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## The Effect of Academic Stress on Sleep Quality Mediated by School Burnout Among High School Students

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**Abstract.** *Academic stress is a factor that affects sleep quality. In this study, the variable that mediates the effect of academic stress to sleep quality is school burnout which is studied in the context of online learning. The research was conducted using quantitative research methods to 307 high school students in Bandung through snowball sampling. Each participant filled out the Student-Life Stress Inventory, the Secondary School Burnout Scale, and the Pittsburgh Sleep Quality Index. The data were analyzed using the Structural Equation Modeling (SEM-PLS) technique. Based on the results of the mediation model test, the VAF number was 0.17 (17% < 20%) which means that school burnout does not have a mediating effect on the effect of academic stress to sleep quality. Academic stress is more accurately seen as a direct effect. Another finding is that conflict indicator is less to represent academic stress, as well as burnout from family and burnout from studying less predict the school burnout. However, daytime dysfunction is the most representative component of sleep quality. Based on the outer loading, there are factors of academic stress, school burnout, and sleep quality that less to represent these variables. The findings reflect cultural bias. That is why this study suggests future researchers to use measuring instrument which not have risk of cultural bias.*

**Keywords:** *academic stress; high school students; school burnout; sleep quality.*

### INTRODUCTION

Generally, adolescences are in the state of pursuing formal education. In the course of education, there are various problems that might be encountered. Problems often found in adolescence are sleep quality, while sufficient sleep time and good sleep quality are the foundation for adolescent health (Yan et al., 2018). If students use their sleeping hours to study more than they are used to, they would experience academic problems the next day, such as difficulty in understanding the subject and difficulty in concentrating on completing assignments during class (Gillen-O'Neel et al., 2013). Research on Youth Risk Behavior Surveys by the Center for Disease Control and Prevention in America (2015) found that 72.7% of teenage students in the junior high school to high school education range have less sleep duration (Wheaton et al., 2018), which is less than 8 hours. Meanwhile, according to the American Academy of Sleep Medicine, adolescents aged 13-18 years need between 8-10 hours of sleep per day (Paruthi et al., 2016).

Sleep problems are not only experienced by adolescents in the United States but also by

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adolescents in various countries, including Asian countries. This demographic has an average of late sleeping hours compared to similar populations in North America and Europe, resulting in less sleep on school days and sleepiness during the day (Gradisar et al., 2011). Furthermore, sleep problems are not only perceived from the quantity but also the quality. Research in China suggests that high school students have the highest prevalence of poor sleep quality (41.9%), insufficient sleep duration (70.8%), and experiencing dysfunction in daily activities due to poor sleep quality (84.7%) (Liu et al., 2020). Corresponding to research conducted in Indonesia, 54.4% of high school students had poor sleep quality (Dhamayanti et al., 2019). The tendency of the high prevalence of sleep quality disorders in Asian countries has become a driving force to know empirically, therefore this research is essential to be conducted.

Individuals in the age range of 13-18 years are generally students, hence the low quality of sleep is presumed to originate from academic pressure. Academic demands will result in stressful or pressured situations. Increasing the perception of stress among students can diminish sleep quality (LeBlanc et al., 2007; Noland et al., 2009). If learning is the main activity carried out by students, academic stress can be classified as a psychological stressor for students (Yan et al., 2018). Academic stress is defined as a negative emotional experience accompanied by several changes in the individual (Putra, 2015). Changes within oneself as an indicator of the presence of a stressor can take the form of internal or physiological reactions, emotional reactions, and behavioral reactions, thus leading to cognitive appraisals (Gadzella, 1994). The Covid-19 pandemic, spreading globally since the end of 2019, has prompted the issuance of various regulations, including in the academic field. Learning activities that originally took place offline then shifted online mode. This change in the implementation of academic activities requires an adaptation process that is difficult for students and will contribute to academic stress (Norma et al., 2021).

Accumulated stress in the academic field will interfere with student performance in completing school assignments thereby improving the chances of burnout (Prins et al., 2007; Spangler et al., 2002). Burnout refers to a psychological state related to the response to prolonged academic stressors (Maslach, 2003). Burnout may occur in a variety of life settings, such as work and school. School burnout which represents a negative psychological state within students will reduce students' desire to pursue academic objectives and it will gradually affect their learning performance or academic performance (Basri et al., 2022). Similar findings from former studies affirm that school burnout is a continuous phenomenon, starting from academic stress that amasses and eventually forms major burnout (Salmela-Aro & Upadyaya, 2014). The three dimensions of school burnout, namely emotional exhaustion, cynicism, and academic inadequacy, are manifested as students' reluctance to participate actively in class activities, less enthusiasm in participating in learning activities, and more silence when participating in discussion activities in class (Salmela-Aro et al., 2009; Smith et al., 2020; Yan et al., 2018).

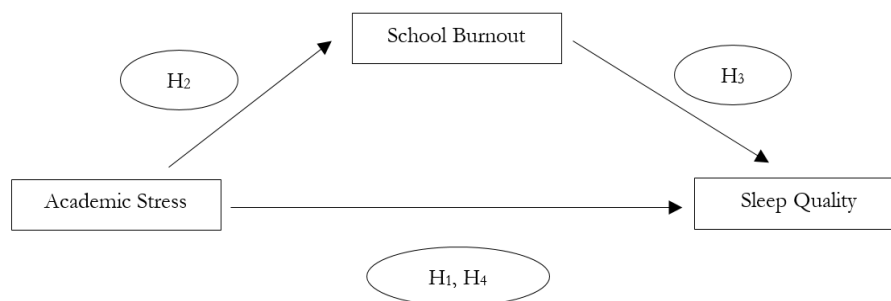
Fatigue, which is a component of burnout, is closely related to subjective sleep quality, which is a component of sleep quality (Shad et al., 2015). Additionally, school burnout experienced by high school students has an impact on the emergence of daytime sleepiness, fatigue, and overall sleep quality which results in a decrease (Lehto et al., 2019).

Adolescence is a critical phase in the development of life span, therefore adequate sleep time and well-maintained sleep quality will be the basis for developing healthy adolescents (Yan et al., 2018). In fact, teenagers experiencing poor sleep quality is a phenomenon found in various countries (Yan et al., 2018). Given the dominant activity of adolescents is studying as the state they are in, academic stress becomes a psychological stressor that is undeniable. The research findings of Yan et al. (2018) show that academic stress has a negative relationship with sleep quality, which

implies that the higher the academic stress of the students, the lower the quality of sleep is. A series of prolonged academic stress events, triggering the onset of school burnout and leading to disruption of sleep quality, is a phenomenon that precipitates interest so it will be examined through this research. Given that school burnout will strengthen the possibility of increasing sleep quality disturbances in students, therefore school burnout in this research will be positioned as a mediator as well as the uniqueness of this research.

School burnout as a mediator gives an understanding that every reinforcement of academic stress will directly strengthen the occurrence of school burnout and in the end will be the source of disruption of sleep quality. For this reason, the researcher will test four hypotheses as temporary answers to the direct effect of academic stress on sleep quality disturbances or the indirect effect of academic stress on school burnout as a mediator.

The research hypothesis is formulated as follows H1: There is effect of academic stress on sleep quality; H2: There is effect of academic stress on school burnout, H3: There is effect of school burnout on sleep quality, and H4: There is effect of academic stress on sleep quality through the role of school burnout as a mediator.



**Figure 1.**  
Hypothetical Model

## METHOD

This study uses a causal relationship method to observe cause and effect (Sugiyono, 2017) from exogenous variables (independent variable, namely academic stress) to endogenous variables (dependent variable, namely sleep quality) with school burnout as a mediator. The target population was high school students, using the snowball sampling technique, and obtained 307 high school students in the city of Bandung. All participants stated their willingness to complete the online questionnaire as informed consent was given.

This study utilized the Student-Life Stress Inventory (Gadzella, 1994) translated by researchers into Indonesian to measure academic stress. The total consists of 51 items and has 5 (five) answer choices, namely never (1), seldom (2), occasionally (3), often (4), and most of the time (5). After testing the validity and reliability using the Confirmatory Factor Analysis technique, 34 valid items were obtained with factor loading values of 0.60-0.90. Meanwhile, the reliability of the 9 (nine) indicators applying 3 (three) criteria, namely Cronbach's Alpha, Composite Reliability, and AVE, obtained that all aspects and indicators are constructively fit and reliable with a 95% confidence level. An example of an item is "As a student, I have experienced failures in accomplishing the goals that I set (aspects of stressors, indicators of frustration); "During stressful situation, I have experienced the Irritable bowels, peptic ulcers, etc (stomach, intestines, and others)" (aspects of stress reactions, physiological indicators).

School Burnout was measured by the Secondary School Burnout Scale (Aypay, 2012) which was translated by researchers into Indonesian to measure school burnout. It consists of 34 items with 4 (four) answer choices, namely Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD). Validity and reliability testing was carried out using the Confirmatory Factor Analysis technique; 33 valid items were obtained with factor loading values of 0.55-0.85. All items based on the criteria of Cronbach's Alpha, Composite Reliability, and AVE of this instrument are fit and constructively reliable at the 95% confidence level. The instances are "I don't want to study" and "I often feel incompetent at school" items.

Sleep quality was assessed by the Pittsburgh Sleep Quality Index (PSQI) (Buysse et al., 1989). This measuring instrument assessed of 7 (seven) components, and the respondents answered them by conducting a self-rating. This PSQI measurement tool has been adapted to Indonesian (Setyowati & Chung, 2021). After confirmatory factor analysis (CFA) was performed on sleep quality variables, a factor loading range acquired 0.43-0.69. The factor loading standard is greater than 0.70, however, the factor loading range is 0.43-0.69. Fulfilling the criteria may evaluate content validity by fully taking into account the effect on AVE gains and composite reliability. Its composite reliability is 0.77, denoting that it remained exceeding the standard limit of 0.70 despite AVE being lower than 0.50 (Hair et al., 2017). The Indonesian version of the PSQI measurement tool based on Cronbach's Alpha criteria, Composite Reliability, and AVE is known to be constructively fit and reliable. Meanwhile, one component of the PSQI, sleep medication use, was excluded from the measuring instrument as the factor loading value was so low (0.29) that it was unfit and not constructively reliable. These findings suggest that the use of sleeping pills is irrelevant and does not support sleep quality disturbances.

All data in the research model were examined with the PLS Structural Equation Model (SEM). The variable construct is reflective which is indicated by measuring arrows from the direction of the latent variable towards the indicator. As a complete description, it is shown in Figure 3 the results of model testing.

## RESULTS AND DISCUSSION

Based on the respondent's data collection, 307 high school students in Bandung City were consent to fill out the questionnaire. Table 1 shows that the majority of respondents were female students (63.2%), third grade (45.65%), and science majors (57%).

**Table 1.**  
Description of Respondents

	Category	Number	Percentage
Sex	Male	113	36.8%
	Female	194	63.2%
Grade	Grade 1	102	33.2%
	Grade 2	65	21.2%
	Grade 3	140	45.6%
Major	Natural Science	175	57%
	Social Science	126	41%
	Language	6	2%

The results of validity and reliability tests of each variable with confirmatory factor analysis (CFA) are presented in table 2. Table 2 displays valid and significant aspects and indicators of academic stress at a significance level of 5% (\*\*).

**Table 2.**  
 Second Stage of Academic Stress CFA Tests

Aspect	Indicator	Factor Loading	Range for CFA Factor Loading
Stressors	Frustration	0.82**	0.69* - 0.78**
	Conflict	0.66**	0.73** - 0.76**
	Pressure	0.77**	0.73** - 0.78**
	Change	0.81**	0.83** - 0.89**
	Self-Imposed	0.76**	0.64* - 0.84**
Reaction	Physiological	0.79**	0.61* - 0.81**
	Emotional	0.87**	0.69* - 0.82**
	Behavioral	0.83**	0.58* - 0.81**
	Cognitive Appraisal	0.74**	0.70** - 0.90**

Table 3 shows the academic stress variable and the indicators are constructively suitable and reliable.

**Table 3.**  
 Second Stage of Academic Stress Goodness of Fit and Reliability Tests

Construct	Cronbach's Alpha	Reliability Composition	AVE
Academic Stress	0.94**	0.95**	0.62**
Frustration	0.73**	0.83**	0.56**
Conflict	0.66**	0.82**	0.60**
Pressure	0.75**	0.84**	0.57**
Change	0.81**	0.89**	0.73**
Self-Imposed	0.63**	0.80**	0.57**
Physiological	0.80**	0.86**	0.50**
Emotional	0.73**	0.83**	0.56**
Behavioral	0.75**	0.83**	0.51**
Cognitive Appraisal	0.50**	0.79**	0.66**

Table 4 shows the factors of school burnout are valid and significant at a significance level of 5% (\*\*).

**Table 4.**  
 Second Stage of School Burnout CFA Test

School burnout factors	Factor Loading	Range for CFA Factor Loading
Loss of interest	0.80**	0.59* - 0.84**
Burnout from family	0.55*	0.70** - 0.84**
Burnout from studying	0.74**	0.58* - 0.74**
Burnout from homework	0.85**	0.53* - 0.83**

School burnout factors	Factor Loading	Range for CFA Factor Loading
Burnout from teacher's attitude	0.78**	0.77* - 0.82**
Need to rest and time for fun	0.73**	0.68* - 0.85**
Feeling of insufficiency	0.69**	0.59* - 0.83**

Table 5 shows the variables of school burnout and the factors are constructively fit and reliable.

**Table 5.**  
 Second Stage of School Burnout Goodness of Fit and Reliability Tests

Construct	Cronbach's Alpha	Reliability Composition	AVE
School burnout	0.93**	0.93**	0.55**
Loss of interest	0.85**	0.89**	0.58**
Burnout from family	0.81**	0.87**	0.57**
Burnout from studying	0.76**	0.84**	0.51**
Burnout from homework	0.77**	0.85**	0.53**
Burnout from teacher's attitude	0.80**	0.87**	0.62**
Need to rest and time for fun	0.78**	0.86**	0.60**
Feeling of insufficiency	0.75**	0.84**	0.57**

Based on Table 6, the components of sleep quality are maintained by considering content and reliability besides the component of using sleeping pills.

**Table 6.**  
 Second Stage of Sleep Quality CFA Test

Sleep Quality Components	Factor Loading
Subjective sleep quality	0.65*
Sleep latency	0.63*
Sleep duration	0.67*
Habitual sleep efficiency	0.43*
Sleep disturbance	0.60*
Sleep medication use	0.29
Daytime dysfunction	0.69*

Table 7 exhibits the variables of sleep quality and the components fit and are constructively reliable.

**Table 7.**  
 Second Stage of Sleep Quality Goodness of Fit and Reliability Tests

Construct	Cronbach's Alpha	Reliability Composition	AVE
Sleep Quality	0.66**	0.77**	0.34

As a follow-up, factor testing was carried out from the variables studied, testing the

relationships between factors, as well as testing compatibility and reliability. The test results are presented in table 8.

**Table 8.**  
Inner Variable Test of Academic Stress

<b>Academic Stress Indicator</b>	<b>Factor Loading</b>	<b>VIF</b>
Frustration	0.82**	2.67*
Conflict	0.67**	1.60*
Pressure	0.78**	2.07*
Change	0.82**	2.62*
Self-Imposed	0.77**	2.28*
Physiological	0.77**	2.15*
Emotional	0.86**	3.41*
Behavioral	0.82**	2.95*
Cognitive Appraisal	0.73**	1.97*

Table 8 suggests that there is no collinearity in measuring construct indicators of academic stress (VIF < 5) and all indicators have a significance level of 1% (\*\*).

**Table 9.**  
Inner Variable Test of School Burnout

<b>School burnout factors</b>	<b>Factor Loading</b>	<b>VIF</b>
Loss of interest in school	0.73**	1.83*
Burnout from family	0.59**	1.27*
Burnout from studying	0.65**	1.85*
Burnout from homework	0.79**	2.46*
Burnout from teacher's attitudes	0.76**	1.95*
Need to rest and time for fun	0.77**	1.77*
Feeling of insufficiency at school	0.76**	1.61*

Based on Table 9, it is found that there is no collinearity in measuring the construct indicators of school burnout (VIF < 5) and all the factors show a significance level of 1%.

**Table 10.**  
Inner Variable Test of Sleep Quality

<b>Sleep Quality Dimension</b>	<b>Factor Loading</b>	<b>VIF</b>
Subjective sleep quality	0.68**	1.34*
Sleep latency	0.60**	1.24*
Sleep duration	0.61**	1.36*
Habitual sleep efficiency	0.34**	1.12*
Sleep disturbance	0.65**	1.23*
Daytime dysfunction	0.76**	1.33*

Table 10 shows that there is no collinearity in the measurement of sleep quality construct

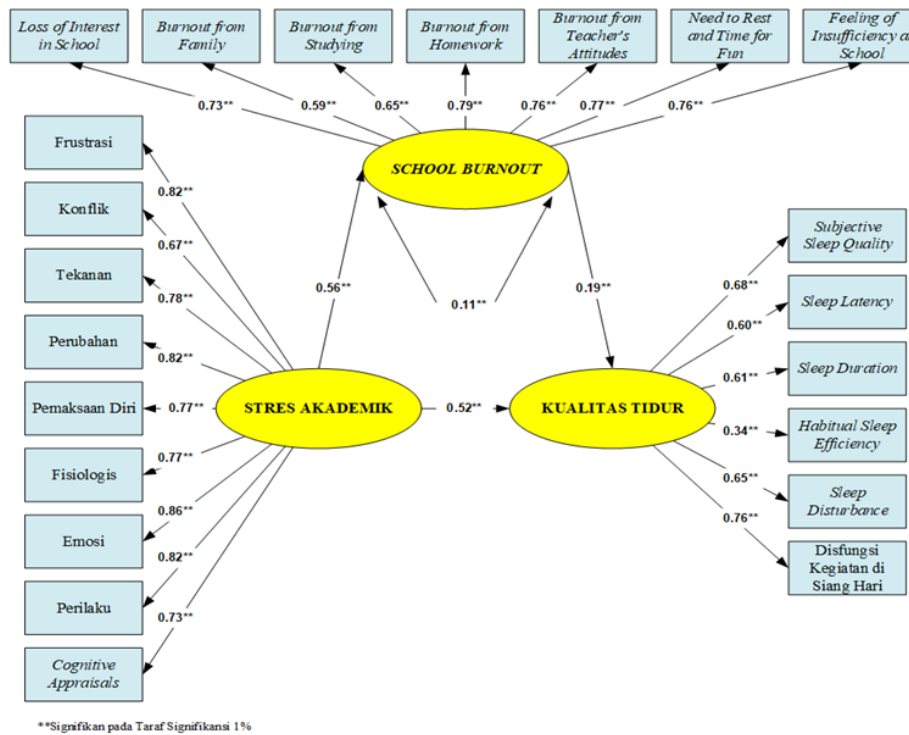
components (VIF < 5). All dimensions of sleep quality are significant at the 1% level.

**Table 11.**  
**Goodness of Fit and Reliability Tests of All Variables**

Construct	Cronbach's Alpha	Reliability Composition	AVE	R <sup>2</sup>
Academic Stress	0.92**	0.93**	0.61**	
School burnout	0.85**	0.88**	0.53**	0.31*
Sleep Quality	0.68**	0.78**	0.38**	0.42*

Table 11 shows that the variables studied are fit and reliable as a construct (\*\*) and have a moderate influence (R<sup>2</sup>).

Results of data processing:



Note: Clockwise= Sleep quality --> Daytime dysfunction; Academic stress --> Frustration, Conflict, Pressure, Change, Self-Imposed, Physiological, Emotional, Behavioral. Level of significant at 1%.

**Figure 2.**  
 Model Testing Results

Based on Table 12, academic stress has a direct effect on sleep quality ( $r^2 = 0.52$ ) or school burnout ( $r^2 = 0.56$ ). This direct effect is far greater compared to the indirect impact of academic stress on sleep quality with school burnout mediators (11%). If this result is followed up by calculating the VAF (Variance Accounted For) value. The VAF value obtained is 17%; this value is less than 20% as the statistically required VAF value.



$$VAF = \frac{Indirect\ Effect}{Direct + Indirect\ Effect} = \frac{0.11}{0.11 + 0.52} = 0.17$$

**Figure 3.**  
 VAF (Variance Accounted For)

Given the VAF score, it was found that school burnout in this research model did not have a role in mediating the effect of academic stress on the sleep quality of respondents. It suggests that despite of academic pressure felt by the respondent and its influence on the development of school burnout, such results are not representative enough to change or distract the quality of the respondent's sleep. A VAF value of <20% denotes that the mediator variable does not play a role in mediating the effect of the independent variable on the dependent variable (Hair et al., 2017).

**Table 12.**  
 The Effect of Outer Variable

Effect between Factors	Effect Coefficient	Effect Size	VAF
Academic Stress --> School Burnout	0.56 **	0.45 *	-
Academic Stress --> Sleep Quality	0.52 **	0.32 *	-
School Burnout --> Sleep Quality	0.19 **	0.04	-
Academic Stress --> School Burnout --> Sleep Quality	0.11 **	-	0.17

Note : \* The power of predictive factors is moderate (0.16 – 0.35)

\*\* Significance at 1% Level

The direct effect of academic stress on sleep quality and school burnout is in line with previous research that the more stress experienced by individuals, the more school burnout will increase (Veyis et al., 2019), and conversely, it will reduce sleep quality (LeBlanc et al., 2007; Noland et al., 2009). Shortly, the effect of academic stress on sleep quality is more appropriate to be perceived as a direct effect rather than aiming at school burnout as a mediator between the two situations. Respondents did not require to experience burnout beforehand because academic stress could directly affect sleep quality. The results of this study correspond to previous studies which suggest that academic stress can directly reduce sleep quality (Yan et al., 2018). Those who experienced academic stress, for example feeling frustrated or under pressure due to academic demands beyond their initial ability to cope with the situation, would automatically have an impact on disrupting sleep quality, therefore triggering dysfunction in performing activities during the day in a school setting.

Based on Figure 2, it can be inferred that almost all factors in academic stress can govern school burnout and the quality of the respondent's sleep. As an illustration, academic stress, which is represented by stressors and physiological reactions, simultaneously modifies school burnout and sleep quality. Considering the findings of this study, emotional factors such as sadness and anger, changes in academic activities, frustration, and self-blame show the strongest influence in responding to daily academic demands. Meanwhile, conflict factors in academic stress do not trigger burnout or disrupt sleep quality. After all, without the presence of conflict among the participants, school burnout or sleep quality remains possible and can manifest in academic activities.

Further investigation of the direct impact of academic stress on sleep quality implies

that the factor most affected by sleep quality is the daytime dysfunction. Respondents with less optimal performance in their academic activities at school, for example, lack of focus, and lack of enthusiasm in assignments and learning activities in class, drowsiness, and lack of concentration, are indicators related to sleep quality disturbances as a result of perceived academic stress. Meanwhile, the other components of sleep quality, namely subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, and sleep disturbances, were relatively stable despite the presence of school burnout.

On the other hand, academic stress will not only be a cause of disturbed sleep quality but also a condition that can develop school burnout. High school students are always struggling with school life, tests or assignments, unable to live up to teachers' expectations, afraid of failing in exams, dealing with parent's demands as well as unrealistic self-demands, and experiencing bad relationships with friends or teachers for various reasons that can trigger the formation of academic stress in students (Veyis et al., 2019). Facing academic tasks that are intensive and continuous in school can cause difficulties for students. Not to mention the existence of academic demands and expectations from the students themselves, parents, and teachers will further provoke the occurrence of physical, psychological, and mental symptoms. Such school burnout will make students doubt their competence in learning at school (Salmela-Aro et al., 2009). Furthermore, other studies state that school burnout is important to study in high school students because it can be a major cause of mental health disorders (Walburg, 2014). Negative emotional states, changes in academic demands, and frustrations that middle students feel when dealing with academic activities will be the driving force behind the formation of school burnout. School burnout manifests in losing interest in school activities, feeling overwhelmed with school assignments, feeling uncomfortable with the attitude displayed by the teacher, requiring time out from academic routines to rest, and feeling inadequate as a school student, which then becomes the cause of disturbed sleep quality. Disturbance in sleep quality has an impact on non-optimal activities the respondents engage in during the day, especially during school hours.

The findings of this study also indicate that the sleep quality measurement tool is not valid for the factor of sleep medication use. The possible cause is that the participants who are high school students and are in the adolescent phase are not familiar with the use of sleeping pills. More than that, the sleep disturbances experienced are mostly caused by academic demands that students encounter, such as during weekends of tests, or when dealing with demanding academic assignments.

## CONCLUSION

Based on the results of the research, it can be summarized that school burnout does not act as a mediator in the effect of academic stress on students' sleep quality. The direct effect of academic stress on school burnout and the direct effect of academic stress on sleep quality can be shown as findings in this study. Conflict indicators do not represent academic stress, nor do burnout from family and burnout from studying predict school burnout. Meanwhile, only daytime dysfunction represents the component of sleep quality disturbances.

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