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Predicting School Burnout among Secondary School Students: The Mediating Role of Academic Resilience in Self-Regulated Learning, Social Support and Bedtime Procrastination

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Abstract

School burnout has emerged as a critical concern among secondary school students due to increasing academic demands and psychological stress. The present study examined the roles of self-regulated learning, social support, and bedtime procrastination in predicting school burnout, with academic resilience serving as a mediating variable. A quantitative research design was employed, involving a total of 453 secondary school students participated in the study and were recruited using stratified random sampling to ensure representation across grades VII, VIII, and IX. Data were collected using validated psychological instruments measuring School Burnout Inventory (SBI), Self-Regulation Scale for Middle School (SRS-MS), Multidimensional Scale of Perceived Social Support (MSPSS), Bedtime Procrastination Scale (BPS), and Academic Resilience Scale-Indonesia (ARS-Indonesia). The findings revealed that self-regulated learning and social support did not exert significant direct effects on school burnout, whereas bedtime procrastination positively predicted school burnout. However, academic resilience significantly mediated the relationships between self-regulated learning and school burnout, as well as between social support and school burnout, whereas it did not mediate the prediction of school burnout from bedtime procrastination. These findings underscore the importance of fostering students' academic resilience through effective self-regulation, supportive social environments, and healthy sleep-related behaviors to mitigate the risk of school burnout among adolescents.

Keywords: academic resilience, bedtime procrastination, school burnout, secondary school students, self-regulated learning, social support

Abstrak

School burnout *telah menjadi masalah penting di kalangan siswa sekolah menengah karena meningkatnya tuntutan akademis dan tekanan psikologis. Penelitian ini bertujuan untuk menguji peran* self-regulated learning*, dukungan sosial, dan* bedtime procrastination *dalam memprediksi* school burnout*, dengan resiliensi akademik sebagai variabel mediator. Sebuah desain penelitian kuantitatif digunakan yang melibatkan siswa sekolah menengah yang dipilih melalui stratified random sampling, responden pada penelitian ini berjumlah 453 orang siswa sekolah menengah yang berpartisipasi dalam penelitian ini dan direkrut menggunakan pengambilan sampel acak bertingkat untuk memastikan representasi di kelas VII, VIII, dan IX. Data dikumpulkan menggunakan instrument alat ukur psikologis yang mengukur* School Burnout Inventory (SBI), Self-Regulation Scale for Middle School (SRS-MS), Multidimensional Scale of Perceived Social Support (MSPSS), Bedtime Procrastination Scale (BPS), and Academic Resilience Scale-Indonesia (ARS-Indonesia). *Data dianalisis*

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dengan menggunakan Structural Equation Modeling (SEM). *Temuan menunjukkan bahwa* sel-regulated learning *dan dukungan sosial tidak memprediksi* school burnout *secara langsung, sementara* bedtime procrastination *secara positif memiliki pengaruh langsung terhadap* school burnout. *Resiliensi akademik ditemukan secara signifikan memediasi penuh hubungan antara* Self-regulated learning *dan dukungan sosial dengan* school burnout, *sedangkan* bedtime procrastination *memiliki pengaruh langsung terhadap* school burnout *tanpa harus dimediasi oleh resiliensi akademik. Temuan ini menyoroti pentingnya memperkuat ketahanan akademik siswa melalui pengaturan diri yang efektif, lingkungan sosial yang mendukung, dan perilaku terkait tidur yang sehat untuk mengurangi risiko kejenuhan sekolah di kalangan remaja*.

***Kata kunci**: dukungan sosial, kelelahan sekolah, ketahanan akademis, pembelajaran mandiri, penundaan sebelum tidur, siswa sekolah menengah*

Introduction

Adolescence, particularly during the secondary school years, is a developmental stage marked by increasingly complex academic demands, heightened competition, and strong expectations for achievement from both schools and families. In the context of 21st-century education, academic life has become a major source of stress for many adolescents. Heavy workloads, continuous academic pressure, competitive learning environments, and high self-regulatory demands may contribute to prolonged psychological and physical fatigue among students. As a result, many adolescents experience learning-related exhaustion, including fatigue, reduced energy, and diminished motivation for academic tasks and school activities (Lin & Yang, 2021). Such conditions place students at greater risk of school burnout, characterized by emotional exhaustion stemming from excessive academic demands, cynical attitudes toward school, and feelings of inadequacy in meeting academic expectations (Maslach, 2018; Salmela-Aro et al., 2009; Salmela-Aro et al., 2021).

Although previous studies have identified self-regulated learning, social support, and bedtime procrastination as factors associated with students' academic functioning and psychological well-being, their relationships with school burnout have largely been examined as separate or direct effects. Research has shown that self-regulation and social support are associated with students' academic resilience, while social support and academic resilience have also been examined in relation to academic burnout (Adilah et al., 2024; Nadeak et al., 2024; Ristyana, 2023). Bedtime procrastination, meanwhile, has primarily been investigated in relation to sleep-related outcomes, such as shorter sleep duration, poorer sleep quality, and daytime fatigue among adolescents, rather than as part of an integrated model of school burnout (Kadzikowska-Wrzosek, 2020; Pu et al., 2022). This pattern of research provides limited explanation of the mechanisms through which these factors may influence students' vulnerability to burnout. In particular, previous research has not sufficiently clarified whether academic resilience serves as an underlying mechanism through which self-regulatory capacities and social resources are associated with lower academic burnout, or whether bedtime procrastination operates through the same resilience pathway. Consequently, it remains unclear how individual self-regulation, social resources, and bedtime-related behavior operate together in explaining school burnout among secondary school students. To address this gap, the present study integrates self-regulated learning, social support, and bedtime procrastination within a single model and examines the mediating role of academic resilience. This model is specifically designed to explain not only whether these factors are associated with school burnout, but also how self-regulated learning and social support may be linked to burnout through students' capacity to adapt to academic challenges, while examining whether bedtime procrastination represents a distinct pathway to burnout.

School burnout is conceptualized as an adaptation of occupational burnout in educational settings. According to the Job Demands–Resources (JD-R) theory, burnout emerges when environmental demands exceed the personal and contextual resources available to cope with those demands (Bakker & Demerouti, 2017). Within educational settings, excessive academic demands combined with insufficient psychological resources may increase students' susceptibility to school burnout. Whereas

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occupational burnout arises from prolonged work-related stress, school burnout develops from persistent academic demands and pressures experienced by students (Schaufeli et al., 2002). Globally, school burnout has been reported across both developed and developing countries. In East Asian countries such as China, approximately 54.9% of secondary school students experienced school burnout (Zhang et al., 2023). Intense academic competition, high educational expectations, and pressure to gain admission to prestigious schools have been identified as major contributing factors among adolescents. Similarly, studies conducted in Finland and other European countries indicate that school burnout remains prevalent despite well-established educational systems, particularly during periods of educational transition and heightened academic performance demands (Salmela-Aro et al., 2021; Read et al., 2022). In Indonesia, school burnout has also attracted growing scholarly attention, with studies reporting relatively high levels of burnout among secondary school students (Rochim, 2024). The prevalence rates vary considerably and appear to be increasing, ranging from 13.9% among eighth-grade students (Sabila et al., 2024) to 64.51% among seventh-grade students (Utami & Sucipto, 2024). Previous research has further demonstrated that school burnout is associated with a range of adverse outcomes, including poorer academic achievement, greater psychological distress, increased school absenteeism, and a higher likelihood of dropping out of school (Madigan & Curran, 2021).

From an educational psychology perspective, school burnout is influenced not only by academic workload but also by students' ability to regulate their learning processes effectively. Self-regulated learning (SRL) refers to students' active capacity to set learning goals, monitor their progress, and manage their motivation and behavior in order to achieve academic objectives (Zimmerman, 2000). Students with strong self-regulated learning skills are generally better able to cope adaptively with academic pressures, thereby reducing their vulnerability to school burnout. In contrast, students with lower levels of SRL may experience greater difficulty managing time, applying effective learning strategies, and regulating emotions in academic contexts, thereby increasing the likelihood of burnout. Previous research has shown that emotional regulation, as an important component of self-regulated learning, serves as a protective factor against school burnout among adolescents and is negatively associated with burnout symptoms (Iuga et al., 2023). Furthermore, adolescents who demonstrate poor self-regulation in learning are more likely to experience emotional exhaustion related to academic activities (Pereira et al., 2025).

In addition to internal factors, external factors such as social support also play an important role in maintaining students' psychological well-being. Support received from family members, peers, and teachers can function as a protective buffer against academic stress (Zimet et al., 1988). Through supportive social relationships, students may feel valued, cared for, and equipped with emotional and practical resources that enhance their psychological well-being and reduce vulnerability to school burnout. Previous studies have demonstrated that higher levels of social support are associated with lower levels of school burnout among students. These findings suggest that social support plays a significant role in mitigating school burnout (Puspitasari & Sholihah, 2022; Syaffa, 2025). Social support may not only directly alleviate academic stress but also strengthen students' adaptive capacities when facing academic challenges. Evidence from Indonesian adolescents suggests that supportive relationships contribute significantly to academic resilience, enabling students to respond more effectively to academic adversity (Satyaninrum, 2018). Likewise, Difa (2019) found that social support enhances resilience by providing emotional and psychological resources that facilitate adaptation to stressful situations.

On the other hand, recent studies have increasingly emphasized the role of modern adolescent lifestyles as a potential risk factor for psychological difficulties, particularly through the phenomenon of bedtime procrastination. Bedtime procrastination refers to the tendency to delay going to bed without any clear external reason (Kroese et al., 2014). Among adolescents, this behavior has become increasingly prevalent and is associated with shorter sleep duration, greater fatigue, reduced well-being, and lower levels of self-control (Pu et al., 2022). Insufficient sleep has also been linked to emotional exhaustion, which constitutes a core dimension of school burnout (Luo & Peng, 2026). Furthermore,

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sleep deprivation may impair concentration and weaken emotional regulation, thereby increasing students' susceptibility to school burnout.

However, the relationships among self-regulated learning, social support, bedtime procrastination, and school burnout may not always be direct, as these associations can operate through underlying psychological mechanisms. In this regard, academic resilience is proposed as a potential mediating variable. Academic resilience refers to students' ability to adapt, persist, and maintain academic functioning despite academic challenges and adversity (Cassidy, 2016; Masten, 2014). From the perspective of resilience theory, personal and environmental resources do not automatically produce positive outcomes; rather, they enhance individuals' capacity to cope successfully with adversity (Masten, 2014). Accordingly, academic resilience may function as a psychological mechanism through which personal resources, such as self-regulated learning, and contextual resources, such as social support, contribute to lower levels of school burnout. Previous studies have suggested that academic resilience mediates the relationships between various psychological factors, student well-being, and school burnout (Yu & Chae, 2020). Students with higher levels of academic resilience are more likely to interpret academic stressors as manageable challenges rather than overwhelming burdens and to employ adaptive coping strategies when facing difficulties. Moreover, resilience may also help reduce maladaptive behaviors, including bedtime procrastination, by strengthening students' ability to regulate stress and maintain adaptive behavioral patterns (Huang et al., 2025).

Although school burnout has become an increasingly important issue in adolescent education, the psychological processes underlying its development remain insufficiently understood. Previous studies have consistently identified self-regulated learning, social support, bedtime procrastination, and academic resilience as important factors associated with school burnout. However, existing research has largely examined these variables independently or focused primarily on their direct effects, resulting in a fragmented understanding of how personal, social, and behavioral factors interact to influence students' burnout experiences. Consequently, the mechanisms through which these factors contribute to or protect against school burnout have not been adequately explained. One important limitation of prior research is the lack of attention to academic resilience as an explanatory mechanism linking these variables to school burnout. Academic resilience has been recognized as a critical psychological resource that enables students to adapt positively to academic challenges and stressors. Nevertheless, empirical evidence regarding its mediating role in the relationships between self-regulated learning, social support, bedtime procrastination, and school burnout remains limited. Moreover, studies integrating protective factors, such as self-regulated learning and social support, together with a risk factor, namely bedtime procrastination, within a single explanatory framework are still scarce. This limitation is particularly evident in research involving secondary school students in developing countries, including Indonesia, where educational demands and concerns regarding students' psychological well-being continue to increase.

Despite the growing body of research on school burnout, several important gaps remain. First, previous studies have predominantly examined self-regulated learning, social support, bedtime procrastination, and academic resilience as independent predictors of school burnout, resulting in a fragmented understanding of their interrelationships. Second, limited research has simultaneously investigated protective factors (self-regulated learning and social support) and behavioral risk factors (bedtime procrastination) within a single explanatory model. Third, although academic resilience has been identified as a critical psychological resource, its mediating role in explaining how learning behaviors, social resources, and sleep-related behaviors influence school burnout remains insufficiently explored. Finally, empirical evidence from developing countries, particularly Indonesia, remains scarce despite growing concerns regarding adolescents' academic well-being. The novelty of this study lies in three main aspects. First, it incorporates both protective and risk factors within a single structural framework to provide a more comprehensive explanation of school burnout among adolescents. Second, it positions academic resilience as a mediating mechanism through which personal learning strategies, social resources, and sleep-related behavioral tendencies influence school burnout, thereby

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extending previous studies that predominantly focused on direct associations. Third, the study contributes evidence from Indonesian secondary school students, a population that remains underrepresented in the international literature on school burnout.

Theoretically, this study contributes to the advancement of educational psychology by clarifying the role of academic resilience in explaining the pathways through which individual, social, and behavioral factors affect school burnout. The findings are expected to enrich contemporary perspectives on school burnout by demonstrating that students' psychological well-being is shaped not only by external demands but also by the availability of internal and external resources that foster resilience. Furthermore, the proposed model offers a more integrated understanding of the dynamic relationships among learning regulation, social support, sleep-related behavior, and adaptation to academic stress. Empirically, this study provides evidence regarding the direct and indirect contributions of self-regulated learning, social support, and bedtime procrastination to school burnout through academic resilience. By testing these relationships simultaneously within a structural model, the study offers a more comprehensive account of the factors associated with school burnout among secondary school students. The findings are also expected to broaden the existing evidence base from non-Western educational contexts and support the development of evidence-based interventions aimed at strengthening academic resilience, reducing school burnout, and promoting students' academic success and psychological well-being. The research framework model shown in **Figure 1.**

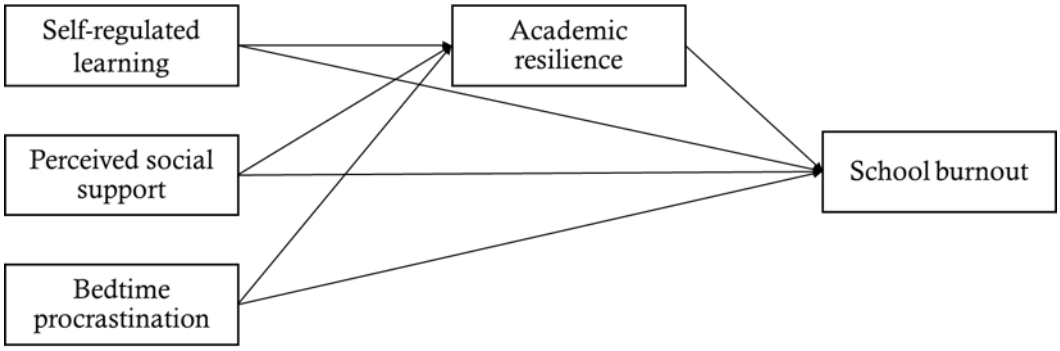

Figure 1. Research framework

Methods

This study employed a quantitative research approach using a one-step Structural Equation Modeling (SEM) analysis to examine the effects of self-regulated learning, social support, and bedtime procrastination on school burnout among secondary school students, with academic resilience serving as a mediating variable. The participants consisted of 453 secondary school students in South Tangerang City Indonesian. A stratified random sampling technique was employed, with the population divided into three strata based on grade level (VII, VIII, and IX), from which participants were randomly selected to ensure representation of each grade. Participation was entirely voluntary, and informed consent was obtained from all respondents before data collection commenced. Data collection was conducted through an online questionnaire distributed between mid-April and May 2026. The instruments employed in this study exhibited strong evidence of validity and reliability. The validity testing confirmed that all items adequately represented their respective constructs and contributed meaningfully to the measurement model. Furthermore, the reliability coefficients exceeded the recommended threshold values, indicating a high level of internal consistency and suggesting that the instruments were capable of producing accurate and dependable measurements. Five measurement instruments were utilized in this study.

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First, the Indonesian-adapted version of the School Burnout Inventory (Rahman, 2020), based on the theoretical framework proposed by Salmela-Aro et al. (2009), was used to assess school burnout. This scale consists of three dimensions and 9 items. This study employed the Indonesian version of the School Burnout Inventory (SBI), which has demonstrated adequate psychometric properties. Reliability testing conducted by Rahman (2020) yielded a Cronbach's alpha coefficient of .70, indicating acceptable internal consistency. Furthermore, exploratory factor analysis supported the construct validity of the instrument, with a Kaiser–Meyer–Olkin Measure of Sampling Adequacy (KMO-MSA) value of .868 and a statistically significant Bartlett's test result ($p < .001$). These findings suggest that the Indonesian version of the SBI is a valid and reliable instrument for assessing school burnout among students.

Second, Self-regulated learning was measured using the Self-Regulation Scale for Middle School developed by Sarıkaya et al. (2023), consisting of 9 items. The scale was theoretically developed based on Zimmerman's (2000) three-phase cyclical model of self-regulated learning, encompassing the forethought phase (goal setting and planning), performance control phase (self-monitoring and behavioral regulation), and self-reflection phase (self-evaluation and strategy adjustment). However, the validation study conducted by Sarıkaya et al. (2023) among secondary school students aged 11–14 years supported a two-factor structure rather than the original three-phase structure. The scale demonstrated good psychometric properties, with a total Cronbach's alpha coefficient of .86, indicating satisfactory internal consistency and reliability.

Third, perceived social support was assessed using the Indonesian-adapted version of the Multidimensional Scale of Perceived Social Support (Laksmita et al., 2020), consisting of three subscales and 12 validated items representing different sources of social support. Previous studies have reported excellent internal consistency, with Cronbach's alpha values ranging from .85 to .91 across its subscales and .88 for the total scale. The Indonesian adaptation has demonstrated good validity and reliability ($\alpha = .85$), supporting its suitability for measuring perceived social support in the current study.

Fourth, Academic resilience was measured using the Indonesian version of the Academic Resilience Scale (ARS-Indonesia), originally developed as the 30-item Academic Resilience Scale (ARS-30) and translated and adapted into Indonesian by Kumalasari et al. (2020). The ARS-Indonesia underwent psychometric evaluation using Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA). Based on the results of the factor analyses, six items were removed, resulting in a 24-item instrument with three dimensions: perseverance (10 items), reflecting and adaptive help-seeking (8 items), and negative affect and emotional response (6 items). The CFA results provided evidence supporting the factorial validity of the Indonesian version, indicating that the three-factor structure adequately represented the underlying latent construct of academic resilience. The instrument also demonstrated excellent internal consistency, with a Cronbach's alpha coefficient of .891. Overall, these findings indicate that the ARS-Indonesia has good validity and reliability for assessing academic resilience among Indonesian students (Kumalasari et al., 2020).

Finally, bedtime procrastination was measured using the Bedtime Procrastination Scale based on the framework developed by Kroese et al. (2014), which was adapted into Indonesian and adjusted for adolescent contexts. This scale consists of three dimensions and 9 items. Following its adaptation into Indonesian by Widyasari (2020), the scale was subjected to psychometric testing and demonstrated satisfactory validity and reliability. The Cronbach's alpha coefficient of .83 reflects good internal consistency, indicating that the instrument is suitable for research purposes and capable of producing reliable data. The data were analyzed using Mplus version 8.3.

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Results and Discussion

Results

The sample in this study comprised 453 secondary school students in South Tangerang City, including 265 female and 188 male students. A detailed description of the participants' demographic characteristics is presented in Table 1.

Table 1. Demographic information of the participants

Characteristics	N	%
Gender		
Female	265	58.50%
Male	188	41.50%
Grade		
VII	205	45.30%
VIII	130	28.70%
IX	117	25.80%
School		
SMP	188	41.50%
MTs	265	58.50%

A total of 453 students participated in the study. In terms of gender, 265 respondents (58.50%) were female, while 188 respondents (41.50%) were male. Regarding grade level, 205 students (45.30%) were in Grade VII, 130 students (28.70%) were in Grade VIII, and 117 students (25.80%) were in Grade IX. Based on school type, 188 students (41.50%) attended junior high schools (SMP), while 265 students (58.50%) attended Islamic junior high schools (MTs). Overall, the sample represented students from different gender, grade-level, and school-type backgrounds.

The data analysis in this study employed a one-step Structural Equation Modelling (SEM) approach, in which both the measurement and structural models were tested simultaneously within a single analytical framework. This approach was selected because all measurement instruments were grounded in established theoretical frameworks and supported by empirical evidence of validity from previous studies.

Table 2. Factor Loading

Construct	Item	Factor loading	t-value	P-value
School Burnout (SBI)	SBI1	.645	15.702	.000***
	SBI2	.815	26.154	.000***
	SBI3	.696	18.297	.000***
	SBI4	.482	9.803	.000***
	SBI5	.776	22.220	.000***

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Construct	Item	Factor loading	t-value	P-value
	SBI8	.618	13.822	.000***
	SBI9	.629	13.653	.000***
Self-Regulated Learning (SRL)	SRL1	.600	16.609	.000***
	SRL2	.615	17.526	.000***
	SRL3	.627	17.305	.000***
	SRL4	.662	18.564	.000***
	SRL5	.780	26.014	.000***
	SRL6	.662	18.113	.000***
	SRL7	.595	14.826	.000***
	SRL8	.448	9.761	.000***
	SRL9	.573	15.887	.000***
Bedtime Procrastination (BP)	BP2	.613	13.180	.000***
	BP3	.537	11.256	.000***
	BP4	.520	11.560	.000***
	BP6	.780	23.078	.000***
	BP7	.654	15.489	.000***
	BP8	.690	2.715	.000***
Perceived Social Support (PSS)	PSS1	.839	42.860	.000***
	PSS2	.886	53.710	.000***
	PSS5	.792	34.500	.000***
	PSS6	.739	25.623	.000***
	PSS7	.542	13.730	.000***
	PSS9	.778	32.891	.000***
	PSS10	.785	35.603	.000***
	PSS12	.618	18.275	.000***
Academic Resilience (ARS)	ARS1	.510	11.565	.000***
	ARS2	.657	2.593	.000***
	ARS4	.515	12.229	.000***
	ARS6	.769	27.305	.000***
	ARS7	.719	22.400	.000***
	ARS8	.804	29.115	.000***
	ARS10	.705	22.019	.000***

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Construct	Item	Factor loading	t-value	P-value
	ARS11	.649	18.821	.000***
	ARS12	.799	34.399	.000***
	ARS13	.438	1.537	.000***
	ARS14	.752	26.441	.000***
	ARS15	.565	16.005	.000***
	ARS16	.663	19.795	.000***
	ARS18	.700	21.717	.000***

***$p < .001$.

In **Table 2**., the confirmatory factor analysis (CFA) results indicated that all indicators demonstrated satisfactory factor loadings above .40, with t-values exceeding 1.96 and p-values below .05. These results suggest that all retained items significantly represented their respective latent constructs. Any non-significant items were automatically removed from the model to improve overall model fit and ensure measurement validity.

Table 3. Factor Loading Range

Construct	Factor Loading Range	Interpretation
School Burnout (SBI)	.482 – .815	Moderate to very strong
Self-Regulated Learning (SRL)	.448 – .780	Moderate to very strong
Bedtime Procrastination (BP)	.520 – .780	Moderate to very strong
Perceived Social Support (PSS)	.542 – .886	Strong to very strong
Academic Resilience (ARS)	.438 – .804	Moderate to very strong

The data presented in **Table 3.** illustrate the factor loadings for each variable, as detailed below:

School Burnout Inventory **(SBI)**

The School Burnout Inventory construct showed factor loadings ranging from .482 to .815. Among the indicators, SBI2 emerged as the strongest indicator of school burnout (λ = .815; t = 26.154; p < .001), whereas SBI4 demonstrated the lowest loading (λ = .482; t = 9.803; p < .001). Although two items (SBI6 and SBI7) were excluded due to non-significant results, the remaining indicators still met the acceptable threshold for convergent validity. Overall, these findings suggest that the SBI indicators adequately represent the construct of school burnout.

Self-Regulated Learning **(SRL)**

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The Self-Regulated Learning construct exhibited factor loadings ranging from .448 to .78. The SRL5 indicator was identified as the strongest indicator (λ = .780; t = 26.014; p < .001), whereas SRL8 showed the lowest loading (λ = .448; t = 9.761; p < .001). This range suggests that most SRL indicators are moderately to strongly effective at measuring students' learning regulation abilities. In addition, all SRL items showed positive coefficients and t-values greater than 1.96, indicating that all items were valid. As no items were removed, all indicators were retained in the computation of factor scores.

Bedtime Procrastination **(BP)**

The Bedtime Procrastination construct demonstrated factor loadings ranging from .520 to .78. Among its indicators, BP6 contributed the most strongly to the construct (λ = .780; t = 23.078; p < .001), while BP4 showed the lowest loading (λ = .520; t = 11.560; p < .001). Three items (BP1, BP5, and BP9) were excluded from the final model due to non-significant results. Overall, the remaining indicators exhibited satisfactory convergent validity, indicating that the bedtime procrastination construct is sufficiently stable and well represented by the retained items.

Perceived Social Support **(PSS)**

The Perceived Social Support construct demonstrated the strongest measurement quality among all constructs, with factor loadings ranging from .542 to .886. The PSS2 indicator emerged as the most dominant item (λ = .886; t = 53.710; p < .001). Four items (PSS3, PSS4, PSS8, and PSS11) were removed from the model due to non-significant results. Overall, most of the remaining indicators exhibited factor loadings above .70, indicating that perceived social support was measured with high strength and consistency.

Academic Resilience Scale **(ARS)**

The Academic Resilience construct exhibited factor loadings ranging from .438 to .804. Among the indicators, ARS8 was identified as the strongest indicator (λ = .804; t = 29.115; p < .001), whereas ARS13 showed the weakest loading (λ = .438; t = 1.537; p < .001). Nine items (ARS3, ARS5, ARS9, ARS19, ARS20, ARS21, ARS22, ARS23, and ARS24) were removed from the model due to non-significant results. Although several indicators demonstrated only moderate loadings, the overall construct still met the criteria for adequate convergent validity, indicating that academic resilience is sufficiently represented by the retained items.

Hypotheses Test

At this stage, hypothesis testing was conducted using a one-step Structural Equation Modeling (SEM) approach in Mplus version 8.3. The model was specified based on the initial research hypotheses, which informed the development of the overall theoretical framework. The proposed model was then evaluated for its goodness of fit to the empirical data, with particular emphasis on the RMSEA index as a key indicator of fit. This model evaluation was conducted specifically to address H1, namely, whether the hypothesized model provides an adequate fit to the observed data.

Table 4. presents the results of the goodness-of-fit evaluation, indicating that the proposed model provides an overall good fit to the empirical data. The RMSEA value of .045 falls within the excellent fit range, as it is below the .05 threshold. Similarly, the CFI (.931) and TLI (.927) values exceed the recommended cut-off of .90, indicating an acceptable to good model fit. The SRMR value of .064 is also below the upper limit of .08, suggesting relatively low residual errors in the model. Furthermore, the χ^2/df ratio of 1.90 meets the criterion for a well-fitting model, as it is below the recommended maximum value of 3.0. Overall, these results confirm that both the measurement and structural models satisfy the required fit criteria and are appropriate for subsequent hypothesis testing.

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Table 4. Goodness of Fit Model SEM Test

GoF Index	Results	Cut-off Value	Interpretation
Chi-Square (χ^2)	1692.407	The smaller the better	Sensitive to sample size
Degrees of Freedom (df)	892	—	—
χ^2/df (CMIN/DF)	1.90	< 3.00	Good fit
RMSEA	.045	≤ .08	Good fit
90% CI RMSEA	.041 – .048	≤ .08	Good fit
RMSEA ≤ .05	.998	≥ .50	Excellent fit
CFI	.931	≥ .90	Good fit
TLI	.927	≥ .90	Good fit
SRMR	.064	≤ .08	Good fit

Table 5. Correlation between factors

Correlation between constructs	Correlation coefficient (*r*)	*t*-value	*p*-value	Interpretation
SBI ↔ SRL	-.143	-6.105	<.001	Low negative
SBI ↔ BP	.222	8.36	<.001	Low positive
SBI ↔ PSS	-.056	-1.919	.055	Not significant
SBI ↔ ARS	-.131	-6.097	<.001	Low negative
SRL ↔ BP	-.176	-7.615	<.001	Low negative
SRL ↔ PSS	.127	4.793	<.001	Low positive
SRL ↔ ARS	.201	8.282	<.001	Low positive
BP ↔ PSS	-.071	-2.701	.007	Very low positive
BP ↔ ARS	-.11	-5.966	<.001	Low negative
PSS ↔ ARS	.118	5.406	<.001	Low positive

Note. SBI = school burnout inventory; SRL = self-regulated learning; BP = bedtime procrastination; PSS = perceived social support; ARS = academic resilience scale.

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Table 5. presents the results of the correlation analysis among the latent constructs, showing that most variables are significantly correlated, with directions consistent with the proposed theoretical framework. Overall, the correlations between constructs are relatively weak, with all coefficients below .3. This pattern indicates that each construct represents distinct conceptual dimensions and suggests that multicollinearity is not a concern among the latent variables.

School Burnout (SBI) showed a significant negative correlation with Self-Regulated Learning (SRL) (r = -.143, p < .001), indicating that higher levels of learning regulation are associated with lower levels of school burnout. In contrast, School Burnout demonstrated a significant positive correlation with Bedtime Procrastination (BP) (r = .222, p < .001), suggesting that greater tendencies to delay bedtime are associated with higher levels of school burnout. Although this represents the strongest correlation observed among the variables, it remains within the low range.

Meanwhile, the relationship between School Burnout and Perceived Social Support (PSS) showed a non-significant negative correlation (r = -.056, p = .055), indicating that perceived social support is not directly and statistically associated with school burnout levels. In contrast, School Burnout showed a significant negative correlation with Academic Resilience (ARS) (r = -.131, p < .001), suggesting that students with higher academic resilience tend to experience lower levels of burnout. Self-Regulated Learning (SRL) was also significantly negatively correlated with Bedtime Procrastination (BP) (r = -.176, p < .001), indicating that students with stronger self-regulation skills are better able to manage their sleep habits and are less likely to engage in bedtime procrastination. In addition, SRL showed a significant positive correlation with Perceived Social Support (PSS) (r = .127, p < .001), suggesting that greater social support is associated with better learning regulation abilities. Furthermore, a significant positive relationship was found between Self-Regulated Learning and Academic Resilience (r = .201, p < .001), indicating that students with stronger self-regulation skills tend to demonstrate higher academic resilience when facing academic challenges and pressures. This association represents one of the strongest positive correlations within the research model.

Bedtime procrastination showed a significant negative correlation with perceived social support (r = -.071, p = .007), although the relationship was relatively weak. In addition, bedtime procrastination was negatively correlated with academic resilience (r = -.110, p < .001), indicating that higher levels of procrastination are associated with a reduced ability to cope with academic pressures and challenges. Furthermore, perceived social support showed a significant positive correlation with academic resilience (r = .118, p < .001). Overall, the correlation analysis revealed that the relationships among the constructs ranged from low to very low in magnitude, indicating that each latent variable maintains clear conceptual distinctiveness. This pattern also suggests that the model demonstrates adequate discriminant validity, as the correlations between constructs are not excessively high.

Table 6. Direct and Indirect Effect Estimation of the SEM Model

Effect	Type of Effect	*β*	*SE*	*t*-value	*p*-value
PSS → SBI	Total Effect	-.002	.049	-.048	.962
PSS → ARS → SBI	Indirect Effect	-.029	.013	-2.189	.029*
PSS → SBI	Direct Effect	.026	.048	.549	.583
SRL → SBI	Total Effect	-.129	.063	-2.064	.039*
SRL → ARS → SBI	Indirect Effect	-.150	.045	-3.324	.001**

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Effect	Type of Effect	*β*	*SE*	*t*-value	*p*-value
SRL → SBI	Direct Effect	.021	.077	.266	.790
BP → SBI	Total Effect	.500	.053	9.512	.000***
BP → ARS → SBI	Indirect Effect	.011	.012	.952	.341
BP → SBI	Direct Effect	.488	.050	9.758	.000***

Note. SE = standard error; PSS = perceived social support; SBI = school burnout inventory; ARS = academic resilience scale; SRL = self-regulated learning; BP = bedtime procrastination. $^{*}p < .05$.$^{**}p < .01$. $^{***}p < .001$.

The results of the structural equation modelling analysis revealed that academic resilience plays a varying role in the relationships between perceived social support, self-regulated learning, bedtime procrastination, and school burnout. This analysis examined the total, direct, and indirect effects, with academic resilience as a mediating variable.

Regarding the relationship between perceived social support and school burnout, the total effect was non-significant (β = -.002; t = -.048; p = .962), indicating that perceived social support did not have a significant overall influence on school burnout. Similarly, the direct effect of perceived social support on school burnout was non-significant (β = .026; t = .549; p = .583), suggesting that perceived social support alone was not directly associated with reduced school burnout among students. However, different findings emerged for the indirect contribution through academic resilience. The indirect contribution of perceived social support on school burnout through academic resilience was found to be significantly negative (β = -.029; t = -2.189; p = .029). This result indicates that perceived social support may help reduce school burnout indirectly by strengthening students' academic resilience.

The relationship between self-regulated learning and school burnout demonstrated a significant negative total effect (β = -.129; t = -2.064; p = .039), indicating that self-regulated learning generally contributes to lower levels of school burnout. However, further analysis revealed that the direct contribution of self-regulated learning on school burnout was not statistically significant (β = .021; t = .266; p = .790). This finding suggests that students' ability to regulate their learning does not directly reduce school burnout. In contrast, the indirect contribution of self-regulated learning on school burnout via academic resilience was significantly negative (β = -.150; t = -3.324; p = .001). These results indicate that self-regulated learning may reduce school burnout indirectly by enhancing students' academic resilience.

In contrast, the relationship between bedtime procrastination and school burnout demonstrated a different pattern. The total effect of bedtime procrastination on school burnout was significantly positive and relatively strong (β = .500; t = 9.512; p < .001), indicating that bedtime procrastination is a substantial predictor of school burnout. This finding suggests that students who delay bedtime more frequently tend to experience higher levels of school burnout. Similarly, the direct contribution of bedtime procrastination on school burnout was also found to be significantly positive (β = .488; t = 9.758; p < .001), indicating that bedtime procrastination directly contributes to increased levels of school burnout. However, the indirect effect of bedtime procrastination on school burnout through academic resilience was not statistically significant (β = .011; t = .952; p = .341). These findings suggest that academic resilience does not serve as a significant mediator in the relationship between bedtime procrastination and school burnout. The structural equation model of this study is presented in **Figure 2**.

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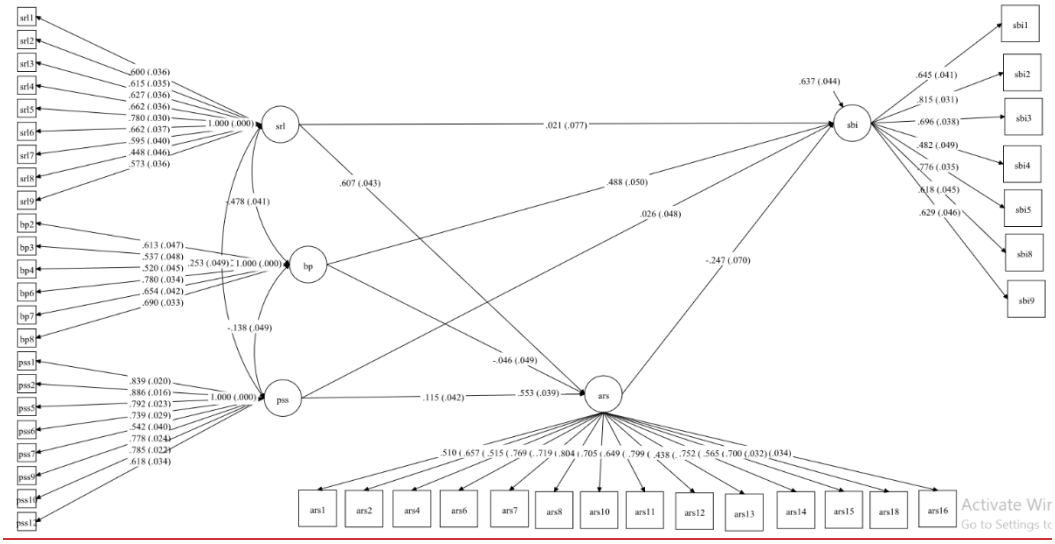

Figure 2. Structural model predicting school burnout among secondary school students: the mediating role of academic resilience in self-regulated learning, social support, and bedtime procrastination.

Discussion

This study employed a quantitative research approach using a one-step Structural Equation Modeling (SEM) analysis to examine the effects of self-regulated learning, social support, and bedtime procrastination on school burnout among secondary school students, with academic resilience serving as a mediating variable. The participants consisted of 453 secondary school students in South Tangerang City Indonesian. A stratified random sampling technique was employed, with the population divided into three strata based on grade level (VII, VIII, and IX), from which participants were randomly selected to ensure representation of each grade. Participation was entirely voluntary, and informed consent was obtained from all respondents before data collection commenced. Data collection was conducted through an online questionnaire distributed between mid-April and May 2026. The instruments employed in this study exhibited strong evidence of validity and reliability. The validity testing confirmed that all items adequately represented their respective constructs and contributed meaningfully to the measurement model. Furthermore, the reliability coefficients exceeded the recommended threshold values, indicating a high level of internal consistency and suggesting that the instruments were capable of producing accurate and dependable measurements. Five measurement instruments were utilized in this study.

Among the predictors examined, bedtime procrastination was the only variable that demonstrated a significant direct association with school burnout. Students who tended to delay bedtime reported higher levels of burnout. This finding is consistent with previous research linking bedtime procrastination to poorer sleep-related outcomes and emotional exhaustion (Kroese et al., 2016; Luo & Peng, 2026). The present findings extend this literature by suggesting that bedtime procrastination may also be relevant to school burnout as a broader construct, rather than being limited to emotional exhaustion. However, the mechanism underlying this association should be interpreted cautiously. Although delayed bedtime may reduce opportunities for adequate rest and recovery, sleep duration, sleep quality, and physiological indicators were not directly assessed in the present study. Therefore, explanations involving sleep-related physiological processes remain possible interpretations rather than mechanisms established by the current findings.

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The absence of significant direct effects of self-regulated learning and perceived social support on school burnout provides an important theoretical insight. Although previous studies have suggested that these factors may directly protect students from burnout (Poorgholamy et al., 2020; Ye et al., 2021), the present findings indicate that their contribution may be more appropriately understood in relation to students' capacity to respond to academic difficulties. Self-regulated learning involves planning, monitoring, and evaluating learning activities (Zimmerman, 2008), but these competencies may not necessarily reduce burnout in themselves. Their potential protective value may become more evident when students are able to use these competencies to persist, adjust their strategies, and respond adaptively to academic challenges. This interpretation is consistent with evidence linking self-regulated learning with adaptive responses to academic demands and academic resilience (Martin & Marsh, 2021).

A similar pattern was observed for perceived social support. Support from family, peers, and teachers was not directly associated with lower school burnout, but its relationship with burnout was evident through academic resilience. This finding suggests that the availability of social support alone may not be sufficient to reduce burnout; rather, its potential value may depend partly on how students perceive and utilize available support when facing academic challenges. Emotional encouragement, practical assistance, and a sense of belonging may provide resources that facilitate adaptive responses to academic stress (Wang et al., 2022; Hou et al., 2024). Thus, the findings highlight the importance of considering the process through which social resources may be translated into adaptive academic responses rather than assuming a uniform direct protective effect.

Academic resilience represents an important contribution of the present model. The findings provided statistical support for its mediating role in the relationships between self-regulated learning, perceived social support, and school burnout. Academic resilience refers to students' capacity to adapt and persist when facing academic difficulties and setbacks (Cassidy, 2016). In the present study, the mediation findings suggest that self-regulated learning and social support were associated with school burnout partly through their relationship with academic resilience. Students with stronger self-regulatory capacities may be better positioned to maintain adaptive learning strategies and persistence when encountering difficulties, while supportive relationships may provide resources that facilitate coping and adaptation (Hannani & Ajisuksmo, 2020; Hou et al., 2024; Satyaninrum, 2018).

Importantly, these findings should not be interpreted as demonstrating that academic resilience is an established causal mechanism. Rather, they provide statistical support for academic resilience as a mediator within the proposed model. Given the cross-sectional design of the study, the temporal and causal ordering among the variables cannot be definitively established. Nevertheless, the findings contribute to existing research by suggesting that academic resilience may be a relevant pathway through which personal and contextual resources are associated with students' experiences of school burnout. This interpretation is consistent with previous studies identifying academic resilience as an important resource in students' responses to academic stress and adversity (Putwain et al., 2023; Romano et al., 2021).

In contrast, academic resilience did not significantly mediate the relationship between bedtime procrastination and school burnout. This finding suggests that the association between bedtime procrastination and burnout may involve pathways that are not captured by academic resilience in the present model. One possible explanation is that bedtime procrastination concerns a behavioral pattern related to the timing of sleep and opportunities for recovery, whereas academic resilience primarily reflects students' adaptive responses to academic difficulties. However, this interpretation should remain tentative because sleep duration, sleep quality, daytime functioning, and physiological processes were not directly measured. Future studies could therefore examine whether sleep-related variables or other behavioral and psychological factors account for the relationship between bedtime procrastination and school burnout.

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The findings regarding gender and school type also provide a useful contextual perspective. No significant differences in school burnout were observed between male and female students or between students from junior high schools (SMP) and Islamic junior high schools (MTs). This pattern suggests that school burnout in the present sample may not be strongly differentiated by these demographic and educational characteristics. Instead, factors related to academic demands, psychological resources, and students' responses to educational pressures may be more relevant to understanding variation in burnout. This interpretation is broadly consistent with research emphasizing the role of academic demands and psychological well-being in school burnout (Salmela-Aro & Upadyaya, 2020; Read et al., 2022).

Overall, the findings contribute to the school burnout literature by integrating self-regulated learning, perceived social support, bedtime procrastination, and academic resilience within a single explanatory model. The results particularly highlight academic resilience as a statistically supported pathway linking self-regulated learning and social support with school burnout, while bedtime procrastination showed a distinct direct association with burnout. These patterns suggest that personal and social resources may not necessarily have uniform direct effects on burnout, but may be associated with students' burnout experiences through their capacity to adapt to academic challenges. At the same time, the findings regarding bedtime procrastination indicate the need to consider behavioral factors alongside psychological resources. Future research using longitudinal designs and direct measures of sleep and recovery is needed to clarify the temporal relationships and mechanisms underlying these associations.

Conclusion

This study This study contributes to the school burnout literature by highlighting academic resilience as a statistically supported pathway linking self-regulated learning and social support with school burnout, while bedtime procrastination showed a distinct direct association with burnout. These findings suggest that students' vulnerability to burnout may be better understood by considering the interplay between personal resources, social resources, adaptive capacity, and behavioral factors. Given the cross-sectional design, however, these relationships should not be interpreted as causal mechanisms.

The findings suggest that schools and student support services may consider opportunities to strengthen students' adaptive responses to academic challenges, including goal setting, self-monitoring, persistence, adaptive help-seeking, and the effective use of social support. Attention to bedtime-related behaviors and healthy sleep routines may also be relevant given the observed association between bedtime procrastination and school burnout. These recommendations should be viewed as practical considerations rather than evidence of intervention effectiveness, as the present study did not evaluate any intervention or sleep-related program.

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