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Predicting Problematic Internet Use Based on Loneliness and Alexithymia in Students

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Abstract

Introduction: Problematic internet use (PIU) is a complex and increasingly prevalent phenomenon in contemporary societies, posing a significant challenge, particularly for adolescents and young adults, and predominantly female upper secondary school students in Shiraz, Iran. Consequently, the primary objective of the present study was to predict PIU based on loneliness and alexithymia in female high school students.

Methods: In this descriptive-correlational study, the target population consisted of all female high school students in Shiraz during the 2023–2024 academic year. For this study, a sample of 259 students was recruited using convenience sampling. Data were collected using the Problematic Internet Use Questionnaire, the UCLA Loneliness Scale, and the Toronto Alexithymia Scale-20. Statistical analysis was performed using the Pearson correlation coefficient and simultaneous multiple regression.

Results: The results indicated significant positive relationships between loneliness and PIU ($r=0.47$, $P<0.001$) and between alexithymia and PIU ($r=0.58$, $P<0.001$). Simultaneous multiple regression showed that loneliness and alexithymia together explained 39.8% of the variance in PIU ($R^2=0.398$, adjusted $R^2=0.394$, $F=84.83$, $P<0.001$), with alexithymia ($\beta=0.48$, $P<0.001$) as the stronger predictor than loneliness ($\beta=0.28$, $P<0.001$).

Conclusion: The findings demonstrate that both loneliness and alexithymia are significant positive predictors of problematic internet use in female upper secondary students in Shiraz, Iran. Consequently, these results strongly suggest that interventions targeting the reduction of loneliness and the enhancement of emotional identification and expression skills are crucial for effectively addressing PIU within this population.

Keywords: Internet addiction disorder, Loneliness, Alexithymia, Students

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Introduction

In the digital era, the widespread availability of digital technologies and easy access to the internet have profoundly reshaped lifestyles and social interactions, especially among adolescents (1). Social networking sites, online games, and digital platforms have become central to daily routines. Although these technologies offer numerous benefits, excessive engagement can lead to psychological dependence. Individuals may experience anxiety, restlessness, and emotional emptiness when offline (2).

Problematic internet use (PIU) represents a growing concern in contemporary societies and poses particular challenges for adolescents and young adults. Cyberspace provides easy access, extensive communication opportunities, diverse entertainment, and perceived social support. For many users, it gradually replaces face-to-face interactions and real-world relationships (3). Adolescents, in particular, may turn to the online environment to escape emotional or psychological difficulties, using it as a compensatory mechanism for unmet emotional needs (4). Research consistently shows that adolescents are more vulnerable to PIU than other age groups, mainly because of the developmental characteristics of this life stage (5). Beyond its impact on academic performance and interpersonal relationships, PIU can seriously impair mental and emotional well-being (6).

Two psychological factors repeatedly linked to PIU are loneliness and alexithymia (7). Loneliness is a distressing subjective experience

of social isolation and emotional detachment (8). It often arises when interpersonal relationships are perceived as inadequate or when desired intimacy remains unfulfilled (9). Adolescents tend to report higher levels of loneliness than other age groups, placing them at elevated risk (10). Empirical studies, including those by Matiz et al. (11), have documented a robust association between loneliness and PIU in this population.

Alexithymia, in contrast, refers to a marked difficulty in identifying, describing, and expressing emotions as well as in distinguishing emotional feelings from bodily sensations of emotional arousal (12, 13). Individuals with high alexithymia typically exhibit externally oriented thinking and limited imaginative capacity (14, 15). This trait is associated with maladaptive emotion-regulation strategies, such as avoidance or suppression (16, 17). Consequently, affected individuals may turn to the online environment to circumvent complex internal emotional experiences. Growing evidence indicates that alexithymia is a significant predictor of PIU among students (18, 19).

The present study holds both theoretical and practical significance. Examining the roles of loneliness and alexithymia in PIU contributes to a deeper understanding of the psychological mechanisms underlying this phenomenon. Adolescence is a critical period for social and emotional development. Identifying predisposing factors is therefore essential for designing effective prevention and intervention programs. Moreover, some evidence suggests that female adolescents may be particularly susceptible to loneliness and emotion-regulation difficulties, making gender-specific research especially valuable.

Given the cultural context of Iran, where social restrictions may limit opportunities for open interaction among adolescent girls, the online environment can become an attractive alternative space for connection—yet paradoxically increase the risk of problematic use. Understanding these dynamics is crucial for educators, mental health professionals, and policymakers. Accordingly, the present study tested the following hypotheses: A) Loneliness is significantly and positively associated with problematic internet use among female high school students. B) Alexithymia is significantly and positively associated with problematic internet use among female high school students. C) Loneliness and alexithymia together significantly predict problematic internet use in this population. By addressing these hypotheses, the study aims to provide evidence-based insights to inform targeted psychological and educational interventions in the Iranian context.

Methods and Materials

Study Design and Participants

A descriptive-correlational design was utilized for this study. The target population consisted of all female high school students in Shiraz, Iran, during the 2023–2024 academic year. The required sample size was determined a priori using G*Power 3.1 software. Assuming $\alpha=0.05$, power=0.90, and a medium effect size ($f^2=0.15$) for multiple regression with two predictors, a minimum of 103 participants was indicated. To increase statistical power and account for potential incomplete questionnaires, 280 students were initially approached. Convenience sampling was employed. Five female public high schools were selected, and five classes from each school were subsequently included. Data were collected from female students enrolled in the second cycle of high school (grades 10–12). Of the 280 distributed questionnaires, 259 were complete and valid for analysis (92.5% response rate). Incomplete questionnaires or those with evident response patterns were excluded.

Eligibility criteria required participants to be female, enrolled in the second cycle of high school, and willing to participate. Because all participants were under 18 years of age, written informed consent was obtained from both the students (assent) and their parents or legal guardians. Institutional permissions were secured from the Education Department of Shiraz, and the study protocol received ethical approval from the Ethics Committee of Islamic Azad University (code: IR.IAU.A.REC.1403.149). Anonymity and confidentiality were strictly maintained, and results are reported only in aggregate form.

Measures

The Problematic Internet Use Scale: Problematic internet use was assessed using the 17-item Generalized Problematic Internet Use Scale-2 (GPIUS-2) (20) adapted to Persian by Seyedi Nasab and Bahrami (21). The Persian version has demonstrated good psychometric properties (Cronbach's $\alpha=0.87$ in the validation study and 0.85 in the current sample). Items

are rated on a 5-point Likert scale (1=Never, 5=Always). Total scores range from 17 to 85. Higher scores indicate greater problematic internet use; scores ≥ 61 are typically interpreted as indicating high risk.

The UCLA Loneliness Scale (ULS): Loneliness was measured with the 20-item UCLA Loneliness Scale (Version 3) (22). The Persian adaptation has shown satisfactory reliability and validity (23). Responses are given on a 4-point scale (1=Never, 4=Always). Total scores range from 20 to 80. Higher scores reflect greater loneliness; scores > 44 are generally considered indicative of moderate-to-high loneliness. Internal consistency in the present sample was excellent (Cronbach's α=0.84).

The Toronto Alexithymia Scale (TAS-20): Alexithymia was evaluated using the 20-item Toronto Alexithymia Scale (TAS-20) (24). The Persian version, validated by Besharat et al. (25), yielded good reliability (Cronbach's α=0.81 in the current study). The scale comprises three subscales: Difficulty Identifying Feelings (DIF), Difficulty Describing Feelings (DDF), and Externally Oriented Thinking (EOT). Items are scored on a 5-point Likert scale (1=Strongly disagree, 5=Strongly agree), with five items reverse-scored. Total scores range from 20 to 100. Scores ≤51 indicate low alexithymia, 52–60 borderline, and ≥61 high alexithymia.

Data Analysis

Data were analyzed using IBM SPSS version 26. Descriptive statistics (means, standard deviations, skewness, and kurtosis) were computed. Pearson's correlation coefficient was used to examine bivariate relationships. Simultaneous multiple regression analysis was performed to determine the predictive roles of loneliness and alexithymia on problematic internet use. The assumptions of normality, linearity, homoscedasticity, and absence of multicollinearity were verified and met.

Results

An analysis of the demographic data provided the following distribution across grade levels: 87 students were in the tenth grade (33.6%), 129 in the eleventh grade (49.8%), and 43 in the twelfth grade (16.6%). Regarding academic specialization, participants were distributed as follows: 120 were enrolled in experimental sciences (46.3%), 71 in mathematics (27.4%), and 68 in humanities (26.3%). Table 1 presents the descriptive statistics for the key study variables: PIU, loneliness, and alexithymia, including means, standard deviations, skewness, and kurtosis. Average scores indicated a moderate level of PIU (M=50.54, SD=9.60) within the student sample. Mean loneliness scores (M=49.98, SD=9.69) were comparable, demonstrating similar central tendency and variability to PIU. Alexithymia scores averaged slightly higher (M=59.43, SD=10.89) and showed somewhat greater dispersion. Assessment of skewness and kurtosis revealed values for all three variables that fell within acceptable limits (typically between -1 and +1), suggesting the distributions approximated normality and supporting the use of parametric statistical analyses.

Pearson correlation coefficients are shown in Table 2. Loneliness was significantly and positively correlated with problematic internet use (r=0.47, P<0.001). Alexithymia also showed a significant positive correlation with problematic internet use (r=0.58, P<0.001).

A simultaneous multiple regression analysis was conducted to examine the predictive effects of loneliness and alexithymia on problematic internet use. The overall model was significant (F=84.83, P<0.001) and explained 39.8% of the variance in problematic internet use (R^2=0.398, adjusted R^2=0.394). Alexithymia emerged as the stronger predictor (β=0.48, t=9.62, P<0.001), followed by loneliness (β=0.28, t=5.62, P<0.001) (Table 3).

Table 1: Descriptive statistics of the research variables: means, standard deviations, skewness, and kurtosis

Variables	Means	SD
Problematic internet use (PIU)	50.54	9.60
Loneliness	49.98	9.69
Alexithymia	59.43	10.89

Table 2: Pearson correlation coefficients among the research variables

Variables	Problematic internet use (PIU)	P
Loneliness	0.47	0.001
Alexithymia	0.58	0.001

Table 3: Simultaneous multiple regression analysis predicting problematic internet use (PIU)

Predictor(s)	B	SE	β	t	P
Alexithymia	0.42	0.04	0.48	9.62	0.001
Loneliness	0.28	0.05	0.28	5.62	0.001

Model summary: R=0.631, R^2=0.398, adjusted R^2=0.394, F=84.83, P<0.001

Discussion

The present study examined the predictive roles of loneliness and alexithymia in PIU among female high school students in Shiraz, Iran. As anticipated, higher levels of loneliness and alexithymia were significantly and positively associated with increased PIU. The simultaneous multiple regression analysis showed that these two variables together accounted for approximately 40% of the variance in PIU, with alexithymia demonstrating a more substantial predictive effect than loneliness.

The observed association between loneliness and PIU is consistent with earlier investigations (11, 26, 27). This finding supports the compensatory internet use theory, which posits that adolescents experiencing social and emotional isolation turn to the online environment for readily accessible connection and validation. In the Iranian context, where cultural and social norms often restrict adolescent girls' opportunities for unrestricted face-to-face interaction, the internet may represent one of the few socially acceptable spaces for relational engagement. The current study is novel in demonstrating that this compensatory mechanism operates robustly even under conditions of structural limitation on offline interaction, distinguishing it from many Western samples where such restrictions are less pronounced.

The more substantial contribution of alexithymia aligns with previous reports (18, 28) and underscores the importance of emotion-processing deficits in the development of behavioral addictions. Adolescents with pronounced difficulty identifying and describing feelings appear particularly likely to use cyberspace as an avoidance-based coping strategy, obtaining transient relief from external stimuli without the demand for internal emotional work. By focusing exclusively on female students within a sociocultural milieu that traditionally discourages open emotional expression among girls, the present research highlights a potentially underexplored pathway from alexithymia to PIU.

From a clinical perspective, these results carry direct implications for prevention and intervention. Rather than generic awareness campaigns, schools could implement structured, evidence-based programs that explicitly target the identified risk factors. Examples include (a) group-based emotion-regulation training adapted from Dialectical Behavior Therapy for Adolescents (DBT-A), which teaches skills in mindfulness, distress tolerance, and emotion labeling; (b) the Tuning in to Teens program modified for classroom delivery to enhance emotional awareness; and (c) peer-mentoring or cooperative learning initiatives designed to foster genuine belonging and reduce perceived loneliness. Such interventions would be feasible within the existing Iranian educational framework and could be evaluated through school-based pilot trials.

Despite its contributions, several limitations warrant consideration. The use of convenience sampling from public high schools in a single city markedly restricts the generalizability of findings to male students, private-school populations, rural areas, or other regions of Iran. The cross-sectional design prevents causal conclusions. Important confounding variables—socioeconomic status, parenting styles, actual daily duration of internet use, and comorbid psychological conditions—were not assessed. Finally, exclusive reliance on self-report measures introduces the possibility of shared method variance and response bias.

Future research should adopt longitudinal designs to clarify temporal and potentially bidirectional relationships among loneliness, alexithymia, and PIU. Experimental or quasi-experimental studies testing emotion-regulation and social-belonging interventions would establish causality. Incorporating objective measures of internet use (e.g., smartphone logging applications), parental reports, and socioeconomic indicators would yield more comprehensive models. Comparative studies examining gender differences and urban–rural variations within Iran, as well as cross-cultural investigations across Middle Eastern countries, would further illuminate the moderating role of sociocultural context.

Conclusion

In conclusion, both loneliness and alexithymia emerged as significant positive predictors of problematic internet use among female high school students in Shiraz, Iran, collectively explaining nearly 40% of the variance. These findings highlight the critical need to address emotional isolation and deficits in affective processing through targeted, school-based psychological interventions. Implementing structured programs that enhance emotion identification, expression, and regulation, alongside initiatives that foster meaningful offline relationships, offers a promising and culturally feasible approach to preventing and mitigating PIU in this population.

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Ethical Approval

This study received ethical approval under the code IR.IAU.A.REC.1403.149.

Conflict of Interest

There are no conflicts of interest.

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