

Compulsive Internet Use, Social Interaction Anxiety, and Loneliness Among Nigerian University Students: Survey Findings and Design Implications

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IH '26: Proceedings of the 2026 ACM Interactive Health Conference

Article No.: 9, Pages 1 - 7

<https://doi.org/10.1145/3786579.38049>

Jesugbemi Adedeji*

Obafemi Awolowo University, adedejijesugbemi@gmail.com

Internet-enabled technologies have reshaped how young adults communicate, learn, and maintain social relationships. While these platforms provide opportunities for connection, increasing concern surrounds patterns of compulsive internet use characterized by excessive engagement, diminished self-regulation, and interference with daily functioning. Such patterns are associated not only with social interaction anxiety but also with loneliness. Both social interaction anxiety and loneliness are significant public health concerns among young adults, linked to poorer psychological wellbeing, reduced academic and social functioning, and long-term mental health risks.

This study examines the relationships among compulsive internet use, social interaction anxiety, and loneliness using a cross-sectional survey of university students. Findings indicate a significant positive association between compulsive internet use and social interaction anxiety, with loneliness partially mediating this relationship. These results suggest a reinforcing behavioural loop in which individuals turn to digital environments to cope with feelings of isolation or anxiety, yet patterns of overuse may further displace opportunities for restorative offline interaction.

Drawing on human–computer interaction perspectives, the paper argues for a shift from user-dependent self-regulation strategies toward embedded, in-app design interventions that support healthier engagement. Proposed approaches include natural stopping cues to replace infinite scrolling, reflective usage summaries, and context-sensitive nudges that encourage intentional rather than habitual use. By positioning digital platforms as active sites for prevention and behavioural support, this work contributes to interactive health research that reframes technology design as a means of mitigating loneliness and social anxiety rather than exacerbating them.

CCS CONCEPTS • Human-centered computing • Human-computer interaction • Empirical studies in HCI

Additional Keywords and Phrases: compulsive internet use, social interaction anxiety, digital wellbeing, persuasive design

1 INTRODUCTION

Digital connectivity is now a central part of everyday social life. For many young adults, work, leisure, social interaction, and identity expression are done through networked platforms, making online engagement a crucial condition of modern living. Globally, billions of individuals participate in digital environments with young people representing the most consistently connected demographic. This integration of online connectivity has reshaped how relationships are formed, maintained, and expressed across contexts (Quiñones-García & Korak-Kakabadse, 2014).

In societies like Nigeria where digital development is rapid, internet access has expanded and changed the way Nigerians participate economically, express themselves and build social interactions (Imoka, 2023). Young Nigerians not only rely on the internet for communication and entertainment but also for education, employment pathways, and creative engagement (Olorundare et al., 2022). As digital participation becomes inseparable from everyday functioning, it is crucial for researchers and designers of interactive systems to understand its psychosocial and mental health consequences.

Emerging research suggests that patterns of digital engagement may also produce unintended outcomes. One such pattern is compulsive internet use (CIU), characterized by a persistent and uncontrollable urge to use the internet, often leading to negative emotional, cognitive, and social consequences (Meerkerk, van den Eijnden, Vermulst, & Garretsen, 2008). Rather than viewing CIU as an individual pathology, an HCI perspective considers how these interactions with the internet shape these behaviours.

This paper considers how digital engagement intersects with experiences of loneliness and face-to-face interactions, which are both mental health concerns. If digital environments are the primary places of social and economic participation, they may reduce the opportunities that young adults need to rehearse offline relational skills (Caplan, 2007; Dong et al., 2024; Hernández et al., 2024). This young adulthood stage is a developmental period strongly associated with identity formation and social belonging (Pham & Wong, 2025; Khalaf et al., 2023; Cai et al., 2023; Firth et al., 2019).

Despite growing global interest in digital wellbeing, research examining these dynamics with African contexts remains limited. Most studies focus on Western settings, leaving open questions about how the African context shapes user experience with digital environments and how they affect health.

To address this gap, the present study investigates relationships among compulsive internet use, loneliness, and social interaction anxiety among Nigerian university students. By examining how digital engagement relates to psychosocial wellbeing and mental health, this work contributes to ongoing conversations in Human–Computer Interaction about designing technologies that support, rather than undermine, meaningful social connection, and ultimately better mental health.

2 RELATED WORK

2.1 Compulsive Patterns of Internet Engagement

Compulsive Internet Use (CIU) refers to a pattern of excessive and uncontrollable internet use that disrupts daily functioning and responsibilities (Van den Eijnden et al., 2008). Theoretical models show that such behaviour is not driven by the internet itself, but by the psychological rewards enabled by specific activities such as social networking, entertainment, or information seeking (Katz et al., 1974; Brand et al., 2019).

Frameworks such as the Interaction of Person–Affect–Cognition–Execution (I-PACE) model conceptualize compulsive use as emerging from dynamic interactions among predisposing variables, affective and cognitive responses, executive functioning, and reinforcing platform affordances (Brand et al. 2016; Brand et al. 2019). Similarly, the Uses and Gratifications perspective shows that individuals actively turn to the internet to satisfy needs for belonging, identity formation, and mood management (Katz et al. 1974). The more effective the internet is at satisfying these needs, the more likely individuals are to use it compulsively, especially if alternative coping strategies or social outlets are lacking. These perspectives focus on understanding how design features like immediacy, availability, and socially reinforcing feedback can sustain repeated engagement and thereby influence compulsive use.

2.2 Loneliness

Loneliness, defined as the distressing feeling that arises when one's social relationships are perceived to be inadequate (Perlman & Peplau, 1981), is a common and universal psychological experience. It is recognized as a pressing public health issue because of its strong associations with physical, mental, and social health outcomes (Cacioppo et al., 2002; Gerst-Emerson & Jayawardhana, 2015).

Numerous studies consistently show a robust, positive relationship between loneliness and social anxiety–type symptoms, including social interaction anxiety (Bonetti et al., 2010; Lim et al., 2016; Maes et al., 2019; Oren-Yagoda et al., 2022; Reinwart et al., 2024).

In some cases, loneliness has been identified as a predictor of compulsive internet use (Caplan, 2006; Ceyhan & Ceyhan, 2008; Bulut Serin, 2011; Skues et al. 2016), which may mean individuals who compulsively use the internet may initially do so to cope with loneliness or social discomfort, but excessive online engagement can inadvertently reduce meaningful offline interactions, reinforcing feelings of isolation. In other studies, excessive and compulsive internet use is shown to contribute to increased loneliness over time, particularly as it replaces meaningful offline social interactions (Hu, 2009; Sharabi & Margalit, 2011; Costa et al., 2019; Alheneidi, et al., 2021).

2.3 Intersections Among Compulsive Use, Social Interaction Anxiety, and Loneliness

In existing literature, loneliness is also frequently identified as a mediating factor in the relationship between compulsive internet use and social interaction anxiety (Caplan, 2007; Dong et al., 2024; Hernández et al., 2024). For instance, Caplan (2007) found that individuals who reported high social anxiety were more likely to use the internet excessively to regulate their mood and avoid discomfort in social situations. However, this avoidance contributed to loneliness, which further reinforced their internet dependence, creating a cycle of social withdrawal.

In a more recent study, Dong et al. (2024) examined teenagers and found that loneliness and maladaptive coping styles jointly mediated the relationship between social anxiety and internet addiction. Their study revealed that individuals high in social anxiety were more likely to feel lonely, and in turn, were more prone to excessive internet use.

Similarly, Hernández et al. (2024) conducted a daily-life assessment and concluded that loneliness predicted higher internet addiction, which subsequently increased symptoms of social anxiety. Their study emphasized a 'cycle of solitude and avoidance', where people use the internet to escape loneliness, but in doing so, reduce their real-life social competence, intensifying social interaction anxiety over time.

3 METHODOLOGY

A quantitative cross-sectional survey was conducted to examine the relationship among compulsive internet use, loneliness, and social interaction anxiety in a university population. Participants were 250 young adults (aged 18–30)

enrolled at Obafemi Awolowo University, Ile-Ife, Nigeria. This population represents a highly connected demographic with routine access to smartphones, social media platforms, and internet-enabled academic resources.

A convenience sampling strategy was used. Participants were recruited through in-person invitations in lecture halls and shared campus spaces, as well as through student online communication channels. Participation was voluntary and uncompensated. Participants were asked to consider 'internet use' as any online activity accessed via smartphone, computer, or tablet, including social media (e.g., Instagram, TikTok, WhatsApp), web browsing, streaming, gaming, and messaging.

Compulsive internet use was assessed using the 14-item Compulsive Internet Use Scale (CIUS) (Meerkerk et al. 2009). The CIUS evaluates loss of control, preoccupation, mood regulation, and conflict related to online engagement. Items were rated on a 5-point scale from 0 ("Never") to 4 ("Very often"). Internal consistency in this study was high (Cronbach's $\alpha = .88$).

Social interaction anxiety was measured using the 6-item Social Interaction Anxiety Scale (SIAS-6) (Fergus et al. 2012). Items assess anxiety experienced during everyday interpersonal exchanges (e.g., initiating conversations). Responses were recorded on a 5-point Likert scale ranging from 0 ("Not at all") to 4 ("Extremely"). Higher scores indicate greater social interaction anxiety. In the present sample, internal consistency was good (Cronbach's $\alpha = .84$).

Loneliness was measured using the 8-item UCLA Loneliness Scale (Hays and DiMatteo, 1987). This short-form instrument captures perceived social isolation and dissatisfaction with social relationships. Responses were recorded on a 4-point scale from 1 ("Never") to 4 ("Often"). Internal consistency in this sample was acceptable (Cronbach's $\alpha = .83$).

Participants reported age, gender, academic level, and general frequency of internet use to contextualize behavioural patterns. Data were collected via a self-administered online questionnaire. After receiving study information, participants provided informed consent before accessing the survey. The questionnaire required approximately 10–12 minutes to complete. The study emphasized anonymity and allowed participants to discontinue at any time without penalty.

Data were analyzed using SPSS (Version 26). Descriptive statistics summarized participant characteristics and scale distributions. Pearson correlation analyses examined associations among compulsive internet use, loneliness, and social interaction anxiety.

To test whether loneliness mediated the relationship between compulsive internet use and social interaction anxiety, a mediation analysis using PROCESS Macro Model 4 (Hayes 2022) was conducted. Indirect effects were estimated using bias-corrected bootstrapping with 5,000 resamples. Mediation was considered significant when the 95% confidence interval excluded zero. Statistical tests were evaluated at $\alpha = .05$ (two-tailed).

4 RESULTS

Using the recommended SIAS-6 cutoff score of 9, 19.6% of participants ($n = 49$) met the threshold for clinically meaningful social interaction anxiety, while 80.4% ($n = 201$) scored below the threshold. This indicates that approximately one in five students in the sampled population experiences elevated anxiety during everyday interpersonal interactions, highlighting a substantial subgroup potentially vulnerable to digitally mediated coping strategies.

Pearson correlation analysis revealed a significant positive association between compulsive internet use and social interaction anxiety ($r = .35$, $p < .05$). Participants who reported greater difficulty regulating online engagement also reported higher discomfort in face-to-face social interaction. This pattern aligns with displacement theories of internet use, which posits that time spent on social media replaces time spent in face-to-face interaction, particularly with close friends and family, thus reducing well-being (Jeffery & Dong, 2022).

To examine whether loneliness explained this association, we conducted a mediation analysis using PROCESS Model 4 with 5,000 bootstrap samples. Compulsive internet use significantly predicted social interaction anxiety ($B = .166$, $p < .001$). When loneliness was included, the direct effect decreased but remained significant ($B = .090$, $p < .01$), indicating partial mediation. The indirect pathway through loneliness was significant ($B = .076$, 95% CI [.044, .114]), suggesting that individuals who engage compulsively online may experience increased loneliness, which in turn relates to heightened social interaction anxiety. This pattern supports a feedback interpretation in which compulsive internet use, perceived isolation, and interaction anxiety reinforce one another. Importantly, the partial (rather than full) mediation indicates that loneliness is one—but not the only—mechanism linking compulsive internet use and social interaction anxiety. Other potential pathways might include sleep disruption, reduced face-to-face interactions, or algorithmic exposure to anxiety-inducing content. The bidirectional nature of these relationships also warrants attention: socially anxious students may turn to the internet to cope with loneliness, inadvertently reinforcing both isolation and compulsive use patterns.

A moderation analysis using PROCESS macro (Model 2, 5,000 bootstraps; Hayes, 2022) examined whether gender and age moderated the relationship between compulsive internet use and social interaction anxiety. The overall model was significant, $F(5, 244) = 9.49$, $p < .001$, and explained 16.3% of the variance in social interaction anxiety ($R^2 = .163$). These findings suggest that the observed relationship between compulsive internet use and social interaction anxiety operates similarly across demographic subgroups within this sample. Neither gender nor age significantly moderated the compulsive internet use–social interaction anxiety relationship, suggesting that the observed association operates similarly across demographic subgroups within this sample. The lack of moderation in our sample may reflect the increasingly ubiquitous nature of smartphone access among Nigerian university students, or cultural factors that equalize internet use across genders in this age cohort.

5 DISCUSSION AND CONCLUSION

5.1 Design Implications for Reducing Compulsive Internet Use

This study identified a significant relationship between compulsive internet use, social interaction anxiety ($r = .35$, $p < .05$) with loneliness as a mediator ($B = .076$, 95% CI [.044, .114]). While this study did not attempt to explain why these behaviours occur, the results help identify where design may exacerbate or mitigate loneliness and social interaction anxiety. Given these identified relationships, further design interventions and considerations are outlined and discussed.

The present findings suggest that compulsive internet use is not merely an individual self-regulation challenge but occurs within interaction ecosystems intentionally designed to sustain engagement. For example, social media applications like Instagram. As such, interventions that rely on users downloading third-party applications may be insufficient, as compulsive patterns are characterised by reduced reflective control and high responsiveness to in-platform cues (Ravya et al, 2023).

Our mediation analysis revealed that loneliness partially explained the relationship between compulsive internet use and social interaction anxiety, accounting for approximately 46% of the total effect $[(0.076/0.166) \times 100]$. This suggests that interventions must address not only usage patterns but also the underlying experience of social isolation that may drive compulsive engagement. Design implications therefore fall into two categories: (1) features that interrupt compulsive use patterns, and (2) features that redirect users toward connection-building activities that may reduce loneliness.

From a behavioural design perspective, the Fogg Behavior Model posits that behaviour is shaped by the alignment of motivation, ability, and prompts (Fogg, 2009). Digital platforms optimise all three to encourage repeated engagement, making tools for disengagement that exist outside these environments structurally disadvantaged. Embedding compulsive use interventions within the same digital platform may therefore be more effective than expecting users to self-impose external constraints.

Similarly, Persuasive Systems Design (PSD) conceptualises interactive technologies as inherently behaviour-shaping systems (Oinas-Kukkonen & Harjumaa 2009). While PSD principles are widely used to increase adherence and engagement, they may also be redirected toward supporting digital wellbeing through features such as self-monitoring, natural stopping cues that signal content completion. For the 19.6% of students in our sample who met clinical thresholds for social interaction anxiety, such features may be particularly critical, as this subgroup may be most vulnerable to using digital platforms as avoidance mechanisms. This counteracts the boundary-less consumption patterns enabled by infinite scrolling.

These proposed design features are based on the empirical features:

Loneliness-Aware Nudges

Since loneliness mediated the Compulsive Internet Use-Social Interaction Anxiety relationship, rather than the generic “you have been scrolling for X minutes” notifications, platforms could implement context-sensitive prompts that address perceived isolation. For example: “You’ve been browsing for 30 minutes. Would reaching out to [close contact] help you feel more connected?” or “Consider switching from scrolling to messaging a friend directly.” This directly addresses loneliness and steers users from passive consumption (which may exacerbate isolation) toward active social connection.

Reflective Checkpoints with Usage Visualisation

Interfaces can incorporate reflective checkpoints that visualise accumulated time or interaction patterns, enabling users to transition from automatic to intentional engagement. Such features align with PSD dialogue-support strategies by providing context-sensitive feedback. For example, after 45 minutes of use, display a simple visualization: “You’ve scrolled through 200 posts today. How are you feeling? [Energized / Neutral / Drained]” followed by “Would you like to continue or take a break?”

Productive Friction to Interrupt Habitual Patterns

With compulsive internet use, users may be trapped in habitual cycles. Rather than maintaining entirely frictionless interaction, systems may introduce soft barriers e.g., pause screens, optional delays that interrupt habitual scrolling cycles without fully restricting autonomy. Prior HCI work has described such mechanisms as ‘productive friction’ that supports self-regulation (Sheahan et al., 2024). For example, after scrolling through 50 posts continuously, introduce a 3-second pause screen: “You’ve been scrolling quickly. Take a breath. Ready to continue?” This brief interruption may help users recognize automatic behavior.

Platforms designed around attention retention also bear responsibility for mitigating foreseeable harms associated with compulsive use. Integrating wellbeing-oriented persuasive features reflects a shift from engagement maximisation to balanced interaction design, consistent with ethical approaches in human–computer interaction.

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A APPENDICES

Compulsive Internet Use Scale (CIUS-14)

Instructions: Tick one response to indicate how often each statement applies to you when using the internet.

Table 1: Compulsive Internet Use Scale (CIUS-14)

Item	Never	Seldom	Sometimes	Often	Very Often
Do you find it difficult to stop using the Internet when you are online?					
Do you continue to use the Internet despite your intention to stop?					
Do others (e.g., partner, parents) say you should use the internet less?					
Do you prefer to use the Internet instead of spending time with others(e.g., partner, children, parents)?					
Are you short of sleep because of the Internet?					
Do you think about the Internet, even when not online?					
Do you look forward to your next Internet session?					
Do you think you should use the Internet less often?					
Have you unsuccessfully tried to spend less time on the Internet?					
Do you rush through your homework in order to go on the Internet?					

Item	Never	Seldom	Sometimes	Often	Very Often
Do you neglect your daily obligations (at school or at home) because you prefer to go on the Internet?					
Do you go on the Internet when you are feeling down?					
Do you use the Internet to escape from your sorrows or get relief from negative feelings?					
Do you feel restless, frustrated, or irritated when you cannot use the Internet?					

Social Interaction Anxiety Scale (SIAS-6)

Instructions: Please indicate how characteristic each statement is of you.

Item	Not at all	A little	Somewhat	Very	Extremely
I have difficulty making eye contact with others					
I find it difficult mixing comfortably with the people I work with					
I tense up if I meet an acquaintance on the street					
I feel tense if I am alone with just one person					
I have difficulty talking with other people					
I find it difficult to disagree with another's point of view					

UCLA Loneliness Scale (ULS-8)

Instructions: Please indicate how often you feel the following.

Item	Never	Rarely	Sometimes	Often
I lack companionship				
There is no one I can turn to.				
I am an outgoing person				

I feel left out				
I feel isolated from others				
I can find companionship when I want it				
I am unhappy being so withdrawn				
People are around me but not with me				