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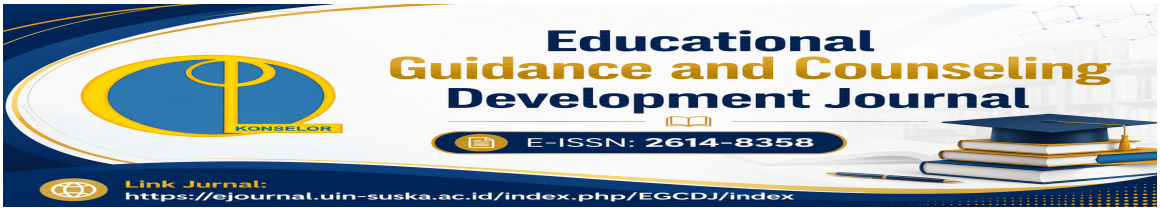

The Mediating Role of Self-Esteem on Academic Fatigue and Learning Concentration: Implications for Guidance and Counseling Interventions Among University Students

Abid Raisardhi Abdullah(✉)[1], Salsabila Nasution[2], and Nurfaidah Ardis[3]

[1,2,3]Program Studi Bimbingan dan Konseling, Universitas Negeeri Makassar

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(✉)**Correspondence to:**
abid.raisardhi.abdullah@unm.ac.id

Abstract: The digital transformation of higher education has intensified academic demands, placing university students at heightened risk of chronic fatigue that disrupts cognitive functioning. Despite growing awareness of this issue, the mechanisms through which academic fatigue impairs learning concentration, particularly the mediating role of self-esteem, remain underexplored in the Indonesian higher education context. This study examined the direct and indirect effects of academic fatigue on learning concentration, with self-esteem as a mediating variable. A total of 1,168 active university students across Indonesia were recruited via random sampling. Data were collected using three validated instruments: the Academic Fatigue Scale, the Self-Esteem Scale, and the Learning Concentration Scale. Path analysis using the lavaan package in R confirmed that fatigue exerts a significant negative direct effect on self-esteem ($\beta = -0.383$, $p < 0.001$) and learning concentration ($\beta = -0.438$, $p < 0.001$). Self-esteem partially mediated the fatigue–concentration relationship, with an indirect effect of -0.047 ($p < 0.0001$) and a total effect of -0.485. Power analysis validated the sample's adequacy, yielding statistical power exceeding 0.99—well above the minimum required threshold of 175 respondents. These findings demonstrate that academic fatigue undermines cognitive functioning both directly and indirectly by eroding students' self-perception through mechanisms of internal sabotage and imposter syndrome. Theoretically, the results support Cognitive Load Theory and the Anxiety-Buffering Hypothesis within the digital higher education context. Practically, universities are recommended to implement Student Assistance Program (SAP)-based interventions, encompassing regular fatigue screening, cognitive load management training, and Cognitive Behavioral Therapy (CBT), to reinforce students' self-esteem as a cognitive buffer and break the chain of fatigue's adverse effects on academic performance.

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INTRODUCTION

The higher education ecosystem in the digital era has undergone profound transformation. Students are no longer passive learners; they have become cognitive workers operating in an environment saturated with digital information, analogous to employees in high-technology sectors (Ismail & Vallasamy, 2025). The massive integration of technology does offer flexibility, yet simultaneously creates digital information overload. This condition depletes students' psychological resources and triggers chronic academic fatigue (Bakiner, 2026; Faiza Nur Muthmainah & Naila Fauzianazwa, 2025).

Academic fatigue is understood as a psychobiological state characterized by the depletion of physical and mental energy resulting from prolonged exposure to academic stressors (Wang et al., 2024). National data from 2023 indicate that 16.3% of Indonesian university students experience significant academic stress, and 8% of them exhibit signs of chronic burnout such as irritability, apathy, and loss of learning motivation (Kementerian Kesehatan, 2023). A culture of constant online availability blurs the boundaries between study time and personal recovery time, creating ego depletion, wherein students lose control over their attentional resources (Bakiner, 2026; Han et al., 2024).

The problem that emerges is that fatigue not only impairs physical stamina but also disrupts emotional regulation, ultimately leading to a decline in self-esteem. When students fail to meet academic expectations due to fatigue, they tend to internalize such failure as evidence of intellectual incapacity. This erosion of self-esteem triggers what may be termed "internal sabotage" or imposter syndrome, in which students begin to question their legitimacy within the academic environment (Holden et al., 2024). Consequently, attentional resources become fragmented, students' cognitive energy is absorbed by managing anxiety about their own competence rather than mastering academic content (Brueckmann et al., 2025; Olatunbosun & Pillay, 2024).

Furthermore, recent studies have demonstrated that the rapid digitalization of higher education has significantly altered students' learning behavior and psychological endurance. University students are increasingly exposed to continuous academic connectivity, excessive screen time, and simultaneous digital tasks that demand sustained cognitive effort and emotional adaptation (Deng et al., 2024; Li & Zhang, 2025). This condition often produces mental fatigue symptoms such as reduced attentional control, emotional exhaustion, and declining academic persistence. From the perspective of Cognitive Load Theory, digital learning environments characterized by constant notifications, multitasking, and fragmented information streams generate excessive extraneous cognitive load that weakens working memory performance and disrupts concentration processes (Sweller et al., 2019). Moreover, prolonged academic fatigue has been associated with decreased self-worth and heightened vulnerability to self-doubt among university students, particularly within highly competitive academic environments (Orth & Robins, 2022). Consequently, self-esteem functions as an essential psychological buffer that helps students maintain emotional stability, academic confidence, and concentration despite increasing academic demands in the digital era.

In addition, the increasing dependency on digital technology in higher education has contributed to the emergence of "always-on academic culture," where students feel compelled to remain constantly connected to academic tasks and communication platforms. This continuous engagement reduces opportunities for psychological detachment and recovery, thereby increasing vulnerability to chronic stress and cognitive exhaustion (Suh & Lee, 2023; Zhao et al., 2024). Students who experience prolonged exposure to digital academic pressure frequently report difficulties in maintaining focus, regulating emotions, and sustaining motivation during learning activities. Neuropsychological evidence also suggests that excessive digital stimulation can impair executive functioning, particularly selective

attention and working memory efficiency, which are essential components of effective learning concentration (Wilmer et al., 2017). Consequently, unmanaged academic fatigue may gradually evolve into psychological disengagement, reducing students' capacity to adapt to academic challenges and diminishing their overall academic well-being.

Moreover, contemporary educational psychology literature emphasizes that self-esteem plays a fundamental role in protecting students from the adverse psychological consequences of academic stress. Students with higher self-esteem tend to demonstrate stronger emotional regulation, better coping strategies, and greater resilience when facing academic difficulties (Mann et al., 2024). Conversely, low self-esteem is associated with increased anxiety, fear of failure, and negative self-evaluation, all of which intensify concentration problems and academic burnout symptoms (Pérez-Fuentes et al., 2023). In digitally demanding academic environments, students who continuously compare themselves with peers through online platforms are particularly susceptible to self-doubt and imposter feelings, which further weaken their cognitive engagement in learning activities (Tao et al., 2025). Therefore, strengthening self-esteem may serve not only as a psychological intervention target but also as a strategic preventive approach to maintaining students' concentration and academic functioning in higher education institutions.

Although research on student stress is extensive, there remains a gap in the literature concerning the application of industrial counseling perspectives within Indonesian higher education institutions. Traditional guidance services frequently focus only on reactive-clinical aspects, without addressing the systemic and proactive management of mental workload (Attridge & McDaniel, 2026). This study aims to fill that gap by treating students as analytical units within the "digital education industry," employing self-esteem mediation analysis on a large sample of 1,168 respondents. The study seeks to validate cognitive load theory in explaining declines in concentration, statistically demonstrate the mediating role of self-esteem through lavaan-based modeling, and formulate a transformation of university services through the Student Assistance Program (SAP) model.

METHOD

Research Design and Sampling Procedure

This study employed a quantitative approach using a correlational survey method. Data were collected from active university students across Indonesia through a a multi-site sampling strategy combining purposive institutional selection with within-institution random sampling. Thirteen higher education institutions from six geographic regions were involved: Sulawesi (Universitas Negeri Makassar), Riau (UIN Sultan Syarif Kasim Riau), Bengkulu (Universitas Bengkulu), West Sumatra (Stikes Piala Sakti Pariaman, UIN Imam Bonjol Padang, Universitas Negeri Padang), West Java (IKIP Siliwangi), and North Sumatra (Universitas Negeri Medan), alongside several additional institutions. At the institutional level, selection was purposive, guided by geographic representativeness and institutional accessibility. Within each selected institution, however, participants were recruited via simple random sampling applied to available student lists or class rosters, ensuring each student had an equal probability of selection. This two-stage design — purposive at the institutional level and random at the individual level — is consistent with guidelines for large-scale survey research in educational settings and optimizes both logistical feasibility and within-site randomness (Memon et al., 2025). Accordingly, while within-institution selection procedures were randomized, readers should interpret generalizability at the national level with appropriate caution given the purposive nature of site selection.

A total of 1,168 valid responses were obtained from students enrolled across academic years 2021–2025. The sample comprised 939 female and 229 male students. The gender disproportion reflects the naturally higher female enrollment rates in guidance and counseling programs across Indonesian universities, consistent with national enrollment statistics in this field.

Sampling Validation with Power Analysis

To ensure the credibility of the findings, sample size was estimated using statistical power analysis through the WebPower package in RStudio. Simulations were conducted assuming a moderate effect size (βa = 0.3; βb = 0.3), a significance level of α = 0.05, and a target power of 0.80.

Table 1. Result of Power Analysis

N	power	a	B	alpha
174.195	0.8	0.3	0.3	0.05

The calculation results indicate that the minimum sample size required to detect a significant mediation effect is 175 respondents. With an actual sample of 1,168 students, this study possesses superior statistical power (> 0.99), minimizing the risk of Type II error (failure to detect an effect that truly exists) and yielding highly stable parameter estimates (Memon et al., 2025)

Instruments dan Data Analysis

Data were collected using three instruments: 1) Academic Fatigue Scale (α = 0.725), developed to measure students' general level of physical and mental energy depletion; 2) Self-Esteem Scale (α = 0.740), to evaluate individuals' self-assessment of their competence and sense of worth; and 3) Learning Concentration Scale (α = 0.685), to measure the sharpness and persistence of attention during academic tasks.

To ensure the psychometric robustness of the adapted instruments within the Indonesian digital higher education context, a Confirmatory Factor Analysis (CFA) and internal consistency test were conducted. An item purification process was executed to eliminate items with standardized factor loadings below 0.30. The revised measurement model demonstrated a strong absolute fit, indicated by an RMSEA of 0.055 and an SRMR of 0.050, both strictly satisfying the recommended threshold of < 0.08. While the incremental fit indices were marginally below the strict ideal (CFI = 0.874, TLI = 0.857), the robust absolute fit validates the structural integrity of the model for a large sample size (N = 1,168)

Data analysis was conducted using Path Analysis with the lavaan package in the R statistical software. This method enables simultaneous testing of the direct effect of fatigue on concentration, as well as the indirect effect mediated by self-esteem, using bootstrapping to assess the significance of the mediation effect. . It is important to acknowledge that while path analysis provides a strong test of specified directional relationships, it does not constitute a full Structural Equation Modeling (SEM) procedure with comprehensive model-fit evaluation. The CFA reported above (RMSEA = 0.055, SRMR = 0.050; CFI = 0.874, TLI = 0.857) addresses the measurement model, but the structural paths themselves were estimated without global model-fit indices such as CFI or RMSEA for the full SEM. Consequently, claims regarding support for Cognitive Load Theory (CLT) and the Anxiety-Buffering Hypothesis (ABH) should be understood as empirically consistent rather than

definitively confirmatory: the findings are theoretically interpretable within both frameworks, but full theoretical verification would require comprehensive SEM testing in future research.

RESULT AND DISCUSSION

Result

Descriptive Analysis and Correlation Matrix

Descriptive analysis results indicate that students' fatigue levels were in the moderate-to-high category. The linear relationships among the main variables are presented in Table 2 below.

Table 2. Correlation Matrix and Descriptive Statistics (*n* = 1168)

Variable	Mean	SD	1	2	3
1. Academic Fatigue	13,19	2,91	1,00		
2. Self-Esteem	21,37	2,30	-0,383**	1,00	
3. Learning Concentration	16,55	2,63	-0,485**	0,291**	1,00
Note: ** p < 0,01					

The data in Table 2 show significant negative correlations between fatigue and both self-esteem and learning concentration. Conversely, self-esteem has a significant positive relationship with students' level of concentration.

Results of Path Analysis

Testing of the mediation model revealed that all path relationships in the model were statistically significant ($p < 0.001$). Details of the parameter estimation coefficients are presented in Table 3.

Table 3. Path Parameter Estimation Results (Lavaan Model)

Parameter Model	B	SE	z	β	p
Fatigue → Self-Esteem (a)	-0,303	0,021	-14,151	-0,383	< 0,001
Self-Esteem → Concentration (b)	0,141	0,031	4,516	0,124	< 0,001
Fatigue → Concentration (c')	-0,396	0,025	-15,953	-0,438	< 0,001
Indirect Effect (Mediation)	-0,043	0,010	-4,302	-0,047	< 0,001
Total Effect	-0,438	0,029	-18,971	-0,485	< 0,001

Interpretation of the Mediation Model

Path analysis confirmed the occurrence of Partial Mediation. Fatigue affects concentration through two pathways:1) Direct Effect: Fatigue exerts a significant negative direct effect on learning concentration ($\beta = -0.438$, $p < 0.001$), indicating that the depletion of physical and mental energy directly reduces cognitive focus regardless of the students' self-esteem level. 2) Indirect Effect: Fatigue significantly erodes students' self-esteem ($\beta = -0.383$, $p < 0.001$), which in turn leads to a further decrease in learning concentration. The indirect effect coefficient is -0.047 ($p < 0.001$), generating a total negative effect of fatigue on concentration amounting to $\beta = -0.485$.

Table 4. Comparative Analysis of Research Variables (N = 1,168)

Variable	Male (n=229)	Female (n=939)	t value	p-value	Note
Academic Fatigue	13.25	13.17	0.396	0.692	Not Significant
Self-Esteem	21.32	21.39	-0.334	0.738	Not Significant
Learning Concentration	16.78	16.50	1.467	0.143	Not Significant

The analysis conducted to enrich the discussion confirmed that while path analysis shows a significant influence of fatigue on concentration, the t-test results (See Table 4) indicate no significant difference based on gender ($p > 0.05$) for Academic Fatigue ($p=0.692$), Self-Esteem ($p=0.738$), or Learning Concentration ($p=0.143$). This suggests that the self-esteem mediation model in the fatigue-concentration relationship is universal and is not influenced by the demographic factor of gender among Indonesian university students.

DISCUSSION

The findings of this study provide empirical evidence that self-esteem is a key variable in sustaining students' cognitive performance under pressure in the digital era. The partial mediation effect found indicates that to restore learning concentration, interventions must not only reduce the academic workload but must also address the restoration of self-esteem (Brueckmann et al., 2025; Olatunbosun & Pillay, 2024). This finding aligns with ego depletion theory, which posits that fatigue depletes the mental energy needed to maintain a positive self-evaluation (Banguit et al., 2026).

Regarding the study's unique contribution, it is important to acknowledge that while the general relationship between fatigue, self-esteem, and concentration has been explored in prior research, the present study makes several distinctive contributions that set it apart from the existing literature. First, contextually, no previous study known to the authors has empirically tested this mediation model within the Indonesian higher education landscape, which is characterized by a rapid digital transition, culturally distinct academic norms, and a comparatively underserved counseling infrastructure. The Indonesian context introduces unique stressors — such as geographic dispersion across archipelagic regions, high female enrollment ratios in BK programs, and hybrid academic systems — that affect the dynamics of fatigue and self-esteem differently from Western samples. Second, perspectivally, this study pioneers the application of an industrial counseling lens to the student population, reframing students as "cognitive workers" and repositioning guidance services within a functional well-being paradigm rather than a purely clinical one. This framing is novel in the Indonesian BK literature. Third, practically, the study translates mediation findings into a concrete institutional framework — the Student Assistance Program (SAP) model — specifically adapted for the Indonesian university context, thereby bridging the gap between empirical findings and actionable counseling policy. Together, these contextual, perspectival, and applied contributions justify the study's scholarly relevance even as it builds upon an established theoretical base.

The Mechanism of Internal Sabotage and Imposter Syndrome

Statistical results for Path A demonstrate the negative impact of fatigue on self-esteem ($\beta = -0.383$). The literature explains this phenomenon through the mechanism of Internal

Sabotage (self-handicapping). When academically fatigued, students often experience cognitive distortions and begin to perceive themselves as incompetent (Rani et al., 2022).

To protect the ego from the shame of potential failure, the brain unconsciously creates mental barriers, such as procrastination or delaying study, so that students have an external excuse (fatigue) if their academic results are poor. This behavior is not laziness but rather a defensive psychological strategy that consumes working memory and impairs concentration (Holden et al., 2024).

Furthermore, the high prevalence of imposter syndrome among students in the digital era exacerbates this condition. Students who feel like cognitive "impostors" tend to overwork themselves to conceal perceived deficiencies, which in turn accelerates burnout and further erodes self-esteem (Holden et al., 2024).

This destructive cycle can only be broken if university counseling services are able to integrate self-esteem reinforcement as an integral component of academic performance management.

Industrial Counseling Implications

From an industrial counseling perspective, these findings provide a foundation for transforming university services through the Student Assistance Program (SAP) model. SAP offers a proactive framework focused on the functional optimization of students as cognitive workers. Based on research involving 2,800 cases, SAP has been proven effective in restoring self-esteem through 24/7 online service access (Attridge & McDaniel, 2026).

SAP implementation recommendations for universities include:1) Proactive Intervention: Regular screening for fatigue and self-esteem to provide early detection of concentration decline risks before they manifest as academic failure (Memon et al., 2025). 2) Cognitive Load Management: Training in cognitive restoration techniques, digital detox, and boundary setting to prevent working memory depletion resulting from hyperconnectivity (Bakiner, 2026; Han et al., 2024). 3) Curative Self-Esteem Intervention: The use of Cognitive Behavioral Therapy (CBT) and psychodrama to disrupt patterns of internal sabotage and restore students' self-image (Izzati, 2023; Rani et al., 2022).

CONCLUSION

This study concludes that academic fatigue has a significant negative effect on learning concentration, both directly and indirectly through the mediation of general self-esteem. Self-esteem functions as a psychological buffer, and when eroded, it triggers mechanisms of internal sabotage that exacerbate cognitive dysfunction. Strengthening the support system through the SAP model is viewed as a strategic solution from an industrial counseling perspective for maintaining student productivity in the digital era.

A limitation of this study lies in its cross-sectional design, which cannot capture the longitudinal dynamics of variable change. Future research is recommended to employ experimental approaches to test the effectiveness of specific self-esteem strengthening programs on improving learning concentration among students experiencing chronic fatigue.

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