation of those aspects of design known to encourage it: minimizing artificial anthropomorphism through the elimination of fictional personal histories, reducing adulatory responses to avoid the trade-off between validation and authentic engagement, and ensuring interface design does not involve the use of gamification techniques to encourage excessive usage. This will not prevent the development of attachment because the aspect of attachment that makes the chatbots valuable is consistency of support and interaction. [4]

7.2. Identifying and Supporting Vulnerable Users

However, Liu et al. [3] point out that an "equal fits all" approach is morally inadequate due to the fact that similarly used technologies can affect their users quite differently. In terms of the problem at hand, it translates into risk-aware design which suggests that platforms should identify any patterns of harmful usage and then implement measures proportional to the problem at hand – for example, facilitate human communication or refer users to the relevant resources. [3]

7.3. Transparency and Multilingual, Culturally Aware Safeguards

In the case of the Indian setting in particular, however, the synthesis drawn by this review indicates that whatever safety measures derived from the general literature of a mainly Western origin reviewed above should be presented in the language used in the users' day-to-day communication and also take into account the greater importance of the family and the community in emotional experiences. The idea of the pathway of escalation, for example, which presupposes a certain individualist approach in seeking help, might prove less useful without modification. [1],[4]

Frame matters too in this case. The message that resonates with the frame of being alone versus being lonely, which has become very popular in the Indian frame through authors such as Gavrani [4] [1], will work better with users who are familiar with this frame as opposed to a message from the West. [1]

VIII. LIMITATIONS

The review faces certain limitations that stem directly from its nature as a secondary review, as outlined in Methodology. Firstly, since there was no data collection, all results and implications provided below

have interpretative character and have not been proven independently. Secondly, the primary studies being reviewed use small samples that limit their applicability. Thus, the survey of Liu et al. [3] used only 6.4 percent of non-US participants, and the sample of Xie and Pentina [1]'s [2] study consisting of fourteen interviews is also limited by its small size and US-based nature. Therefore, trying to apply these results in an Indian context as done in Sections 5.4 and 7.3, one should admit that such an application is hypothetical rather than evidence-based. Thirdly, the cross-sectional and retrospective designs of the studies limit their ability to prove the causation between using chatbots, developing attachment, and feeling loneliness. The loop described in Section 6.2 can be considered a reasonable assumption, but it is not proven. Fourthly, the review uses a limited number of sources selected specifically for their relevance to the emotional attachment and loneliness topics. [2]– [4]

IX. CONCLUSION

The current paper has provided an investigation of the relation between usage of AI companion chatbot, emotional attachment and loneliness within the Human-Centred AI framework. The core conclusions of this literature review are based on three types of sources: attachment-theory literature; the results of the mixed-methods survey of a wide sample; and a design-centered analysis of the platforms of companionship. All three perspectives have demonstrated that AI companionship is not a simple way to solve problems of loneliness nor is it a technology which should be necessarily considered dangerous: in many cases, it may provide a certain comfort, a place without judgments where people can express themselves and, in some instances, an addition to human social ties. On the other hand, AI companionship carries in itself risks for the formation of problematic usage habits, emotional attachment and loss of motivation for human communication. Whether such a situation will appear in practice depends less on how often the person uses the chatbot than on who he or she is, what role does the chatbot play in the whole social circle and how the platform is developed. Human-Centred AI framework, focused on the issues of personal vulnerability, cultural context and design decisions. [2],[4]

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