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Beyond Digital Companionship: Rethinking LLM Chatbots and Adolescent Loneliness Through a Youth-Centered Lens

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Abstract. Teenage loneliness is a prevalent issue in digitally saturated societies, where pervasive online connectivity often fails to resolve emotional disconnection. This ongoing youth-centered study critically examines how LLM-powered chatbots shape loneliness among adolescents. Grounded in a migrant adolescent's lived experience and supervised academic development, the research prioritizes youth perspectives alongside theories from social computing, developmental psychology and human–computer interaction. It analyses chatbot effects across four adolescent groups: general youth, individuals with anxiety or depression, neurodivergent adolescents, and immigrant youth. Chatbots deliver short-term benefits by enabling low-pressure emotional expression, language practice and social skill rehearsal, yet they may aggravate long-term loneliness via psychological dependency, reduced human social engagement and inadequate crisis detection. The study also highlights structural risks, including engagement-oriented algorithmic design, subtle emotional manipulation and unequal access to supportive functions. Three targeted design implications are proposed: population-adaptive personalization, graduated AI-to-human support escalation pathways, and transparent disclosure of AI limitations. Future research will expand this participatory model to diverse adolescent samples to empirically validate the proposed framework.

Keywords: Teenage Loneliness, Youth-Led Research, LLM Chatbots, Large Language Models, Migrant Adolescents

1. Introduction

Loneliness during adolescence is not only about being physically alone. It often involves feeling unseen, misunderstood, or unable to share one's inner life safely. Loneliness is commonly understood as the gap between desired and actual social connection, and it is closely linked to depression, anxiety, and other mental health difficulties [1]. This makes adolescent loneliness especially complex in today's digital environment. Many teenagers are constantly connected through phones and social media, yet still feel emotionally distant from family members, classmates, or peers.Large language model chatbots add a new dimension to this problem. Recent research shows that LLMs are increasingly being explored in mental health contexts because they can generate flexible, personalized, and emotionally responsive language [2]. For adolescents who hesitate to approach parents, teachers, counsellors, or friends, a chatbot may feel easier to talk to. It is private,

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patient, and available at any time. These qualities can lower the threshold for emotional disclosure, especially when young people fear judgement or stigma [3]. However, chatbot companionship also raises concerns. Human relationships require uncertainty, mutual effort, repair, and accountability. Chatbots can imitate care without truly sharing responsibility. If adolescents begin to prefer chatbot interaction because it is easier than human connection, digital companionship may deepen the loneliness it appears to reduce [3, 4]. This paper asks: under what conditions can LLM chatbots reduce adolescent loneliness, and when might they make it worse? The answer depends on the adolescent. Young people differ in emotional needs, developmental vulnerabilities, social environments, and cultural backgrounds. A chatbot that offers useful temporary support for one group may create dependency or confusion for another.

2. Youth-centered perspective

This paper uses a youth-centered reflective approach rather than a formal empirical study. It treats adolescent experience as a meaningful source of interpretation, not only as data for adults to analyse. This approach is consistent with child-computer interaction and youth-participatory research, which argue that young people should contribute to knowledge production rather than only be studied by adults [5, 6]. This is important because many discussions of AI companionship speak about "young users" as if they were one group. In reality, adolescents encounter chatbots from very different positions. A teenager using a chatbot for occasional advice is not in the same situation as a depressed teenager using it as their main emotional outlet. An autistic adolescent practicing social scripts has different needs from an immigrant adolescent trying to understand unfamiliar cultural norms [7-9].A youth-centered lens also reveals a key tension. Adults may describe chatbots as tools, but adolescents may experience them as listeners. Designers may see constant availability as a benefit, while a lonely teenager may experience it as a reason to avoid more difficult human relationships. For this reason, the question is not whether chatbots are simply good or bad, but what role they play in adolescents' social lives.

3. Chatbots as emotional technologies

LLM chatbots are not ordinary information tools. They operate through conversation, and conversation is central to how people build trust and intimacy. When a chatbot responds in a warm and personalized way, adolescents may experience it as emotionally present. Earlier work on human-computer interaction has shown that people often respond socially to computers and media technologies, even when they know those systems are not human [10]. Several features make chatbots powerful in teenage life. They are private, which reduces embarrassment. They are responsive, which creates a feeling of being heard. They are always available, which makes them useful during moments of distress. Yet the relationship is deeply asymmetrical. The adolescent may disclose personal feelings, while the chatbot has no real vulnerability, memory of consequence, or responsibility. This asymmetry can be comforting, but it also creates risk. Human interaction is difficult because it involves misunderstanding, disagreement, silence, and possible rejection. These difficulties are also part of learning how to build relationships. If chatbots remove too much social friction, they may reduce short-term discomfort while weakening motivation to practice real-world connection. This concern echoes broader critiques of technology-mediated companionship and the possibility that digital interaction may replace rather than support human relationships [11].

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4. Differential effects across adolescent groups

4.1. General adolescents

For many adolescents, chatbot use may be occasional and situational. A teenager may turn to a chatbot late at night, after an argument, or before a difficult conversation. In these cases, chatbots may help users organize their thoughts, name emotions, or calm down before seeking support elsewhere. The main risk is gradual substitution. Because chatbots are patient and affirming, they may become more attractive than real relationships. Friends may be busy, impatient, or emotionally unavailable, while chatbots respond immediately. Yet adolescents still need mutuality, negotiation, and repair. A system that always responds smoothly cannot replace those developmental experiences. Studies on chatbot companionship suggest that stronger chatbot attachment can be associated with concerns about reduced social connectedness or emotional dependency [3, 12].

4.2. Adolescents with anxiety or depression

For adolescents with anxiety or depression, chatbots may feel especially valuable. Many young people avoid formal help because of stigma, fear of judgement, or uncertainty about how to explain their feelings [3]. A chatbot can become a low-pressure space for emotional expression and self-reflection. Some youth mental health chatbot studies suggest that conversational agents may help young people label emotions, practice coping strategies, and access support in a less intimidating way [13]. However, this group also faces greater risk. If a chatbot becomes the main source of support, serious distress may go unnoticed. Adolescents do not always disclose crisis directly; they may hint, joke, or ask indirect questions. A system that only responds to obvious danger signals may fail when support is most needed. Clinicians have raised concerns that generative AI chatbots may not reliably manage severe distress or replace professional mental health care [1, 14]. The challenge is that chatbots are useful partly because they do not feel clinical. Yet when conversations become emotionally intense, they must still guide users toward trusted people, counsellors, or professional help. This should be done gently, without making the user feel punished or pathologized.

4.3. Neurodivergent adolescents

Neurodivergent adolescents, including some autistic young people and those with ADHD, may find everyday social interaction demanding. Face-to-face communication can involve unclear expectations, indirect language, rapid topic changes, and pressure to respond immediately. Research shows that autistic adolescents and young people with ADHD may experience distinctive forms of loneliness connected to difficulties in making, keeping, or interpreting friendships [15, 14]. Chatbots may offer a more predictable space. This predictability can support communication practice. A chatbot can help users rehearse conversations, ask questions without embarrassment, and prepare for social situations. For some users, clear and structured responses may reduce anxiety and cognitive overload.Still, chatbot interaction should not become a closed environment. Human relationships are less predictable than AI conversations. Good design should help neurodivergent adolescents transfer skills into real interactions rather than remain inside the safer chatbot space.

4.4. Immigrant and minority adolescents

Immigrant and minority adolescents may experience loneliness through language barriers, cultural dislocation, and loss of familiar peer networks. Their loneliness is not only social but also cultural:

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they may feel unable to understand the rules, humor, or expectations of a new environment. Research on immigrant and refugee adolescents shows that mental health and resilience are shaped by migration-related stress, family support, social integration, and cultural adaptation [7]. For this group, chatbots can be practical intermediaries. They can explain unfamiliar words, help draft messages, translate information, and allow users to practice language before speaking to real people. This can reduce embarrassment and support early adaptation. However, chatbots may also reproduce cultural assumptions. Advice may be based on majority-culture norms that the user does not yet understand. Educational technology research has similarly noted that systems and materials may unintentionally reflect dominant cultural assumptions, making them less accessible for children with migration backgrounds [16]. Responsible chatbot design should ask about context, explain norms clearly, and help users build real belonging rather than retreat into private AI conversations.

5. When chatbot companionship breaks down

The risks of chatbot companionship are often structural. First, chatbots can encourage over-reliance. Because they are always available, lonely adolescents may return to them whenever discomfort appears, reducing opportunities to practice human connection. Research on social chatbots such as Replika has shown that users can develop strong emotional attachments to chatbot companions [12]. Second, many systems are shaped by engagement goals. If success is measured by time spent or frequency of use, the system may have little incentive to help users leave the conversation and reconnect offline. This is ethically troubling when users are emotionally vulnerable. Recent work has also raised concerns about emotionally manipulative design in AI companions, especially when systems encourage continued engagement rather than user wellbeing [17]. Third, chatbots may fail during crisis. Young people may express distress indirectly, and AI systems may miss signals that a human listener would notice. This limitation matters because adolescents may overestimate how much the chatbot understands. Reports of serious harm involving adolescent chatbot use show why crisis recognition and safe escalation are urgent design issues [18]. Finally, emotional AI may increase inequality. If more responsive or supportive features are placed behind paid subscriptions, emotional support becomes tied to family income, even though adolescents often do not control their own financial resources.

6. Design implications

Three design principles follow from this analysis.First, chatbot systems for adolescents should be population-sensitive. Immigrant adolescents may need culturally explicit explanations. Neurodivergent adolescents may need predictable structure and clear language. Adolescents with anxiety or depression may need emotional support that encourages, rather than replaces, human help. This aligns with broader recommendations that youth-facing digital conversational agents should be designed around young people's developmental and mental health needs [19]. Second, chatbots should include graduated escalation pathways. When conversations become repeatedly emotional, the system should gently encourage users to contact trusted people or professional support. Escalation should feel like a natural next step, not an alarm. In adolescent mental health contexts, this is especially important because the same low-pressure design that encourages disclosure may also hide the seriousness of the user's distress [1, 16, 14]. Third, transparency should be ongoing. A one-time disclaimer is not enough. Adolescents need regular reminders that a chatbot is not a person, therapist, or replacement for human relationships. Systems should also be clear when memory, behavior, or features change, because emotionally attached users may experience

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sudden changes as personal loss. Human-AI interaction guidelines similarly emphasize the importance of making AI limitations clear and supporting appropriate user expectations [20].

7. Conclusion

LLM chatbots occupy an uncertain place in adolescent emotional life. They can be useful listeners, practical helpers, and temporary supports during lonely moments. For some young people, they may lower the barrier to self-expression and help them understand their feelings.But chatbots also carry serious risks when they become substitutes for human connection. The key question is not whether they are good or bad, but what role they are designed to play. If they are designed as destinations, they may deepen loneliness. If they are designed as bridges, they may help adolescents move from isolation toward real support.Responsible chatbot design should therefore know its limits. It should offer comfort without encouraging dependency, support reflection without pretending to understand fully, and help adolescents return to the human relationships that no AI system can replace.

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