

Original Article

Internet Addiction and Depressive Symptoms Among High School Students: A Cross-Sectional Study



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ABSTRACT

Background: Internet addiction has become an emerging public health concern among adolescents and has been associated with adverse mental health outcomes, including depressive symptoms. However, limited evidence is available regarding the association between internet addiction and depressive symptoms among Indonesian high school students. Therefore, this study examined the association between internet addiction and depressive symptoms among high school students.

Methods: This analytical cross-sectional study, reported according to the STROBE guidelines, was conducted among 81 Grade XI students at a State Senior High School 1, Kendal Regency, Indonesia, from June to August 2025. Internet addiction was assessed using the Internet Addiction Test (IAT) and depressive symptoms were assessed using the the Patient Health Questionnaire-9 (PHQ-9). Data were analyzed using Spearman's rank correlation test.

Results: Most participants were female (56.8%) and aged 17 years (58.0%). The mean IAT score was 47.52 ± 15.43 , while the mean PHQ-9 score was 8.96 ± 5.64 , indicating predominantly mild internet addiction and mild depressive symptoms. Internet addiction showed a moderate positive correlation with depressive symptoms ($r = 0.512$, $p < 0.001$).

Conclusion: Internet addiction was positively associated with depressive symptoms among adolescents. These findings provide preliminary evidence that may inform future school-based digital wellness and adolescent mental health initiatives

Keywords: Adolescent; Depression; Internet Addiction; Mental Health; Students.

Implications for Practice:

- The findings highlight the potential value of incorporating brief assessments of internet use and depressive symptoms into comprehensive adolescent health assessments to support early identification of

Implications for Practice:

- students who may benefit from further psychological evaluation.
- The findings may inform the development of school-based digital wellness and mental health promotion initiatives; however, their effectiveness and feasibility should be evaluated in future intervention and

Implications for Practice:

implementation studies before routine adoption.

- Future screening and prevention strategies should be culturally appropriate and feasible for implementation in resource-limited school settings, particularly in low- and middle-income countries.

Introduction

Internet addiction has emerged as a growing global public health concern among adolescents because of its increasing prevalence and adverse effects on mental health, academic performance, and psychosocial well-being ([Zhang et al., 2024](#)). Although the internet plays an essential role in education, communication, entertainment, and social interaction, excessive and uncontrolled use may develop into internet addiction, a behavioral condition characterized by impaired control over internet use that negatively affects academic functioning, interpersonal relationships, and psychological well-being ([Zhang et al., 2024](#); [Zhou et al., 2022](#)). Adolescence represents a critical developmental stage marked by substantial biological, psychological, and social changes that increase vulnerability to addictive behaviors and mental health problems ([Mastorci et al., 2024](#)).

The prevalence of internet addiction among adolescents continues to rise worldwide, ranging from 11.8% in several European countries to 20.6% in Canada, with considerably higher rates reported across Asian countries ([Zhang et al., 2024](#)). In Indonesia, internet use has increased substantially over the last decade because of widespread smartphone ownership and affordable internet access. Approximately 40% of Indonesian adolescents exhibit symptoms of internet addiction, and national reports identify Indonesian adolescents as among the most active internet users in Southeast Asia,

emphasizing the importance of understanding its impact on mental health ([Ma'ruf et al., 2024](#); [Tanjung & Lili Rohmawati, 2023](#)).

Internet addiction has been associated with behavioral, cognitive, and neurobiological alterations affecting executive function, emotional regulation, and impulse control, thereby increasing vulnerability to depressive symptoms, anxiety, and other psychological disorders ([Méndez et al., 2024](#)). Depressive symptoms are a major mental health concern among adolescents and are associated with poorer quality of life, reduced academic achievement, impaired interpersonal relationships, and an increased risk of suicide ([Li et al., 2025](#); [Liu & Kuai, 2025](#)). According to the Indonesia National Adolescent Mental Health Survey (I-NAMHS), approximately one in three Indonesian adolescent experiences mental health problems, yet only a small proportion receives professional mental health services, highlighting the importance of identifying modifiable risk factors such as excessive internet use ([Ma'ruf et al., 2024](#); [Wahdi et al., 2023](#)).

Previous longitudinal and cross-sectional studies consistently demonstrate a significant association between internet addiction and depressive symptoms. These conditions appear to reinforce one another throughout adolescence ([Zhang et al., 2024](#)). Adolescents experiencing depressive symptoms often use the internet as a coping strategy, whereas excessive internet use may further exacerbate depressive symptoms through social isolation, sleep disturbances, emotional dysregulation, and impaired academic functioning ([Zhang et al., 2024](#)). Nevertheless, the mechanisms underlying this relationship remain inconclusive. Previous studies have identified social connectedness, emotion regulation, sleep quality, family functioning, and social anxiety as potential mediating or

moderating factors ([Ma et al.](#), 2024; [Xu et al.](#), 2024).

Evidence from Indonesia remains limited, particularly among adolescents living in district and semi-urban settings. Most previous Indonesian studies have focused on social media addiction, online gaming, or urban populations, whereas evidence regarding general internet addiction among high school students in district areas is still scarce ([Arnani](#), 2021; [Rakhmawati et al.](#), 2021). Furthermore, findings from high-income countries cannot be directly generalized to Indonesian adolescents because differences in sociocultural values, parenting practices, educational systems, family supervision, digital literacy, and access to mental health services may influence both internet use behaviors and psychological outcomes ([Aziz et al.](#), 2024; [Chen et al.](#), 2025; [Purboningsih et al.](#), 2025). Therefore, additional evidence from Indonesian district populations is needed to support context-specific adolescent mental health interventions.

Roy's Adaptation Model provides a useful theoretical framework for understanding how adolescents respond to environmental challenges ([Roy et al.](#), 2009). According to this model, excessive internet exposure may function as a focal stimulus that requires adaptive coping responses. When coping mechanisms are insufficient, maladaptive responses, including problematic internet use, may occur. Previous studies have suggested that such maladaptive responses may be associated with adverse psychological outcomes, including depressive symptoms ([Du et al.](#), 2024; [Yi & Li](#), 2021). Although Roy's Adaptation Model offers a conceptual framework for interpreting these relationships, the present study did not directly measure the model's adaptation constructs, such as coping processes or adaptive responses.

This study may be associated with the growing evidence on adolescent mental health by providing data from an Indonesian district population, where evidence remains limited. The findings may provide preliminary evidence to inform school nurses, educators, and policymakers when developing future digital wellness and adolescent mental health initiatives.

Therefore, this study aimed to examine the association between internet addiction and depressive symptoms among Indonesian high school students. We hypothesized that higher levels of internet addiction would be significantly associated with greater depressive symptoms among adolescents.

Methods

Study Design

This analytical cross-sectional study was conducted among Grade XI students at State Senior High School 1, Kendal Regency, Indonesia. The study was reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines ([Von Elm et al.](#), 2007). A cross-sectional design was selected because it is appropriate for examining the association between internet addiction and depressive symptoms at a single point in time.

Participants

The target population consisted of all 102 eleventh-grade students enrolled at State Senior High School 1, Kendal Regency, Indonesia, during the 2025/2026 academic year. An analytical cross-sectional study using purposive sampling was conducted to recruit students who met the predefined eligibility criteria and to achieve the required sample size.

The inclusion criteria were: (1) active eleventh-grade students at State Senior High School 1, Kendal Regency; (2) aged 15–18 years; (3) having regular access to the

internet through smartphones or other digital devices; (4) willing to participate by providing written informed consent (and parental consent where required); and (5) being present during the scheduled data collection period. Students who were absent during the scheduled data collection period were excluded from the study.

Eligible participants were identified from the official school enrollment list. The minimum required sample size was calculated using the Slovin formula with a 5% margin of error ($e = 0.05$), yielding a minimum sample of 81 participants from a finite population of 102 students. The Slovin formula was used because the target population was finite and predefined. However, no a priori power analysis based on the expected effect size, statistical power, and significance level was performed. Therefore, the sample size should be interpreted as an estimate for a finite population rather than an optimal sample size for detecting correlations. To account for potential non-response, 85 students who met the predefined eligibility criteria were invited to participate using purposive sampling. During the scheduled data collection period, four invited students were absent and were therefore unable to participate. Consequently, questionnaires were completed by 81 students, all of whom were included in the final analysis. Purposive sampling was employed because only students who fulfilled all predefined eligibility criteria and were available during the data collection period were eligible for inclusion.

Instruments

The independent variable was internet addiction, whereas the dependent variable was depressive symptoms. Data were collected using self-administered paper-based questionnaires comprising the Indonesian versions of the Internet

Addiction Test (IAT) and the Patient Health Questionnaire-9 (PHQ-9).

The Internet Addiction Test (IAT), originally developed by [Young](#) (1998), was used to assess the severity of internet addiction. The questionnaire consists of 20 items covering four dimensions: excessive internet use, impaired self-control, social and interpersonal problems, and psychological dependence on internet use. Each item is rated on a 5-point Likert scale from 1 (never) to 5 (always), yielding a total score of 20 to 100. Internet addiction severity was categorized as follows: normal (20–30), mild (31–49), moderate (50–79), and severe (80–100). The Indonesian version of the IAT has been translated, culturally adapted, and psychometrically validated among Indonesian adolescents, demonstrating good internal consistency (Cronbach's $\alpha = 0.855$) ([Siste et al.](#), 2021). In the present study, the IAT demonstrated good internal consistency (Cronbach's $\alpha = 0.884$).

Depressive symptoms were assessed using the Indonesian version of the Patient Health Questionnaire-9 (PHQ-9), originally developed by [Kroenke et al.](#) (2001). The PHQ-9 consists of nine items assessing depressive symptoms experienced during the previous two weeks, including depressed mood, loss of interest, sleep disturbance, fatigue, appetite changes, feelings of worthlessness, concentration difficulties, psychomotor changes, and suicidal ideation. Each item is scored on a 4-point Likert scale from 0 (not at all) to 3 (nearly every day), yielding a total score of 0 to 27. Depressive symptoms severity was categorized as minimal (0–4), mild (5–9), moderate (10–14), moderately severe (15–19), and severe (20–27). The Indonesian version of the PHQ-9 has been translated, culturally adapted, and psychometrically validated for Indonesian populations, demonstrating good validity and reliability with a Cronbach's alpha coefficient of 0.873

([Dian et al.](#), 2022). In the present study, the PHQ-9 demonstrated good internal consistency (Cronbach's $\alpha = 0.861$).

Data Collection

Following ethical approval and institutional permission, data were collected from June to August 2025. Eligible students were identified using the official school enrollment list and recruited through classroom announcements coordinated by homeroom teachers. Before data collection, the homeroom teachers received a brief orientation regarding the study procedures and ethical considerations; however, they did not administer the questionnaires or influence participants' responses. Students who met the eligibility criteria and agreed to participate provided written informed consent before completing the self-administered paper-based questionnaires in the classroom. The questionnaires required approximately 15–20 minutes to complete. After collection, the principal investigator checked all questionnaires for completeness. Each questionnaire was assigned a unique identification code to ensure participant anonymity, and the data were entered into Microsoft Excel using double-entry verification before statistical analysis.

Data Analysis

Data were analyzed using IBM Statistical Package for the Social Sciences (SPSS) version 26.0. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize participants' characteristics, internet addiction, and depressive symptoms. Data normality was assessed using the Shapiro-Wilk test. Because the data were not normally distributed, the association between internet addiction and depressive symptoms was examined using

Spearman's Rank Correlation Test. Statistical significance was set at $p < 0.05$ (two-tailed). Correlation coefficients were interpreted according to their magnitude as indicators of effect size. No missing data were identified; therefore, all completed questionnaires were included in the final analysis.

Ethical Considerations

This study received ethical approval from the Health Research Ethics Committee of the Institute of Health Technology Cendekia Utama Kudus, Indonesia (No. 98EC/KEPITEKES-CU/VI/2025). The study was conducted in accordance with the ethical principles of the Declaration of Helsinki ([Bibbins-Domingo et al.](#), 2025).

Before participation, all eligible students received an explanation of the study objectives, procedures, potential benefits, and their right to decline or withdraw from the study at any time without consequences. Written informed consent was obtained from all participants prior to data collection. Because the participants were aged 15–18 years, written parental or legal guardian consent was also obtained in accordance with the school's and the ethics committee's requirements. Participant anonymity was maintained by assigning each questionnaire a unique identification code, and no personal identifiers were collected. All data were used exclusively for research purposes, stored securely, and were accessible only to the research team.

Results

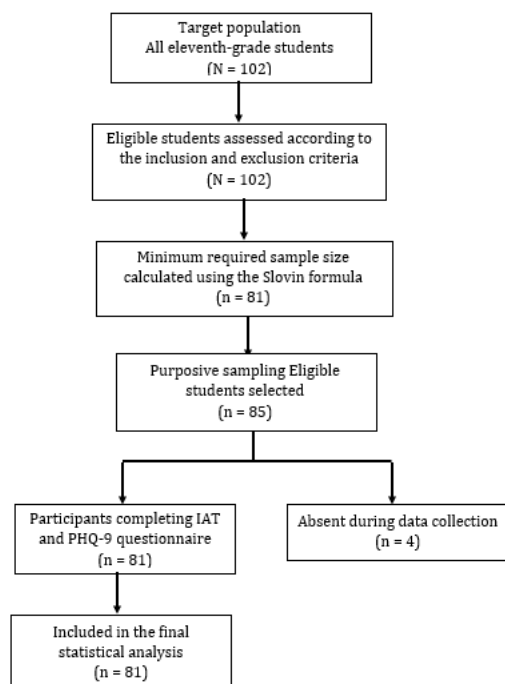


Figure 1. participant flow diagram

Figure 1 illustrates the participant recruitment and selection process. A total of 102 eleventh-grade students enrolled at State Senior High School 1, Kendal Regency, Indonesia, constituted the target population. Based on the Slovin formula with a 5% margin of error, the minimum required sample size was 81 participants. To accommodate potential non-response, 85 eligible students who met the predefined inclusion criteria were selected through purposive sampling. During the scheduled data collection period, four selected students were absent and were therefore unable to participate. All completed

questionnaires were reviewed immediately after collection, and no incomplete responses were identified. Consequently, data from 81 students who completed both the Internet Addiction Test (IAT) and the Patient Health Questionnaire-9 (PHQ-9) were included in the final statistical analysis, representing a response rate of 95.3% (81/85).

Participant Characteristics

Table 1. illustrates the demographic characteristics of the participants, including age and gender.

Table 1. Participant Characteristics (n = 81)

Characteristics	Frequency (n)	Percentage (%)
Age (years)		
16	28	34.6
17	47	58.0
18	6	7.4
Gender		
Male	35	43.2
Female	46	56.8

Table 1 illustrates that most participants were aged 17 years (n = 47; 58.0%), followed by 16 years (n = 28; 34.6%) and 18 years (n = 6; 7.4%). Based on gender, participants were predominantly female (n = 46; 56.8%), while male participants numbered 35 (43.2%).

Descriptive Statistics for IAT and PHQ-9 scores

Table 2 illustrates the descriptive statistics for Internet Addiction Test (IAT) and Patient Health Questionnaire-9 (PHQ-9) scores among participants.

Table 2. Descriptive Statistics for IAT and PHQ-9 Scores (n = 81)

Variable	Mean±SD	Min	Max
Internet Addiction Test (IAT) Scores	47.52 ± 15.43	20	85
Patient Health Questionnaire-9 (PHQ-9) Scores	8.96 ± 5.64	0	24

Note. IAT = Internet Addiction Test (possible range: 20–100); PHQ-9 = Patient Health Questionnaire-9 (possible range: 0–27). SD = Standard Deviation.

Table 2 presents descriptive statistics for the Internet Addiction Test (IAT) and the Patient Health Questionnaire-9 (PHQ-9) scores. The mean IAT score was 47.52 ± 15.43 (range: 20–85), indicating a mild level of internet addiction, on average, according to the predefined IAT classification. The mean PHQ-9 score was 8.96 ± 5.64 (range: 0–24), indicating mild depressive symptoms on average.

Internet Addiction Among Participants

Table 3 illustrates the distribution of participants based on their level of internet addiction as measured by the Internet Addiction Test (IAT).

Table 3. Distribution of Internet Addiction Levels Among Participants (n = 81)

Internet Addiction Level	Frequency (n)	Percentage (%)
Normal (IAT score: 20–30)	18	22.2
Mild (IAT score: 31–49)	31	38.3
Moderate (IAT score: 50–79)	24	29.6
Severe (IAT score: 80–100)	8	9.9

Note. IAT = Internet Addiction Test. Mean IAT score = 47.52 ± 15.43 (observed range: 20–85).

Table 3 illustrates the distribution of participants according to their level of internet addiction as measured by the Internet Addiction Test (IAT). The majority of participants were classified as having mild internet addiction (n = 31, 38.3%), followed by moderate internet addiction (n = 24, 29.6%), normal internet use (n = 18, 22.2%), and severe internet addiction (n = 8, 9.9%). The mean IAT score was 47.52 ± 15.43 (observed range: 20–85), indicating

that the average participant was classified as having mild internet addiction.

Depressive Symptoms Among Participants

Table 4 illustrates the distribution of depressive symptom severity among Participants as assessed using the Patient Health Questionnaire-9 (PHQ-9).

Table 4. Distribution of Depressive Symptom Severity Among Participants (n = 81)

Depressive Symptom Severity	Frequency (n)	Percentage (%)
Minimal (PHQ-9 score: 0–4)	35	43.2
Mild (PHQ-9 score: 5–9)	24	29.6
Moderate (PHQ-9 score: 10–14)	15	18.5
Moderately Severe (PHQ-9 score: 15–19)	5	6.2
Severe (PHQ-9 score: 20–27)	2	2.5

Note. PHQ-9 = Patient Health Questionnaire-9. Mean PHQ-9 score = 8.96 ± 5.64 (observed range: 0–24).

Table 4 presents the distribution of participants by depressive symptom severity, as measured by the Patient Health Questionnaire-9 (PHQ-9). Most participants were classified as having minimal depressive symptoms (n = 35, 43.2%), followed by mild (n = 24, 29.6%), moderate (n = 15, 18.5%), moderately severe (n = 5, 6.2%), and severe depressive symptoms (n = 2, 2.5%). The mean PHQ-9 score was 8.96 ± 5.64 (observed range: 0–24), indicating that, on average, participants experienced mild depressive symptoms.

Normality Test Results

Table 5 illustrates the results of normality testing for both study variables using the Shapiro–Wilk test (appropriate for n < 100).

Table 5. Normality Test Results (Shapiro–Wilk, n = 81)

Variable	Mean ± SD	W Statistic	p-value
IAT Score	47.52 ± 15.43	0.961	0.013
PHQ-9 Score	8.96 ± 5.64	0.943	0.002

Note: Shapiro–Wilk test. A p-value <0.05 indicates that the data are not normally distributed.

Table 5 illustrates the results of the normality test for the Internet Addiction Test (IAT) and Patient Health Questionnaire-9 (PHQ-9) scores. Both variables were not normally distributed, as indicated by the Shapiro–Wilk test ($p < 0.05$). Therefore, Spearman’s Rank Correlation Test was used to examine the

association between internet addiction and depressive symptoms.

Association Between Internet Addiction and Depressive Symptoms

Table 6 illustrates the results of the Spearman’s Rank correlation test analysis examining the association between internet addiction and depressive Symptoms.

Table 6. Association Between Internet Addiction and Depressive Symptoms (n = 81)

Variables	Spearman’s Rank Correlation Test (r)	95% CI	p-value	Effect size
Internet Addiction (IAT) vs depressive symptoms (PHQ-9)	0.512	[0.33; 0.66]	<0.001	Moderate positive

Note. Spearman’s rank correlation test (two-tailed). Correlation coefficients were interpreted as negligible (<0.20), weak (0.20–0.39), moderate (0.40–0.59), strong (0.60–0.79), and very strong (≥ 0.80).

Table 6 illustrates the results of the Spearman’s rank correlation test analysis between internet addiction and depressive symptoms. A statistically significant moderate positive correlation was observed between Internet Addiction Test (IAT) scores and Patient Health Questionnaire-9 (PHQ-9) scores ($\rho = 0.512$, 95% CI: 0.33–0.66, $p < 0.001$). This finding indicates that participants with higher levels of internet addiction tended to report higher levels of depressive symptoms.

Discussion

The present study demonstrated a significant positive association between internet addiction and depressive symptoms among Indonesian adolescents, indicating that higher levels of internet addiction were associated with greater depressive symptoms. The observed correlation was of moderate magnitude, suggesting that internet addiction may represent one of several factors associated

with adolescent mental health rather than an independent causal determinant.

The observed association should be interpreted cautiously because several important confounding variables, including sleep quality, academic stress, family functioning, social support, socioeconomic status, and duration of internet use, were not measured in the present study.

These findings are consistent with previous studies demonstrating a significant association between internet addiction and depressive symptoms among adolescents across different populations. A recent longitudinal study reported that internet addiction and depressive symptoms frequently co-develop over time, suggesting that these conditions may share common developmental pathways (Zhang et al., 2024). Similarly, a recent meta-analysis confirmed a moderate positive association between internet addiction and depressive symptoms among adolescents worldwide (Ye et al., 2023). The moderate

correlation observed in the present study is therefore consistent with previous observational evidence.

However, the strength of this association varies across studies. [Li et al. \(2022\)](#) found that family functioning substantially modified the association between internet addiction and depressive symptoms, indicating that psychosocial factors may attenuate or amplify this relationship. Likewise, [Ye et al. \(2026\)](#) reported that coping strategies influenced the longitudinal relationship between internet addiction and depressive symptoms, while other prospective studies have highlighted the protective roles of social support and family environment in reducing adverse mental health outcomes among adolescents ([Li et al., 2024](#)). These findings suggest that internet addiction should be viewed as one of several interrelated determinants of adolescent depressive symptoms rather than an isolated risk factor.

The findings may be interpreted using Roy's Adaptation Model, which conceptualizes adolescents as adaptive systems that continuously respond to environmental stimuli through cognitive and behavioral coping mechanisms ([Roy et al., 2009](#)). Within the context of the digital era, excessive internet use may be viewed as a persistent environmental stimulus requiring adaptive responses. Previous studies have suggested that prolonged and uncontrolled internet use is associated with poorer emotional regulation, reduced executive functioning, and less effective coping capacity, thereby increasing adolescents' susceptibility to maladaptive behavioral responses ([Du et al., 2024](#); [Méndez et al., 2024](#)). When adaptive coping responses are insufficient, adolescents may develop problematic internet use or internet addiction, which has been associated with poorer psychological functioning and a greater likelihood of

depressive symptoms ([Yi & Li, 2021](#); [Zhang et al., 2024](#)). Although the present study did not directly measure the adaptation processes or coping mechanisms proposed by Roy's Adaptation Model, the framework provides a useful conceptual perspective for interpreting the observed association between internet addiction and depressive symptoms. Therefore, the findings should be interpreted as supporting an association between these variables rather than confirming the theoretical pathways proposed by the model.

This theoretical explanation is supported by recent neurobehavioral evidence demonstrating that excessive internet use is associated with impaired executive functioning, emotion regulation, and impulse control, thereby increasing the risk of depressive symptoms among adolescents ([Méndez et al., 2024](#)). However, these mechanisms were not examined in the present study and are presented only to contextualize the observed association within the existing literature.

Furthermore, the present findings are consistent with studies reporting that internet addiction is associated not only with depressive symptoms but also with anxiety, stress, and broader psychological distress ([Ismail, 2024](#); [Sayed et al., 2022](#); [Soriano-Molina et al., 2025](#)). Several mechanisms may explain this association. Previous studies have demonstrated that poor sleep quality mediates the association between internet addiction and depressive symptoms because excessive internet use, particularly during nighttime, disrupts circadian rhythms and sleep patterns ([Hammad et al., 2024](#); [Huang et al., 2023](#)). In addition, excessive online engagement may reduce face-to-face social interaction, increase loneliness, and weaken perceived social support, all of which may be associated with depressive symptoms ([Ma et al., 2024](#)). Structural equation modeling studies have also demonstrated that stress

and anxiety partially mediate the association between internet addiction and depressive symptoms, indicating that this association is multifactorial rather than direct alone.

The Indonesian context should also be considered when interpreting these findings. Adolescents in Indonesia experience rapid digital expansion, while access to school-based mental health services, psychological counseling, and digital literacy education remains uneven, particularly in district and semi-urban areas ([Ma'ruf et al., 2024](#); [Wahdi et al., 2023](#)). These conditions may influence adolescents' opportunities to develop healthy digital behaviors and to access timely mental health support. Family supervision, collectivist cultural values, academic expectations, and differences in internet accessibility may influence adolescents' internet use behaviors and psychological adaptation ([Daka et al., 2025](#); [Purboningsih et al., 2025](#)). These contextual factors may explain variations in the strength of the association across countries and underscore the importance of locally generated evidence.

From a nursing and public health perspective, these findings highlight the importance of early identification of internet addiction among adolescents through school-based mental health screening. In resource-constrained school settings, routine screening with brief instruments such as the IAT and PHQ-9 may facilitate early identification of students who could benefit from further psychological assessment and support, without requiring substantial additional resources. School nurses and community health nurses may provide psychoeducation on healthy digital behavior, promote adaptive coping strategies, and establish referral pathways for students requiring further psychological assessment. Furthermore, schools and

policymakers may consider integrate digital literacy education and adolescent mental health monitoring into existing school health services to promote psychological well-being.

To our knowledge, this study is among the few studies conducted in district-level Indonesian settings examining the association between internet addiction and depressive symptoms among adolescents. Unlike many previous studies conducted in metropolitan cities or high-income countries, the present findings demonstrate that the association between internet addiction and depressive symptoms is also evident among adolescents living in semi-urban Indonesian communities. These findings strengthen the external evidence supporting internet addiction as an emerging public health concern across diverse sociocultural and educational settings and highlight the need for context-specific prevention strategies in Indonesia.

Implications and limitations

Roy's Adaptation Model provides a useful conceptual framework for interpreting the observed association between internet addiction and depressive symptoms among adolescents. However, because the present study did not directly measure the model's adaptation constructs, the findings should be interpreted as supporting an association rather than confirming the theoretical pathways proposed by the model. The findings may inform future research and support consideration of school-based digital wellness and mental health promotion initiatives. Future longitudinal and multicenter studies should examine potential mediating and confounding factors, including sleep quality, family support, social connectedness, and coping strategies.

Several limitations should be acknowledged. First, the cross-sectional

design precludes causal inference. Second, the study was conducted in a single school, which may limit the generalizability of the findings. Third, the use of self-reported questionnaires may have introduced response bias. Fourth, important confounding variables, including sleep quality, family support, socioeconomic status, and academic stress, were not assessed. Finally, the sample size was determined using the Slovin formula, which does not account for statistical power or expected effect size and may be less suitable for analytical studies examining associations. Future studies should consider using a priori power analysis and probability sampling to strengthen methodological rigor. Despite these limitations, this study provides preliminary evidence of a moderate positive association between internet addiction and depressive symptoms among Indonesian adolescents.

Relevance to Practice

The findings demonstrate that higher levels of internet addiction are associated with greater depressive symptoms among adolescents, highlighting the importance of early identification in school settings. School nurses and other healthcare professionals may use brief screening instruments, such as the Internet Addiction Test (IAT) and the Patient Health Questionnaire-9 (PHQ-9), to identify adolescents who require further assessment and support. They can also promote healthy digital behaviors, strengthen adaptive coping strategies, and collaborate with teachers, parents, and mental health professionals to provide appropriate interventions. At the institutional level, the present findings highlight the potential value of integrating digital wellness education and mental health promotion into existing school health programs. In addition, school-based screening for internet addiction and

depressive symptoms may be considered as one potential strategy to support the early identification of students who could benefit from further psychological assessment. However, the effectiveness, feasibility, and implementation of such approaches should be evaluated in future intervention and implementation studies before being adopted as routine practice, particularly in district and semi-urban areas with limited mental health resources.

Conclusion

This study found a moderate positive association between internet addiction and depressive symptoms among Indonesian high school students. Adolescents with higher levels of internet addiction tended to report higher levels of depressive symptoms. Although the cross-sectional design precludes causal inference, the findings highlight the importance of considering internet use as one of several factors associated with adolescent mental health. Roy's Adaptation Model provides a useful conceptual framework for interpreting this association, although its adaptation constructs were not directly measured. Future longitudinal and multicenter studies are needed to clarify the temporal relationship between internet addiction and depressive symptoms and to evaluate potential mediating and confounding factors.

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CrediT Authorship Contributions Statement

Yulia Ardiyanti: Conceptualization, Methodology, Supervision, Validation, Project Administration, Writing – Review & Editing.

Hesti Fathan Nurfaiz Fauziah (Corresponding Author):

Investigation, Data Curation, Formal Analysis, Visualization, Writing – Original Draft, Methodology, Writing – Review & Editing, Translation, Correspondence.

Sulastris: Investigation, Data Collection, Resources, Writing – Review & Editing.

Fuji Dwilestari: Data Curation, Validation, Writing – Review & Editing.

Puspita Dinda: Formal Analysis, Visualization, Writing – Review & Editing.

Alvi Ratna Yuliana: Supervision, Validation, Writing – Review & Editing.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this study.

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