

# The Mediating Role of Fear of Missing Out (FOMO) and Loneliness in the Relationship Between Internet Addiction and Rumination in Adolescents

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## ABSTRACT

This study aimed to investigate the mediating roles of fear of missing out (FOMO) and loneliness in the relationship between internet addiction and rumination among adolescents. A descriptive correlational design was employed with a sample of 388 adolescents from Tehran, selected based on Morgan and Krejcie's sampling table. Participants completed standard self-report instruments measuring internet addiction, FOMO, loneliness, and rumination. Descriptive statistics and Pearson correlation coefficients were analyzed using SPSS-27, while structural equation modeling (SEM) was conducted using AMOS-21 to test the mediating roles of FOMO and loneliness in the proposed model. The model fit was assessed using indices including Chi-square, RMSEA, CFI, TLI, GFI, and AGFI. Internet addiction was positively and significantly correlated with FOMO ( $r = .59, p < .001$ ), loneliness ( $r = .41, p < .001$ ), and rumination ( $r = .52, p < .001$ ). SEM results confirmed the direct effect of internet addiction on rumination ( $\beta = 0.23, p < .001$ ) as well as significant indirect effects through FOMO ( $\beta = 0.28, p < .001$ ) and loneliness ( $\beta = 0.20, p < .001$ ). The total effect of internet addiction on rumination was substantial ( $\beta = 0.71, p < .001$ ). The structural model demonstrated good fit indices ( $\chi^2/df = 2.06$ , CFI = 0.96, RMSEA = 0.053, GFI = 0.94, TLI = 0.95). The findings suggest that both FOMO and loneliness serve as significant mediators in the relationship between internet addiction and rumination in adolescents. These results highlight the need for targeted interventions addressing emotional vulnerabilities and digital behaviors to mitigate cognitive risks associated with excessive internet use.

**Keywords:** Internet addiction; Rumination; Fear of Missing Out (FOMO); Loneliness; Adolescents.

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## Introduction

The rise of digital technology and the pervasive presence of internet-connected devices have profoundly shaped the daily lives of adolescents. As they navigate social, academic, and emotional development, many teenagers become heavily immersed in online environments—often to the extent of developing maladaptive

behaviors such as internet addiction. Internet addiction, defined as the excessive or poorly controlled preoccupation with internet use that leads to impairment or distress, is increasingly recognized as a pressing psychological concern among adolescents worldwide (1). This overuse is not merely a behavioral issue but is also linked to various emotional and cognitive dysfunctions, including rumination—a repetitive and passive focus on negative thoughts—which can exacerbate or maintain mental health problems such as anxiety and depression (2).

Rumination is especially relevant in adolescence, a developmental stage marked by heightened emotional sensitivity and social comparison. Studies have shown that persistent rumination interferes with cognitive flexibility and adaptive coping, thereby making adolescents more vulnerable to internalizing symptoms (3). In the context of internet addiction, rumination may function as both a consequence and a perpetuating factor. Adolescents might use the internet as a means to escape their repetitive negative thoughts, but this escapism can paradoxically reinforce their dependency and aggravate underlying psychological distress (4).

One critical mechanism that may explain how internet addiction contributes to rumination is the phenomenon known as Fear of Missing Out (FOMO). FOMO refers to the pervasive apprehension that others might be having rewarding experiences from which one is absent, and it is strongly associated with compulsive checking behaviors on social media and other online platforms (5). In digitally saturated environments, adolescents are especially prone to FOMO due to their heightened need for social inclusion and validation (6). The constant exposure to idealized portrayals of others' lives online exacerbates feelings of inadequacy and fear of exclusion, which in turn intensifies rumination over one's own perceived deficiencies or social failures (7).

Numerous studies have established a strong association between FOMO and internet addiction. For instance, FOMO has been identified as both a predictor and a mediator of problematic internet behaviors, including compulsive social media use and online gaming (8, 9). Adolescents with high levels of FOMO tend to spend more time online to stay continuously connected, which not only increases their risk of internet addiction but also perpetuates a cycle of social comparison and cognitive distress (10). This cyclical pattern may create a fertile ground for rumination to thrive. Research suggests that FOMO is not a transient emotional state but a persistent cognitive concern that may function as a catalyst for negative self-referential thoughts, particularly among emotionally vulnerable adolescents (11).

In addition to FOMO, loneliness emerges as another significant mediator in the relationship between internet addiction and rumination. Loneliness, defined as the subjective experience of inadequate or unsatisfactory social relationships, is prevalent among adolescents and is closely linked to problematic internet use (12). The paradox of digital hyper-connectivity is that while adolescents may be surrounded by virtual peers, they often lack deep, meaningful offline relationships—leading to a heightened sense of emotional isolation (13). Several studies have highlighted that the more time adolescents spend online, the greater their levels of perceived loneliness and the more likely they are to ruminate on their social deficits or exclusion experiences (14).

Loneliness not only contributes to the initiation and maintenance of internet addiction but also plays a pivotal role in reinforcing maladaptive cognitive patterns like rumination. When adolescents feel disconnected from their social circles, they may increasingly turn to digital spaces as compensatory mechanisms—ironically worsening their social withdrawal in real life and enhancing their tendency to dwell

on distressing thoughts (15). This aligns with findings suggesting that loneliness serves as both a predictor and a psychological consequence of internet dependency and FOMO, creating a self-perpetuating triadic feedback loop (16).

The intersection of these psychological variables—FOMO, loneliness, and rumination—presents a complex web of interactions that warrant further investigation, particularly in adolescent populations. For example, Jin et al. (2023) found that FOMO mediated the relationship between trait mindfulness and problematic smartphone use, implying that adolescents who lack emotional regulation skills are more vulnerable to FOMO-driven behaviors and thoughts (3). Similarly, Manap et al. (2023) revealed that procrastination mediates the relationship between FOMO and internet addiction, further highlighting the interplay of behavioral and cognitive dysfunctions (17). These findings suggest that FOMO may serve as a bridge between addictive digital behaviors and maladaptive thought processes such as rumination.

Moreover, the role of cultural and environmental factors cannot be overlooked. In collectivistic societies where group belonging is emphasized, adolescents may be more susceptible to the adverse effects of social exclusion and online comparison, exacerbating both FOMO and loneliness (18). Studies conducted in Indonesia and Southeast Asia emphasize how socio-cultural norms around digital participation can influence the psychological outcomes of internet use in adolescents (19, 20). These culturally grounded studies provide valuable insights into how internal psychological processes, such as rumination, are influenced by external socio-digital environments.

While much of the existing literature examines FOMO and internet addiction separately, recent integrative studies propose a more interconnected perspective. For example, Harorlı and Harorlı (2024) conducted a survey among dental students and found a direct correlation between FOMO and internet addiction, which was significantly mediated by perceived loneliness (21). Similarly, ÇİFÇİ and Kumcağız (2023) showed that loneliness and social comparison serve as mediators in the relationship between FOMO and subjective well-being, further highlighting the interconnectedness of these constructs (10).

Taken together, the reviewed studies underscore the need to empirically test a mediational model in which FOMO and loneliness serve as pathways through which internet addiction contributes to rumination in adolescents. Such a model not only advances theoretical understanding but also provides practical implications for intervention. Early detection of FOMO and loneliness may help identify adolescents at risk of developing persistent rumination and subsequent psychological disorders (22).

The objectives of the present study are therefore twofold: (1) to examine the direct relationship between internet addiction and rumination among adolescents in Tehran, and (2) to investigate whether this relationship is mediated by fear of missing out and loneliness.

## Methods and Materials

### *Study Design and Participants*

This study employed a descriptive correlational design to examine the mediating role of fear of missing out (FOMO) and loneliness in the relationship between internet addiction and rumination among adolescents. The statistical population consisted of high school students in Tehran, Iran. Based on Krejcie and Morgan's (1970) sample size determination table, a sample of 395 participants was selected using a stratified random sampling method to ensure representation across gender and educational districts.

Inclusion criteria included being between the ages of 14 and 18, currently enrolled in high school, and providing informed consent. Exclusion criteria were the presence of any diagnosed psychiatric condition reported by the participant or the school counselor.

### *Data Collection*

To measure rumination, the Ruminative Responses Scale (RRS) developed by Nolen-Hoeksema and Morrow (1991) was used. This scale is one of the most widely utilized tools for assessing the tendency to engage in repetitive and passive focus on symptoms of distress and their possible causes and consequences. The RRS includes 22 items, scored on a 4-point Likert scale ranging from 1 (almost never) to 4 (almost always). The scale consists of three subscales: self-focused rumination, symptom-focused rumination, and contemplation of the causes and consequences of mood. Higher scores indicate greater rumination. The scale's validity and reliability have been confirmed in numerous studies, including research conducted on Iranian adolescents, demonstrating acceptable internal consistency (Cronbach's  $\alpha > 0.80$ ) and construct validity.

The Fear of Missing Out Scale developed by Przybylski et al. (2013) was used to assess the level of FOMO among adolescents. This scale includes 10 items rated on a 5-point Likert scale ranging from 1 (not at all true of me) to 5 (extremely true of me). It measures the degree to which individuals fear missing out on rewarding experiences that others might be having. The unidimensional structure of the scale has been supported across various populations. The scale has been translated and validated in Iranian samples, where it demonstrated good psychometric properties, including internal consistency coefficients above 0.80 and confirmed construct validity through factor analysis.

The UCLA Loneliness Scale (Version 3), developed by Russell, Peplau, and Ferguson (1980) and revised by Russell (1996), was employed to measure the subjective experience of loneliness. This scale comprises 20 items, each rated on a 4-point Likert scale from 1 (never) to 4 (often). It evaluates feelings of social isolation and dissatisfaction with social relationships. The total score reflects the overall level of perceived loneliness, with higher scores indicating greater loneliness. The UCLA Loneliness Scale has been validated in numerous cultural contexts, including Iran, where studies have confirmed its high internal consistency (Cronbach's  $\alpha > 0.85$ ) and robust factorial structure among adolescent populations.

Internet addiction was measured using the Internet Addiction Test (IAT) developed by Young (1998), a widely used standardized self-report instrument designed to assess the severity of internet dependency. The scale includes 20 items, rated on a 5-point Likert scale ranging from 1 (rarely) to 5 (always), with total scores ranging from 20 to 100. Higher scores indicate greater levels of problematic internet use. The IAT evaluates key dimensions such as compulsive use, withdrawal, tolerance, interpersonal and health problems, and time management issues. Previous studies have confirmed the scale's strong psychometric properties, including high internal consistency (Cronbach's  $\alpha > 0.85$ ) and construct validity across various populations. The Persian version of the IAT has been validated among Iranian adolescents, showing acceptable reliability and factor structure, making it suitable for use in the present study.

## Data analysis

Data analysis was conducted using SPSS version 27 and AMOS version 21. First, descriptive statistics (mean, standard deviation, frequency, percentage) were used to describe participant demographics. Pearson correlation coefficients were calculated to examine the bivariate relationships between internet addiction (independent variable), the mediators (FOMO and loneliness), and rumination (dependent variable). Additionally, structural equation modeling (SEM) was employed to assess the hypothesized mediation model. Model fit was evaluated using multiple indices including Chi-square ( $\chi^2$ ), Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), and Tucker-Lewis Index (TLI).

## Findings and Results

The sample consisted of 395 adolescents from Tehran. Among them, 208 participants (52.66%) were female and 187 participants (47.34%) were male. Regarding educational grade, 143 students (36.2%) were in the tenth grade, 129 (32.7%) in the eleventh, and 123 (31.1%) in the twelfth grade. The participants ranged in age from 14 to 18 years, with a mean age of 16.02 years ( $SD = 1.10$ ).

Table 1 presents the means and standard deviations for all key variables in the study, including Internet Addiction, Fear of Missing Out (FOMO), Loneliness, and Rumination.

**Table 1. Descriptive Statistics for Research Variables (N = 388)**

Variable	Mean (M)	Standard Deviation (SD)
Internet Addiction	57.84	10.31
Fear of Missing Out	32.47	6.92
Loneliness	41.76	9.12
Rumination	51.32	8.67

As shown in Table 1, participants reported moderate to high levels of internet addiction ( $M = 57.84$ ,  $SD = 10.31$ ) and rumination ( $M = 51.32$ ,  $SD = 8.67$ ). Fear of Missing Out ( $M = 32.47$ ,  $SD = 6.92$ ) and loneliness ( $M = 41.76$ ,  $SD = 9.12$ ) also demonstrated elevated average scores, indicating notable psychological vulnerability in the sample.

Before performing the main analyses, statistical assumptions were examined. Univariate normality was assessed through skewness and kurtosis values, which were within the acceptable range ( $\pm 2$ ). For instance, skewness for the rumination variable was 0.21 and kurtosis was  $-0.48$ , indicating approximate normality. Multicollinearity was evaluated through tolerance and Variance Inflation Factor (VIF) values, with all VIF scores below 1.91 and tolerance values above 0.52, suggesting no significant multicollinearity. Linearity and homoscedasticity were confirmed through residual plots. Additionally, the Mahalanobis distance was used to detect multivariate outliers; 7 outliers were identified and removed, resulting in a final sample of 388 participants used in SEM analysis.

Table 2 displays the Pearson correlation coefficients and associated p-values between the study variables.

**Table 2. Pearson Correlation Coefficients and Significance Levels Among Variables**

Variable	1	2	3	4
1. Internet Addiction	—			
2. Fear of Missing Out	.59** ( $p < .001$ )	—		
3. Loneliness	.41** ( $p < .001$ )	.45** ( $p < .001$ )	—	
4. Rumination	.52** ( $p < .001$ )	.48** ( $p < .001$ )	.44** ( $p < .001$ )	—

Table 2 reveals statistically significant positive correlations among all variables. Internet addiction was strongly associated with FOMO ( $r = .59, p < .001$ ) and moderately with loneliness ( $r = .41, p < .001$ ) and rumination ( $r = .52, p < .001$ ). FOMO also showed strong correlations with both rumination ( $r = .48, p < .001$ ) and loneliness ( $r = .45, p < .001$ ). These findings support the hypothesized associations among study constructs.

**Table 3. Fit Indices for the Structural Equation Model**

Fit Index	Value	Recommended Threshold
Chi-Square ( $\chi^2$ )	276.34	—
Degrees of Freedom (df)	134	—
$\chi^2/df$	2.06	< 3.00
GFI	0.94	> 0.90
AGFI	0.91	> 0.90
CFI	0.96	> 0.95
TLI	0.95	> 0.95
RMSEA	0.053	< 0.08

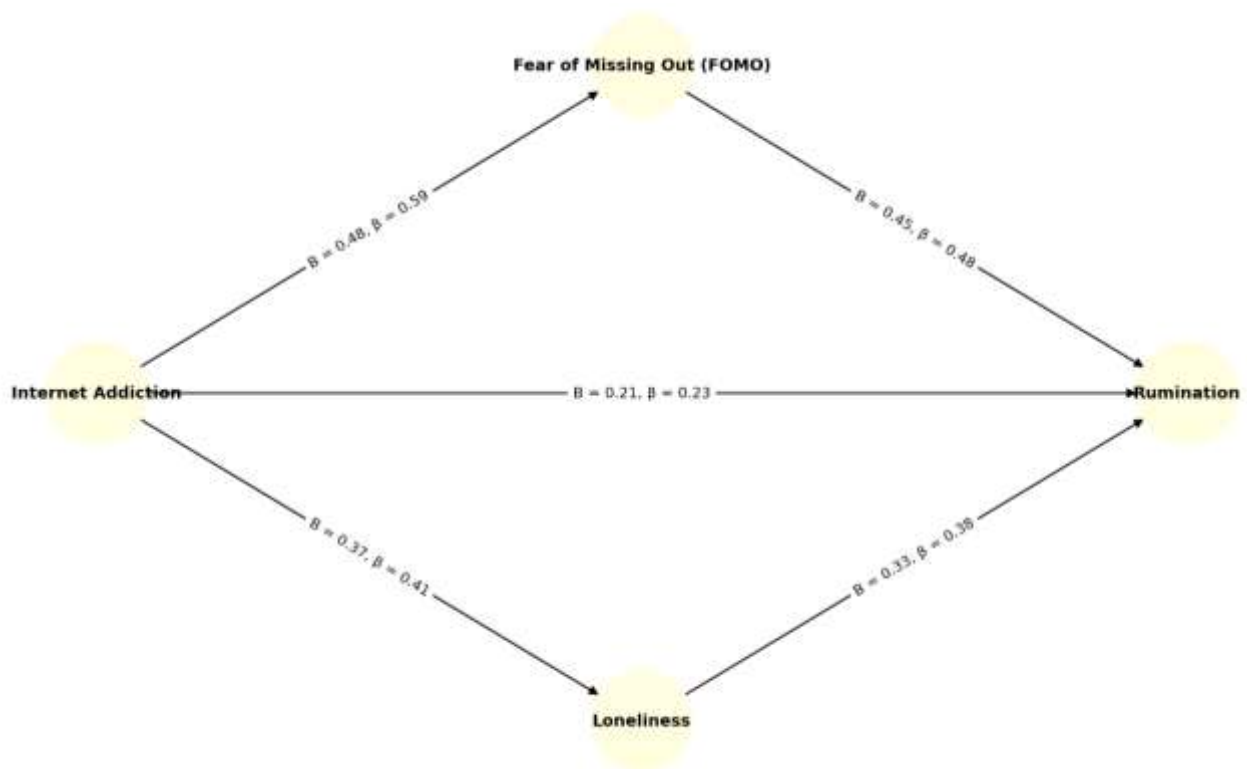
As seen in Table 3, the model demonstrates a good fit to the data. The chi-square to degrees of freedom ratio ( $\chi^2/df = 2.06$ ) is well below the acceptable threshold of 3. Fit indices such as GFI (0.94), AGFI (0.91), CFI (0.96), and TLI (0.95) all exceeded the minimum recommended values. The RMSEA value of 0.053 further supports model adequacy, indicating low approximation error.

Table 4 presents the standardized and unstandardized path coefficients for the direct, indirect, and total effects among the variables based on SEM results.

**Table 4. Direct, Indirect, and Total Effects Among Variables in the Structural Model**

Path	B	SE	$\beta$	p
Internet Addiction → FOMO	0.48	0.06	0.59	< .001
Internet Addiction → Loneliness	0.37	0.07	0.41	< .001
FOMO → Rumination	0.45	0.06	0.48	< .001
Loneliness → Rumination	0.33	0.07	0.38	< .001
Internet Addiction → Rumination (Direct)	0.21	0.06	0.23	< .001
Internet Addiction → Rumination (Indirect via FOMO)	0.22	0.05	0.28	< .001
Internet Addiction → Rumination (Indirect via Loneliness)	0.15	0.04	0.20	< .001
Internet Addiction → Rumination (Total)	0.58	0.07	0.71	< .001

The SEM analysis confirmed significant direct and indirect pathways. Internet addiction had a significant direct effect on rumination ( $B = 0.21, \beta = 0.23, p < .001$ ), as well as significant indirect effects via FOMO ( $B = 0.22, \beta = 0.28, p < .001$ ) and loneliness ( $B = 0.15, \beta = 0.20, p < .001$ ). The total effect of internet addiction on rumination ( $B = 0.58, \beta = 0.71$ ) was substantial and statistically significant, supporting the dual mediation model. Both FOMO and loneliness serve as crucial intermediaries in this relationship.



**Figure 1. Final Model of the Study**

## Discussion and Conclusion

The aim of this study was to explore the mediating roles of fear of missing out (FOMO) and loneliness in the relationship between internet addiction and rumination among adolescents in Tehran. The findings confirmed the study's hypotheses: first, there was a significant and positive relationship between internet addiction and rumination; second, FOMO and loneliness were both positively correlated with internet addiction and rumination; and finally, the structural equation modeling results revealed that FOMO and loneliness jointly mediated the relationship between internet addiction and rumination. These results provide important insights into the psychological mechanisms linking digital dependency with maladaptive cognitive processing in adolescents.

The direct relationship between internet addiction and rumination found in this study supports earlier findings that excessive internet use, particularly among adolescents, is associated with cognitive distortions, emotional dysregulation, and repetitive negative thinking patterns (1, 4). As adolescents increasingly rely on the internet for emotional support, distraction, and social validation, they may become more prone to overthinking and rumination when faced with challenges or social stressors. Rumination, in this sense, may not only be a consequence of internet addiction but also serve to reinforce it, creating a maladaptive feedback loop that hinders emotional recovery (2).

Importantly, the study's findings confirmed that FOMO plays a mediating role in the relationship between internet addiction and rumination. Adolescents who experience higher levels of FOMO tend to engage more

compulsively with online content to avoid feeling excluded from rewarding social experiences, thereby reinforcing addictive behaviors. At the same time, this constant engagement fosters dissatisfaction, self-comparison, and overthinking—central components of rumination. This aligns with previous research indicating that FOMO serves as both a consequence and antecedent of problematic internet use and mental health difficulties such as anxiety and depression (5, 18). In particular, the findings are consistent with Beige et al. (2023), who found that FOMO significantly predicted both internet addiction and cognitive disturbances such as excessive worry and rumination (7).

The mediating role of loneliness also emerged as significant in the model. Adolescents who feel socially disconnected or emotionally isolated may turn to the internet in search of social connection and validation. However, such digital engagement often lacks depth and intimacy, thereby reinforcing feelings of loneliness rather than alleviating them. The persistence of this emotional disconnection contributes to the development of rumination, as lonely individuals are more likely to dwell on their social deficits and internalize negative self-beliefs (12, 14). This result is in agreement with Türk and Koçyiğit (2025), who showed that loneliness significantly mediated the association between social media addiction and emotional dysregulation in adolescents, which in turn predicted ruminative thoughts (13).

The dual mediation pathway identified in this study—through both FOMO and loneliness—is particularly noteworthy. It suggests that the psychological toll of internet addiction is not merely a function of screen time but is rooted in deeper emotional and cognitive vulnerabilities. Adolescents experiencing FOMO and loneliness are more likely to ruminate on perceived inadequacies or social exclusion, which exacerbates their emotional distress and increases the likelihood of further problematic internet use. This finding supports the work of Jin et al. (2023), who found that FOMO and negative affect mediated the relationship between low mindfulness and smartphone overuse, which eventually led to internalizing symptoms such as rumination and anxiety (3). Similarly, the present study aligns with Manap et al. (2023), who demonstrated that procrastination and emotional neglect reinforced the pathway from FOMO to internet addiction and subsequent cognitive dysfunction (17).

In a broader perspective, this study also affirms the relevance of social comparison theory in the digital age. Adolescents who are constantly exposed to curated images and stories of their peers online are more likely to compare themselves unfavorably, leading to feelings of inadequacy, isolation, and emotional insecurity—all of which can fuel both FOMO and rumination (10). The compulsive need to monitor and keep up with peers creates a cognitive overload, which makes it difficult for adolescents to disengage from self-referential and repetitive thought patterns. The findings of this study reinforce Setyaningsih et al. (2023), who highlighted that vocational high school students with higher FOMO scores were also more vulnerable to internet addiction and psychological distress (8).

Additionally, the mediating effect of FOMO and loneliness provides a plausible explanation for the findings in previous meta-analytic and cross-cultural studies that reported inconsistent direct relationships between internet addiction and mental health outcomes. For example, the current results support the meta-analysis by Zhang et al. (2023), which found that the strength of association between mobile phone addiction and FOMO varied depending on mediating variables such as loneliness and emotional sensitivity (9). The dual mediation model presented here thus clarifies that the cognitive and emotional pathways linking

internet addiction to rumination may differ in intensity based on individual differences in social needs and digital coping strategies.

The study also contributes to the growing literature on the psychological risks of digitalization in youth, particularly in transitional periods such as adolescence. As highlighted by Šramová and Hamranová (2022), digital media use creates a paradoxical environment where adolescents are simultaneously hyper-connected and emotionally detached—a dynamic that fosters both dependency and cognitive fragmentation (15). Similarly, Varchetta et al. (2024) emphasized the cultural sensitivity of internet-related psychological outcomes, showing that emotional responses to online environments are moderated by cultural expectations and social roles, which may explain the variability of FOMO and loneliness effects across contexts (16).

In conclusion, the findings of the present study illustrate a clear pathway: adolescents with higher levels of internet addiction experience greater FOMO and loneliness, both of which, in turn, increase their levels of rumination. This sequential mediation supports an integrative framework that emphasizes the role of cognitive and emotional vulnerabilities in the development of psychological problems linked to digital overuse. Understanding this pathway can help in designing interventions that address not only screen time but also the underlying emotional and cognitive challenges faced by adolescents.

Despite its contributions, this study is not without limitations. First, the cross-sectional nature of the research design prevents causal inferences from being drawn. While the structural model suggests directional pathways, longitudinal studies are needed to confirm the temporal sequencing of variables. Second, all data were self-reported, which may introduce response biases such as social desirability or recall bias. Third, the sample was drawn exclusively from adolescents in Tehran, which limits the generalizability of the findings to other regions or cultural contexts. Additionally, variables such as family dynamics, academic pressure, or personality traits were not controlled for, though they may play a role in shaping the observed relationships.

Future studies should employ longitudinal or experimental designs to assess causal mechanisms and test the stability of the proposed model over time. Exploring age and gender differences in the mediation model may reveal more nuanced developmental patterns. It would also be valuable to examine additional mediators or moderators such as emotion regulation strategies, peer attachment, or digital literacy. Cross-cultural comparative studies could help determine the universality or cultural specificity of the observed patterns, particularly with respect to collectivist versus individualist value systems. Integrating qualitative methods may further enhance understanding of the lived experiences behind FOMO, loneliness, and rumination.

The findings suggest that intervention programs aimed at reducing adolescent internet addiction should incorporate components that directly address FOMO and loneliness. Digital wellness education should teach adolescents to critically evaluate online content and limit compulsive social media checking. Schools and mental health practitioners can implement mindfulness and emotional regulation training to counteract the effects of social comparison and cognitive overload. Encouraging offline peer interactions and building stronger real-world social support systems may help mitigate loneliness and its negative cognitive consequences. Ultimately, a multi-level approach that targets individual, familial, and digital environment factors is essential to fostering healthier digital habits and psychological well-being among adolescents.

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### Authors' Contributions

All authors equally contributed to this study.

### Declaration of Interest

The authors of this article declared no conflict of interest.

### Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants. Written consent was obtained from all participants in the study.

### Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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