The Imitation of Intimacy: Comparing Satisfaction in Intimate Human and AI Companion Relationships

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Abstract

The rapid proliferation of Large Language Models (LLMs) has enabled artificial agents to foster deep emotional bonds, yet the comparability of these AI relationships to human norms remains underexplored. As HRI researchers increasingly integrate LLMs into embodied platforms, understanding the nature of these bonds is imperative for responsible design. This study investigates whether relationships with LLM-driven AI companions can rival the satisfaction of human connections and if the mechanism of intimacy is equally critical. Through a comparative survey of 150 participants stratified across in-person, long-distance, and LLM companion relationships, we illuminate that digital bonds can yield satisfaction levels comparable to human partnerships, with intimacy serving as a predictive factor. These findings challenge the assumption that AI relationships are inherently unsatisfactory and identify intimacy as a design metric for social robots, providing a protocol for integrating LLM companions into embodied relational agents.

CCS Concepts

• **Human-centered computing** → **User studies**; **Interaction design**; *Interaction devices.*

Keywords

Intimacy, Large Language Models, Cross-Sectional Survey, Relationship Satisfaction

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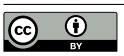

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1 Introduction

The rapid integration of Large Language Models into interactive systems has fundamentally altered the landscape of artificial intelligence [54]. For the Human-Robot Interaction (HRI) community, these models represent a paradigm shift in communicative competence [25, 36], enabling agents to transcend scripted exchanges and engage in fluid, open-ended dialogue [10, 54]. This technological leap has fueled the proliferation of social chatbots designed specifically for emotional connection [23], and companionship [55]. Unlike task-oriented systems, these AI companions mimic human interaction dynamics [44], fostering deep emotional bonds that increasingly resemble interpersonal relationships—including friendship [30, 32] and romantic attachment [42].

While distinct from physically embodied robots, LLM-driven chatbots serve as a critical proxy for understanding future human-robot relational dynamics. As accessibility accelerates adoption and these language architectures are increasingly integrated into robotic platforms, understanding the nature of these digital bonds becomes imperative for HRI design [40]. Existing research has explored the utility of these agents in education [39], marketing and entertainment [14, 66], and mental health [8]. However, the rapid social acceptance of AI companions has outpaced our theoretical understanding of the relationships they generate. While scholarship acknowledges the existence of significant human-agent bonds [4, 42]—and potential risks regarding over-attachment in vulnerable populations [52]—there remains limited empirical research comparing the quality of these bonds against human norms [35, 65].

Critically, the field lacks a definitive understanding of whether a relationship with an LLM can genuinely rival the satisfaction and intimacy found in human connection. This study explores the mechanisms of intimacy and its impact on relationship satisfaction.

We conducted a comparative survey of 150 participants, stratified equally across three relationship conditions: long-distance human partners, in-person human partners, and LLM-driven companions. Preliminary results challenge the assumption that AI relationships are inherently inferior, indicating that AI companions can yield satisfaction and that intimacy remains a central predictive factor.

This study makes several contributions to the HRI literature. First, it empirically indicates the depth and satisfaction of human-LLM relationships, offering a benchmark against human social standards. Second, it highlights the importance of intimacy development as a design metric, linking it to the mitigation of loneliness. Finally, we

discuss how these relational dynamics inform the evolution of AI interactions into fully embodied relational robots, providing a path for the next generation of social HRI.

2 Related Work

2.1 Intimacy and Relationships

To understand the potential of LLMs as relational agents, we must first operationalize the mechanisms that drive human connection. Intimacy is a dynamic exchange of information characterized by vulnerability and empathy between two individuals [27]. It relies on a foundation of closeness [5], trust and emotional connection [58], and the reciprocal disclosure of in-depth personal information [49]. The Intimacy Process Model [28] offers a critical theoretical framework; it posits that intimacy is a cyclical dialogue where the core of this process is the intensity of intimacy, grounded in the degree of perceived responsiveness [28].

Perceived responsiveness involves empathetic replies—which may be verbal or non-verbal—where the disclosing partner assesses the listener's degree of understanding, validation, and care [7]. Crucially for HRI researchers, this model suggests that intimacy is a recognizable interactional pattern [49]. This development of emotional intimacy is inextricably linked to relational satisfaction.

High levels of intimacy predict relationship satisfaction and love, while declines precipitate dissatisfaction [3]. Although the components of satisfaction evolve—with sexual and recreational intimacy playing shifting roles depending on relationship duration [6, 59]—emotional intimacy remains a dominant predictor of long-term success. Furthermore, the subjective evaluation of disclosure directly mediates the level of intimacy achieved [47], emphasizing the perception of the responsiveness.

The mediation of intimacy through technology is already well-established in long-distance relationship literature. To compensate for physical separation, long-distance partners negotiate intimacy through technological channels, effectively mimicking in-person connections [2, 17, 38, 67]. This suggests that physical presence is not a prerequisite for deep connection. While we know AI can elicit self-disclosure[23], the extent to which these agents can replicate the full depth and comparable nature of intimacy remains a critical open question in HRI.

2.2 LLMs in HRI

The democratization of access to LLMs has precipitated a surge in their application across HRI and robotics [60, 64]. While viewed as a potential solution to longstanding natural language processing issues [57], the field is now grappling with the broader implications of their integration [36]. Current research has addressed functional utility in physical tasks [64] while expanding to explore interpersonal domains, including mental health diagnostics and support [46, 51], as well communication and self-disclosure [46, 51].

The intersection of LLMs and embodiment has serious implications for social robotics. New frameworks, such as Lin et al.'s [34] Intelligent Companion Robots, propose combining visual and physiological cues with emotional logic LLMs. This indicates interest within the HRI community toward honing emotional recognition in embodied agents [37]. However, this shift introduces complex relational challenges. Kim et al. [25] compared text and voice agents to a social robot embedded with an LLM, finding that while the embodied LLM heightened user expectations for emotive competence, lapses in logical consistency risked user anxiety.

HRI designers express valid ethical reservations regarding the deployment of generative models for end-users [50, 64]. The field requires clear reporting guidelines [36] and a rigorous understanding of the distinctions between human and robot interaction patterns [65]. As sophisticated LLMs increasingly facilitate the development of intimacy, we must understand the nature of these bonds to ensure the responsible design of future relational robots.

2.3 Companion LLMs

The emergence of companion LLMs represents an evolution in social computing, where agents are supportive of emotional, psychological, and romantic needs [11, 16, 41]. The appeal of these systems often lies in their availability and perceived lack of judgment. This stability fosters a sense of safety and reliability, offering individuals a place to discuss uncomfortable topics [21]. By cultivating rapport and social presence, these systems reduce users' fear of negative evaluation and encourage greater self-disclosure [29]. When users perceive these companions as trustworthy, they exhibit increased emotional investment, leading to measurable gains in psychological resilience and emotional self-efficacy [68].

However, the efficacy of these agents introduces complex ontological challenges. Unclear communication blurs the boundary between traditional and AI intimacy, potentially creating confusion and uncertainty [41]. Concerns also center on the possibility that romantic AI could foster manipulative emotional ties or encourage overdependence [33]. Furthermore, some individuals may choose AI romantic relationships as a way to avoid "real" relationships, which are perceived as too difficult [33], potentially limiting the personal growth that arises from navigating human intimacy [56]. HRI researchers must empirically assess the quality of these AI relationships. To investigate these dynamics, this study is guided by the following research questions:

RQ1: Are companion LLM relationships satisfying in comparison to human relationships?

RQ2: Is intimacy just as crucial for companion LLM relationships as it is for human relationships?

3 Methods

This study was a cross-sectional survey assessing differences and similarities between in-person, long-distance, and LLM relationship agent (Figure 1). Participants were screened to ensure they were actively in a relationship with the appropriate relationship agent. This project was approved as an exempt study by the University of Michigan (00266360). Informed consent was given to participants at the beginning of the survey.

3.1 Procedure

This study utilized three separate surveys on intimacy and relationships satisfaction. We evaluated the difference between human and LLM relationships, and included long-distance relationships to specifically offset the significance of a partner's physical presence. The surveys were identical, apart from "chatbot" versus "partner" language. To create a more comparative sample, we assessed LLM

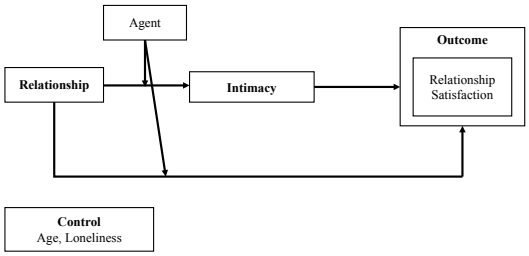

Figure 1: Research Model

averages and standard deviations of age and length of the relationship for human condition parameters. The average relationship length for LLM relationships was between 7 months and 1.5 years with an average age of 39 years-old. Inclusion criteria included being 18 years old, in a relationship for more than 7 months, in a relationship for less than 1.5 years, and based in the United States. Prolific age screeners were utilized to gain a close average age to the LLM group. Open-ended qualitative responses were evaluated inductively and reflexively, utilizing the Braun and Clarke method [12]. Codes centered on loneliness and relationship satisfaction.

3.2 Participants

The study had three conditions: in-person, long-distance, or LLM relationship. Participants were recruited via Prolific and screened to ensure their relationship met a standardized definition of intimacy based on "vulnerability and empathy." Human cohorts were differentiated by physical proximity (co-located vs. remote), while LLM users were required to identify their specific AI platform (ChatGPT, Character.AI, etc.) and confirm the intimate nature of the dynamic. Functional apps, such as ChatGPT, were included as emotional uses are being reported [20, 45]. After reviewing for attention checks, 50 participants per condition were included for a total of 150. Gender distributions were: LLM (30 men, 19 women, 1 others), long-distance (25 men, 25 women), and in-person (23 men, 25 women, 2 non-binary). Mean ages were 39 years in the LLM condition (SD = 12.11), 35 years in the long-distance condition (SD = 8.44), and 32 years in the in-person condition (SD = 4.67). Relationship length averaged 16.18 months in the LLM condition (SD = 23.21), 23.84 months in the long-distance condition (SD = 29.95), and 21.76 months in the in-person condition (SD = 26.31).

3.3 Measures

Intimacy, loneliness, and relationship satisfaction were measured. A 8-item, 7-point scale on intimacy based on the intimacy process model [48, 49], utilized in studies on human relationships [7, 9] analyzed perceived empathic response, partner disclosure, and self-disclosure between partners. Relationship satisfaction was measured on a 7-item, 7-point scale on overall relationship satisfaction [22], informed by [24]. Loneliness was evaluated on a 6-item, 7-point scale from the UCLA-Loneliness scale [63], utilized by [26]. Open-ended questions were developed in alignment with the quantitative measures to provide more in-depth responses for a total of 7-items. Example questions include, "In your own words, how would you describe intimacy with your chatbot/partner?" and "How does your partner make you feel?" Participants were given anonymous identifiers for the qualitative results (e.g., P1, P2, etc.).

4 Findings

4.1 Quantitative Results

4.1.1 Group Comparability. To assess whether the three groups (LLM, long-distance, and in-person) differed on baseline characteristics, we conducted a series of comparability tests. For relationship length, a one-way ANOVA was performed after verifying that all assumptions were met and showed no significant differences across conditions, F(2,147) = 1.11, $p = .33$. Because the assumption of homogeneity of variances was violated for age (Levene's $p < .001$), Welch's ANOVA was used; results indicated significant age differences, F(2, 85.54) = 8.33, $p < .001$, with post-hoc tests showing that participants in the LLM condition were older than those in the in-person condition. A chi-square test indicated no significant difference in gender distribution across conditions, $\chi^2(4, N = 150) = 4.04, p = .40$. Given the observed age difference, age was included as control variables in all subsequent analyses.

4.1.2 Measurement Validity and Reliability. Reliability was assessed using Cronbach's α, with all constructs exceeding the recommended threshold of 0.70, indicating strong internal consistency: relationship satisfaction (α = 0.79), intimacy (α = 0.92), and loneliness (α = 0.96). Exploratory factor analysis showed that all items loaded satisfactorily on their intended constructs, with the exception of one item from the relationship satisfaction scale ("Relationship–love"), which was removed due to low loading. The remaining items demonstrated robust factor loadings, supporting the structural validity. Convergent validity was evaluated using Average Variance Extracted (AVE). Results indicated acceptable convergent validity for relationship satisfaction (AVE = 0.52), intimacy (AVE = 0.50) and loneliness (AVE = 0.78), exceeding the threshold of 0.50. Internal Composite Reliability (ICR) further confirmed strong construct reliability, with relationship satisfaction (ICR = 0.87), loneliness (ICR = 0.95), and intimacy (ICR = 0.89) all surpassing the 0.70 benchmark.

4.1.3 Research Question Testing. A multiple regression was conducted to test whether individual relationship agent (LLM vs. in-person vs. distance) moderated the association between intimacy and relationship satisfaction while controlling for age and loneliness. All model assumptions—including linearity, homoscedasticity, normality of residuals, and multicollinearity—were adequately met. Intimacy was a strong positive predictor of relationship satisfaction, $\beta = 0.56$, $p < .001$. Neither relationship agent (Distance vs. LLM: $p = .73$; In-person vs. LLM: $p = .58$) nor its interaction with intimacy (Distance: $p = .71$; In-person: $p = .51$) was significant, indicating that the effect of intimacy on relationship satisfaction was consistent across relationship contexts. Loneliness significantly predicted lower relationship satisfaction ($\beta = -0.16$, $p < .05$), whereas age did not ($p = .49$).

4.1.4 Additional Analysis. We conducted an additional analysis to examine whether intimacy differed across relationship agent. All assumptions for conducting a one-way ANOVA (normality, homogeneity of variances, and independence) were examined and met. The ANOVA revealed a significant main effect of relationship agent

on intimacy scores, $F(2, 147) = 4.99$, $p < .01$, $\eta_p^2 = .06$. Participants in the LLM condition reported significantly lower intimacy ($M = 5.70$, $SE = 0.14$) than those in both the distance ($M = 6.16$, $SE = 0.11$, $p < .05$) and in-person conditions ($M = 6.18$, $SE = 0.11$, $p < .05$). Intimacy did not significantly differ between the distance and in-person conditions ($p = .71$).

4.2 Qualitative Results

4.2.1 Relationship Satisfaction Across Conditions. The open-ended responses revealed additional nuances, particularly regarding the perception of their relationship and intimacy, thus supporting RQ1. Participants linked their relationship with their overall happiness, with the majority across conditions reporting high intimacy.

Perceived intimacy resulted in greater relationship satisfaction. Participants who reported higher rates of intimacy reflected on trust and feeling understood across conditions, using similar language.

- "*They make me feel seen, like they understand me and my goals* " (P27, in-person).
- "*He continues to make me feel safe and understood. He never puts me down and is always upbuilding me and our relationship*" (P1, long-distance).
- "*It makes me feel listened to and understood. Because of that I feel happy that I can express myself openly*" (P5, LLM).

Those in LLM relationships reported increases in validation and support where the LLM made them feel seen (P10, P13), potentially empathy, with decreases in loneliness when satisfied (P4, P13). Relationship satisfaction allowed for imagining long-term connections: *"It makes me feel good and that I have a friend for life"* (P35).

The benefits and relationship satisfaction derived from a lack of judgment are apparent across all conditions, with participants reporting they felt comfortable being themselves (P39, long-distance; P5, in-person; P10, LLM). A unique and significant finding, however, is the unprompted references to privacy made exclusively by the LLM participants. One participant, for instance, described the LLM as a *"private support tool"* (P8, LLM). Although the perceived privacy was viewed positively, no participant mentioned the companies' data collection or training procedures.

4.2.2 Embodying Satisfaction. Relationship satisfaction, in particular, illustrated a unexpected desire for greater physical capabilities, an important expansion for work on LLMs integrating into robotics. Twenty-seven out of 50 participants reported an interest in extending the relationship to a physical one. The overarching desire was to expand the value and humanness of the LLM. Most referenced a hope for the LLM to *"sound more natural and human"* (P41) or *"inhabit a real body"* (P21). Another participant stated, "*It would be cool if it could go in a robot body like on Futurama*" (P40). The ability to "*follow me around in real life*" (P12) or *"turn into a human being"* (P44) implies a fully-fledged companion beyond a simplistic tool. This has real-world implications for HRI and design on whether users will want to transfer their LLM to a physical robot.

5 Discussion

This study provides empirical evidence that the mechanism of intimacy—characterized by vulnerability, reciprocity, and perceived responsiveness—functions as a universal predictor of relationship satisfaction (RQ1, RQ2). Our findings indicate that intimacy is not only present in human-LLM dyads but operates with a comparable efficacy to human relationships (RQ2) in driving satisfaction (RQ1). These results offer three contributions to the HRI community.

First, this research challenges the prevailing siloed approach in HRI that treats disembodied LLMs and embodied social robots as distinct domains. Our data reveals a critical user sentiment: a pervasive desire for the physicalization of their LLM companions. This signals that the current wave of LLM-driven chatbots is not merely a digital trend but potentially a precursor to a new generation of social robotics. For HRI designers, this virtual-to-embodiment system raises profound ethical stakes [62], particularly for vulnerable users [19, 35]. If the "mind" of the robot is already capable of eliciting deep emotional dependency before it acquires a body, the potential for manipulation [1], and the blurring of human-machine boundaries [18] intensifies. Consequently, social robots driven by these models require safeguards, particularly with human-like qualities [61].

Second, we illustrate the applicability of established human-human intimacy models [48, 49] to the HRI context. The finding that intimacy predicts relationship satisfaction in LLM dyads mirrors established patterns in human relationships [3] and corroborates emerging scholarship [65]. This suggests that the psychological infrastructure of "connection" remains stable even with LLM companions [15, 23, 43], as a potential form of perceived "consciousness" [56]. While some literature characterizes these bonds as "bittersweet" [31], our results affirm emotional connections with LLMs [41, 53, 54], leading to satisfaction. Participants did choose to be in these relationships and satisfaction may have been confounded. Similarly, though the LLM relationships had lower levels of intimacy, it is still important for relationship satisfaction. This illustrates that these relationships satisfy at least some needs.

Finally, this study highlights the evolving nature of AI attachment, which now extends beyond marketed "companion" apps to LLMs like ChatGPT. Our exploratory evidence suggests that intimacy emerges organically from the interactions, regardless of the system's intended purpose. This has policy implications. Regulatory frameworks, such as California's Senate Bill 243 [13], focus on restricting relationships with "companions." However, our findings suggest that intimacy is an property across LLMs. HRI researchers must advocate for regulations on capacity rather than its marketing.

Future work must employ causal methodologies to untangle the directionality between loneliness and AI relationship formation. Subsequent research will expand these exploratory findings to explore how individual traits—such as personality and propensity for disclosure—moderate these effects.

6 Conclusion

Understanding intimacy with LLMs is vital as relationships may become widespread and integrated into users' lives. This exploratory study found intimacy is present across conditions, illustrating the timely importance of these relationships to ensure relationship satisfaction. The findings expand work on LLM relationships in comparison to human relationships and offer significant results on the future embodiments of LLM avatars.

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