Digital Burnout as a Psychological Risk Factor for Loneliness in Generation Z: The Mediating Function of Self-Esteem

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ABSTRACT

Background: Adolescents aged 15–17 years, often classified as Generation Z, are considered vulnerable to mental health problems because they are in a developmental transition from childhood to adulthood. Gen Z typically has high social media use, which may reduce opportunities for direct face-to-face interaction. Objective: This study aimed to examine the association between digital burnout and loneliness, with self-esteem as a potential mediator. Methods: This study employed a path analysis design. The study was conducted at SMAN 1 Sliyeg, Indramayu Regency, Indonesia. Participants were selected using purposive sampling with the following inclusion criteria: students aged 15–18 years, not currently using psychotropic medication, willing to participate, and able to read and write. Data were collected using a demographic questionnaire, the UCLA Loneliness Scale, and the Rosenberg Self-Esteem Scale (RSES). Results: Path analysis indicated that digital burnout significantly contributed to higher loneliness, while self-esteem showed a significant protective association with lower loneliness among Gen Z adolescents (p < 0.05). Conclusion: Digital burnout may influence loneliness directly; however, the mediating role of self-esteem requires further confirmation based on the full mediation pathway.

Keywords: Digital Burnout; Loneliness; Self Esteem; Gen Z

1. INTRODUCTION

The digital transformation characterized by rapid advancements in information technology, social media, and virtual reality has fundamentally reshaped how individuals interact, think, and construct their identities, particularly among Generation Z (Gen Z). Their cognitive and affective structures are shaped and influenced by continuous exposure to social media feeds, short-form videos, and interactive content (Firth et al., 2024). Although technological innovation has introduced significant convenience and accessibility, growing concerns have emerged regarding its impact on psychological well-being, attentional capacity, and social relationships (Shanmugasundaram & Tamilarasu, 2023). Several studies indicate that excessive social media use contributes to digital burnout, social anxiety, and social isolation among Gen Z (Choi & Kim, 2024a; Lyngdoh, El-Manstrly, & Jeesha, 2023). Members of Gen Z frequently experience various emotional and mental health challenges, including low self-esteem, stress,

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and depressive symptoms (Naslund, Bondre, Torous, & Aschbrenner, 2020; Ostic et al., 2021). Discrepancies between online and offline identities may lead to psychological conflict.

According to WHO data (2022), one in seven individuals aged 10–19 years experiences a mental health disorder. The Indonesia National Adolescent Mental Health Survey (I-NAMHS) 2022 reported that approximately 15.5 million adolescents, or 34.9%, experience mental health problems (Center for Reproductive Health, University of Queensland, 2022). National data indicate that the prevalence of depression in Indonesia was 1.4% in 2023, with West Java reporting the highest provincial rate at 3.3% (Kemenkes, 2021). In the working area of the Sliyeg Primary Health Center, adolescent mental health problems were reported at 1.77%. Adolescents within this demographic largely belong to Gen Z, a group particularly vulnerable to various mental health challenges.

Gen Z individuals also tend to experience continuous partial attention due to persistent digital notifications, multitasking behaviors, and Fear of Missing Out (FOMO), reflecting how digitalization has altered cognitive processing patterns (Lim, Ahmad, & Prihadi, 2025; Shanmugasundaram & Tamilarasu, 2023). Low levels of media literacy further exacerbate the negative psychological consequences of digital exposure. Individuals who are unable to critically filter information and manage social expectations in a healthy manner are more likely to report lower levels of psychological well-being (Lim et al., 2025).

At the same time, AI technologies and social media platforms may foster a sense of belonging and social engagement that has declined due to physical isolation or social pressures in real-world environments (Youssef, Medhat, Abdellatif, & Yousif, 2024). Therefore, it is essential to critically examine the ambivalent role of virtual environments as both risk and protective determinants of psychosocial outcomes among Gen Z (Chang & Chang, 2023). Based on these considerations, this study aims to identify the psychological mechanisms linking digital burnout to loneliness, with self-esteem as a mediating variable among adolescents. Understanding these mechanisms is crucial for developing evidence-based interventions aimed at enhancing digital literacy and promoting psychological well-being among youth.

2. METHODS

This study employed a descriptive-analytic design with a cross-sectional approach. To test the mediating (mediation) effect among variables, path analysis was performed (Fernandes & Solimun, 2022).

2.1 Population and Sample

The study participants were senior high school students (or equivalent level) recruited from schools located in the service area of Sliyeg Primary Health Center, West Java Province, Indonesia. The sample was selected using purposive sampling, and the minimum sample size was calculated using Slovin's formula, resulting in 89 students.

Inclusion criteria were: (1) aged 15–18 years, (2) not currently using psychotropic medication, (3) willing to participate, and (4) able to read and write. Exclusion criteria included: (1) students enrolled in inclusive education programs (students with special educational needs), (2) absence during data collection, and (3) severe illness at the time of the study.

2.2 Variables and Instrument

The variables measured in this study were loneliness, self-esteem, and digital burnout. Digital burnout was measured using the Digital Burnout Scale. This study used the following instruments: (1) Respondent characteristics questionnaire, including initials (not full name), age, sex, and occupation, (2) Loneliness was assessed using the UCLA Loneliness Scale, which demonstrates strong validity and reliability, as indicated by a Cronbach's alpha of 0.855 (Rizky Rinaldi, 2025), (3) Self-esteem was measured with the Rosenberg Self-Esteem Scale (RSES), which has a Cronbach's alpha of 0.885 (Spinner & Rudolph, 2019), (4) Digital burnout was evaluated using the Digital Burnout Scale, which reports a Cronbach's alpha of 0.952 (Choi & Kim, 2024b).

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2.3 Data Collection and Analysis

Data were collected using a demographic questionnaire, the UCLA Loneliness Scale, the Rosenberg Self-Esteem Scale (RSES), and the Digital Burnout Scale. Data collection was conducted in person by distributing informed consent forms and questionnaires to eligible respondents. The data collection process was initiated after obtaining research permission and ethical approval from the Health Research Ethics Committee of Politeknik Negeri Indramayu. After data collection was completed, the researchers performed data tabulation and statistical analysis.

This quantitative study used descriptive-analytic methods. Statistical analysis consisted of univariate and multivariate analyses. Univariate analysis was conducted descriptively to summarize participant characteristics (e.g., sex, age, religion) and the main study variables (loneliness, self-esteem, and digital burnout). Multivariate analysis was conducted to examine the relationship between digital burnout and loneliness, with self-esteem tested as a mediator. Path analysis was used for mediation testing. Statistical significance was determined at $p < 0.05$.

2.4 Ethical Considerations

Prior to data collection, the study received ethical approval from the Health Research Ethics Committee of Politeknik Negeri Indramayu (Approval No. 05/PL42/KEPK-B/EC/2025).

3. RESULT AND DISCUSSION

The results describe the demographic characteristics of the respondents, including sex, age, and religion. A detailed distribution of these characteristics is presented in Table 1.

Table 1. Demographic Characteristics of Respondents (n = 89)

Gender	Frequency (n)	Percentage (%)
Male	36	40.4 %
Female	53	59.6 %
Total	**89**	**100 %**
Age (years)		
15	5	5.6 %
16	64	71.9 %
17	20	22.5 %
Total	89	100 %
Religion		
Islam	88	98.9%
Christianity	1	1 %
Total	89	100 %

Based on the findings above, the majority of respondents were female (n = 36, 59.6%), aged 16 years (71.9%), and identified as Muslim (n = 88, 98.8%). The results of the univariate analysis of the study variables are presented in Table 2.

Based on the univariate analysis, 15 respondents (16.9%) reported low self-esteem. The mean score for loneliness was 14.67, and the mean score for digital burnout was 12.18. These findings indicate that respondents with scores above the mean experienced higher levels of loneliness and digital burnout. Conversely, respondents with scores below the mean demonstrated lower levels of loneliness and digital burnout. The results of the multivariate analysis are presented in Table 3.

Table 2. Univariate Analysis of Study Variables (n = 89)

Variable	Frequency (n)	Percentage (%)	
Self-Estem			
Low	15	16.9 %	
Normal	64	11.9 %	
High	10	11.2 %	
Total	89	100 %	
	mean	min	max
Loneliness	14.67	9	22
Burnout Digital	12.18	2	21

Table 3. Multivariate Analysis Results

| Equation / Path	Dependent variable	Predictor	B	SE	β	t	p	95% CI for B	R² (Adj. R²)
(1) Path a	Self-esteem	Digital burnout	-0.152	0.116	-0.139	-1.309	0.194	[-0.382, 0.079]	0.019 (0.008)
(2) Path b	Loneliness	Self-esteem (controlling burnout)	-0.257	0.072	-0.341	-3.575	0.001	[-0.400, -0.114]	0.233 (0.215)
(2) Path c′	Loneliness	Digital burnout (controlling self-esteem)	0.244	0.078	0.297	3.113	0.003	[0.088, 0.400]	0.233 (0.215)
(3) Path c (total)	Loneliness	Digital burnout	0.283	0.083	0.344	3.421	0.001	[0.119, 0.447]	0.119 (0.108)
*R² which is the same because paths b and c′ are in the same regression equation (DV = Loneliness).									
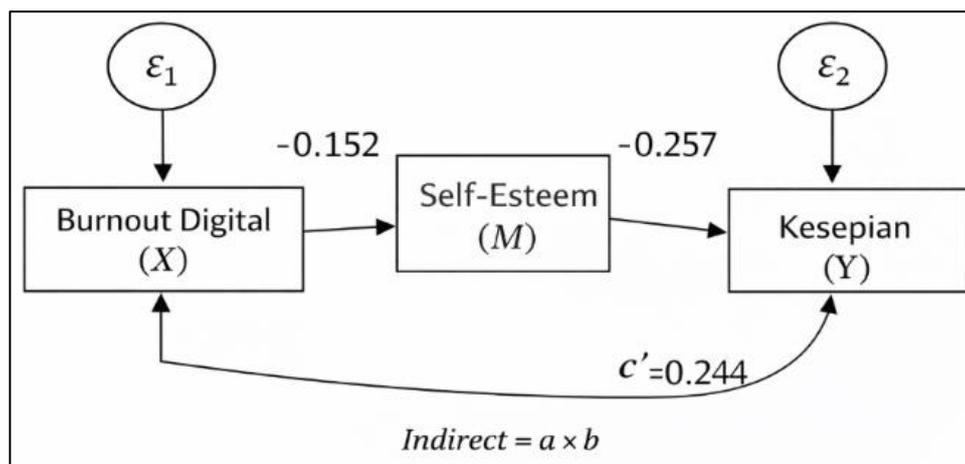
Figure 1. Path Diagram

Based on Table 3 and Figure 1, the path analysis showed that digital burnout was not significantly associated with self-esteem in the mediation model (path a: B = −0.152; SE = 0.116; β = −0.139; p = 0.194), with a very small proportion of explained variance (R^2 = 0.019). In the outcome model, when digital burnout and self-esteem were entered simultaneously as predictors of loneliness, the model explained 23.3% of the variance in loneliness (R^2 = 0.233; Adj. R^2 = 0.215). The model indicated that

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self-esteem was negatively and significantly associated with loneliness after controlling for digital burnout (path b: B = −0.257; SE = 0.072; β = −0.341; p = 0.001), suggesting that higher self-esteem is linked to lower loneliness. Digital burnout remained positively and significantly associated with loneliness after controlling for self-esteem (path c′: B = 0.244; SE = 0.078; β = 0.297; p = 0.003).

The total effect test showed that digital burnout was overall positively associated with loneliness (path c: B = 0.283; SE = 0.083; β = 0.344; p = 0.001), with R^2 = 0.119. Taken together, these findings indicate that digital burnout contributes to increased loneliness, while self-esteem plays a protective role in reducing loneliness. However, the pathway from digital burnout to self-esteem was not statistically supported in this sample.

The path analysis indicates that digital burnout is positively and significantly associated with loneliness, with both the total effect and the direct effect remaining significant. In contrast, self-esteem is negatively and significantly associated with loneliness, suggesting that self-esteem functions as a protective factor against loneliness. This pattern aligns with the literature emphasizing the ambivalent nature of digital technology exposure while it can facilitate connection, it can also intensify disconnection when use triggers fatigue, overload, or interpersonal alienation (Yuni, Cahyono, & Adiawaty, 2024). The observed direct effect of digital burnout on loneliness is consistent with evidence showing that digital burnout and screen fatigue among adolescents contribute to emotional exhaustion and poorer mental well-being due to continuous connectivity and persistent demands for engagement (Palaparthy, 2025). Digital ecosystems may increase psychological distress and socio-emotional risks that intersect with experiences of loneliness (A. M. Khalaf, Alubied, Khalaf, & Rifaey, 2023; A. Khalaf, Nakazwe, Halawi, & Sichimba, 2025). Digital burnout is a relevant psychosocial determinant of loneliness, independent of variation in other intrapersonal factors.

The inverse association between self-esteem and loneliness in the outcome model is closely related to adolescent well-being and loneliness experiences (Lyyra et al., 2021). Loneliness and self-esteem are widely recognized as important predictors of life satisfaction. From a psychological mechanism perspective, self-esteem may act as a mediator between loneliness and social anxiety, further reinforcing its central role within risk pathways (Chen & Hu, 2022). In this context, self-esteem functions as a "buffer" that reduces the intensity of loneliness even under socio-emotional strain.

The finding that digital burnout contributes to loneliness can also be understood through changes in relationship quality within digital environments, including reduced meaningful interaction, heightened expectations for rapid responses, and fragmented attention. Such conditions may weaken perceived connectedness. Evidence suggests that problematic digital behaviors (e.g., internet addiction) are associated with academic burnout, and that loneliness may form a key component of the psychosocial chain linking digital distress to fatigue-related outcomes (Gu et al., 2023). These emotional burdens may intensify when digital connection does not translate into tangible support in real life (Hemberg et al., 2022; Sundqvist & Hemberg, 2021). Strategies for alleviating loneliness therefore tend to emphasize the need for safe, accepted, and meaningful relationships rather than simply increasing the frequency of social contact (Sundqvist & Hemberg, 2021). Digital burnout may elevate loneliness by reducing individuals' capacity or motivation to engage in supportive interaction, thereby increasing withdrawal and perceived isolation.

However, the path from digital burnout to self-esteem (path a) was not statistically significant, indicating that reduced self-esteem is not the primary mechanism explaining the influence of digital burnout on loneliness in this sample. This differs from findings in occupational contexts, such as among teachers during the pandemic, where burnout has been associated with self-esteem and even positioned as a predictor of self-esteem (Márquez-Aponte, 2020; Yang, Chen, & Chen, 2021). Burnout may erode self-evaluation in work-related environments characterized by sustained performance pressure and role demands (Pereira et al., 2021). The divergence from the present findings may reflect contextual differences between adolescents/students and working adults, as well as differences between digital burnout and occupational burnout. It is plausible that protective factors such as social support, coping strategies, and digital literacy help stabilize self-esteem despite increased digital burnout (Chen & Hu,

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2022). In this study, digital burnout may influence loneliness more strongly through alternative mechanisms, such as diminished relationship quality, increased social withdrawal, or disruptions in emotion regulation, rather than through decreased self-esteem (Choi & Kim, 2024a; Palaparthy, 2025).

Overall, the findings suggest that digital burnout increases loneliness, while self-esteem decreases loneliness, and that mediation by self-esteem is likely weak because path a was not significant. These results underscore the need to maximize the benefits of technology while minimizing disconnection through healthy digital use strategies and community-based policies or interventions (Yuni et al., 2024). In populations vulnerable to digital distress, interventions targeting loneliness such as strengthening emotional connection, relationship skills, and social support may help interrupt the cascade of negative impacts that can culminate in burnout (Gu et al., 2023). At the preventive level, literature on digital burnout and screen fatigue recommends managing screen exposure, incorporating recovery breaks, and establishing digital boundaries to reduce fatigue risk (Palaparthy, 2025). Such strategies may subsequently improve psychosocial outcomes, including loneliness (Palaparthy, 2025; Sundqvist & Hemberg, 2021).

CONCLUSION

Among Gen Z adolescents, digital burnout was significantly associated with increased loneliness in both the total effect and the direct effect after including self-esteem in the model. This indicates that the influence of digital burnout on loneliness is primarily direct. Self-esteem played a protective role, showing a significant negative association with loneliness when digital burnout was controlled. These findings highlight the importance of intrapersonal factors in mitigating loneliness among Gen Z. The pathway from digital burnout to self-esteem was not statistically significant; therefore, the mediating role of self-esteem in the relationship between digital burnout and loneliness was not strongly supported. Taken together, the findings suggest that efforts to prevent loneliness among adolescents in the context of digital transformation should prioritize strategies to reduce digital burnout while simultaneously strengthening self-esteem as a protective factor, even though self-esteem was not confirmed as the primary mediator in this pathway.

LIMITATIONS

Potential confounding variables influencing the relationships among sleep quality, social support, and social media use intensity were not directly measured in the present study. Addressing this limitation in future research is recommended.

ADVISE

It is recommended that Gen Z adolescents adopt healthy digital use habits to reduce digital burnout and loneliness by setting screen-time limits, taking regular breaks, minimizing non-essential notifications, and prioritizing offline restorative activities (sleep, physical activity, and face-to-face interaction). Schools and teachers should integrate brief digital well-being and media literacy education into routine guidance/counseling sessions and establish simple screening and referral pathways for students with elevated digital burnout or loneliness, including peer-support groups to strengthen meaningful connectedness. Primary health centers should collaborate with schools through existing adolescent health programs to deliver psychoeducation, early detection, and brief counseling focused on coping skills and self-esteem strengthening. Future studies should use longitudinal or intervention designs and test other potential mechanisms (e.g., emotion regulation, social withdrawal, sleep quality, and social support) to better explain how digital burnout contributes to loneliness and to guide scalable prevention strategies.

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