

Association between insomnia and social network site use in Indonesian adolescents

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Abstract

Objectives: Sleep deprivation can cause serious physical and mental problems. Although sleep deprivation among adolescents is not a new phenomenon, this problem has recently gained more attention due to the frequent use of smartphones. This study aimed to explain the correlations among family support, academic stress, social network site (SNS) use, and insomnia in adolescents.

Methods: This cross-sectional study included 180 adolescents aged 16 to 17 years, with simple random sampling. This study used a questionnaire that included the frequency and duration of social media use, reasons for using social media, family support, academic stress, and insomnia. Data were analyzed using multiple logistic regression with a degree of significance at $P < 0.05$.

Results: This study showed that insomnia was associated with duration of SNS use ($P = 0.011$), reasons of SNS usage ($P = 0.004$), and academic stress ($P = 0.013$). The frequency of SNS use ($P = 0.645$), types of SNS ($P = 0.965$), and family support ($P = 0.150$) were not associated with insomnia in adolescents.

Conclusions: The reasons of SNS usage, duration of SNS usage, and academic stress are major factors associated with insomnia in adolescents. These components should be embedded in multicomponent educational intervention addressed to both adolescents and parents to reduce insomnia.

KEYWORDS

academic stress, adolescents, family support, insomnia, social network sites

1 | INTRODUCTION

Sleep deprivation can have serious consequences, such as increased risk for physical and mental problems.¹ Sleep deprivation may increase in adolescents who are undergoing the most important period of physical, cognitive, and psychosocial development. These changes have a direct impact and affect subsequent development.² Insomnia is the most common sleep deprivation problem that frequently occurs in adolescents.³ Insomnia is clinically defined as a subjective perception of dissatisfaction with the amount and/or quality of the sleep usually difficulties falling asleep in spite of being in bed, waking up often during the night and having trouble going back to sleep, waking up too early in the morning or having an

unrefreshing sleep.⁴ Particularly, increased mobile use and wireless internet access⁵ can potentially cause addictive social media use, which are features of social network sites (SNSs).^{6,7} Addictive behavior is defined as a repetitive habit pattern which increases the risk of disease and social⁸ and personal problem.⁹ Meanwhile, social network addiction is defined as the excessive use of SNS sites. As adolescents engage intensely with social media, their chances of increasing sleep deprivation are likely.

The concept of SNS addiction was explained when individuals consider that their SNS use may become the most important activity that they engage in, which leads to a preoccupation with SNS use. The activities on these sites are inducing mood alteration. Increased amounts of time and energy are required to engage with SNS

activities. When SNS use is discontinued, individuals experience negative psychological and sometimes physiological symptoms.⁷ This condition can cause increased demands on adolescents that conflict with sleeping, which, in turn, can negatively impact physical, social, and psychological health.¹⁰

Currently, SNSs have become a part of the lives of adolescents, as evidenced by adolescents aged 13 to 17 years being the most frequent users of SNS.^{11,12} In Indonesia, for example, approximately 30 million adolescents are SNS users.^{13,14} Approximately 40% of adolescents spend 3 to 5 hours per day using SNS, accessing SNS more than 10 times per day, and using at least three types of SNS. SNS use in adolescents can impact their social life,¹⁵ quantity of sleep,¹⁶ and sexuality,¹⁷ and may lead to symptoms traditionally associated with substance-related addictions.¹⁸

High SNS use can trigger the occurrence of anxiety, depression, and suicide.¹⁹ SNS use can negatively impact moral development in adolescents, such as increased incidence of cyber-bullying²⁰ and SNS addiction, which could lead to social withdrawal.^{21,22} Mobile phone overuse can be linked to unhealthy sleep habits and insomnia.²³ High SNS use and insomnia can affect the physical, psychosocial, cognitive, moral, and social development of adolescents. Insomnia can cause decreased health status, increased weight, and increased risk of cardiovascular and cardiometabolic disorders.²⁴ Insomnia can also have an impact on psychosocial development, such as depression, anxiety, withdrawal, and aggression.²⁵ Insomnia may affect the cognitive development in adolescents, such as memory loss, concentration disorders, and decreased the speed of thought and response processes.²⁶ Insomnia can also affect the social development in adolescents, such as mood disorders, social dysfunction, and making them always feel tired and sleepy.²⁶

Insomnia in adolescents can be caused by many factors. Spielman's theory (1987) states that the following three factors could lead to the occurrence of insomnia in adolescents: predisposing factors (family support), precipitation factors (school burden), and confounding factors (social media use).^{27,28} Adolescents have a habit of accessing SNS before bedtime, which causes delayed sleeping time and shorter sleep duration. Some studies^{29,30} also reported a link between the use of mobile phones before bed and insomnia. High mobile phone use causes insomnia in adolescents, which may be due to decreased melatonin secretion caused by the light emitted from the phones, causing sleeping difficulties.³¹

The process of social media addiction¹⁸ comprises: *salience*, the use of SNS dominates the thoughts, behavior, and emotions of individuals, causing them to anticipate the next session of social media use; *mood modification*, the use of social media could affect emotional change levels, such as perceived satisfaction after using social media; *tolerance*, excessive increase in the duration of social media use; *withdrawal*, the sense of dissatisfaction or uneasiness when not using social media or dismissed its use; *conflict*, which refers to the conflict between the user and others regarding the time spent in using excessive social media and the conflict between the user and others due to personal behavior in social media; *relapse*, the tendency

to reuse social media despite attempts in controlling the urge to use social media.

Family support is also important in adolescent development. Family support can influence social, psychosocial, and educational development in adolescents. Family support encourages a sense of security and comfort, which reduces stressors in adolescents.²⁹ In addition, the burden of school or *academic stress* is one of the stressors often experienced by almost all students worldwide.³¹ School load occurs when a student experiences feelings of discomfort, difficulty, or lack of motivation.³²

The prevalence and enormous impact of SNS use, family support, school burden, and insomnia have been major problems in adolescents. Therefore, knowing the relationship between the use of social media, family support, and school load and insomnia needs to be tested. The results of this study are expected to provide understanding for adolescents, nurses, and educational institutions as the basis of thinking to direct the wise and positive use of social media in adolescents. The purpose of the study was to examine the relationship among family support, academic stress, social media use (duration, frequency, type of SNS use, and level of SNS addiction), and insomnia in adolescents.

2 | MATERIALS AND METHODS

2.1 | Methods

The design of this study was descriptive analytic with a cross-sectional approach.

2.2 | Data collection

Participants were students in Senior High School in Surabaya. The sample size was 180 adolescents aged 16 to 17 years, which was obtained by simple random sampling. The researcher collected data regarding the use of SNS, family support, school load, and insomnia.

The questionnaire of social media sites addiction, adapted from Can and Kaya³³ and from Kuss and Griffith.⁷ The instrument comprised 26 two-choice questions (*yes/no*). This questionnaire is mainly focused on the frequency and duration of SNS use also the phase of SNS addiction. This instrument has been validated with reliability score Cronbach's $\alpha = 0,907$.

The questionnaire of family support was adapted from Friedman theory. The instruments comprised 16 questions with a 4-point scale (*never/sometimes/often/always*). This questionnaire measure instrumental support, informational support, emotional support, and appraisal support. This instrument has been validated with reliability score Cronbach's $\alpha = 0,925$. The outcome of family support is described as low, medium, and high. The questionnaire of school load was measure based on Verma and Gupta components of school load.³⁴ This instruments comprised 10 questions with a 4-point scale (*very not agree/ not agree/ agree/very agree*). This questionnaire mainly measures physical demands, task demands, role demands, and interpersonal demands. This instrument has been validated with

reliability score Cronbach's $\alpha = 0,913$. The outcome of the school load is described as low, medium, and high.

The outcome of interest was insomnia, defined as insomnia and no insomnia. The questionnaire of insomnia was adapted from the *Diagnostic and Statistical Manual of Mental Disorders* (fifth edition) for insomnia. This instrument comprised of 14 questions with two-choice (yes/no). This questionnaire measure sleep disturbance of insomnia. This instrument has been validated with reliability score Cronbach's $\alpha = 0,919$. We also considered the demographic data such as age (in years), sex (male/female), family information, type of SNS used, activity during SNS use, and the level for using SNS.

2.3 | Data analysis

Data were analyzed using multiple logistic regression, with $P < 0.05$ considered statistically significant. With regard to multiple logistic regression, the null hypothesis (Ho) is rejected if $P < 0.05$; hence, a significant relationship is found between two variables.

2.4 | Ethical clearance

This study was approved by the ethical commission of Faculty of Nursing, Universitas Airlangga, No: 385-KEPK (Health Research Ethics Committee).

3 | RESULTS

The results of this study included the identification of demographic data, activities performed while using SNS, level for using SNS, distribution of respondents by type of SNS, frequency, duration, types of SNS use levels, family support, school load, and insomnia, hypothesis test result analysis, and dominant factors that affect adolescents.

Most of the respondents were aged 17 years, with female predominance at 117 respondents (65%) (Table 1). All respondents lived with their families. Most fathers (52 respondents) were private employees. Most mothers (104 respondents) were housewives. Most respondents reported that sending and receiving messages or chatting were the activities performed while using SNS (Table 2). These findings are supported by a previous study,³⁵ which stated that two-thirds of adolescents use social media to send and receive messages. This is because adolescents use social media to create and maintain relationships, particularly with their friends for daily communication.

Most respondents reported that the reason for using social media was to seek and share information (94.4%) (Table 3). This is also supported by a previous study,²² which stated that social media provides a supportive environment for youth and makes room for them to seek and share information about everything, including their life, necessities of life, health, music, movies, video games, and so on.

The type of SNS that is often used by almost all respondents (172 respondents, 95.6%) is the LINE application. LINE is a mobile

TABLE 1 Demographic data of respondents (sex, age, place of residence, and occupation of parents) (n = 180)

| Demographic characteristics | n | % |
|--|------|------|
| Sex | | |
| Female | 117 | 65 |
| Male | 63 | 35 |
| Mean age, y | 16,5 | |
| 16 | 78 | 43 |
| 17 | 102 | 57 |
| Staying with family | | |
| Yes | 180 | 100 |
| No | 0 | 0 |
| Father's occupation | | |
| Civil servants | 46 | 26 |
| Lawyer | 1 | 0.5 |
| Entrepreneur | 42 | 23 |
| Doctor | 9 | 5 |
| Employees | 52 | 29 |
| Lecturer | 3 | 1.7 |
| Teacher | 7 | 3.9 |
| Consultant | 2 | 1.1 |
| Army | 6 | 3.3 |
| Police | 4 | 2.2 |
| Contractor | 2 | 1.1 |
| Government corporation employee | 4 | 2.2 |
| Bank employees | 1 | 0.5 |
| Head of neighbourhood | 1 | 0.5 |
| Mother's occupation | | |
| Housewife | 103 | 57.8 |
| Doctor | 9 | 5 |
| Entrepreneur | 20 | 11.1 |
| Civil servants | 16 | 8.3 |
| Lecturer | 5 | 2.8 |
| Teacher | 13 | 7.2 |
| Private employees | 10 | 5.6 |
| Freelance sales | 1 | 0.55 |
| Government corporation employee | 1 | 0.55 |
| Member of Surabaya City House of Representatives | 1 | 0.55 |
| Bank employees | 1 | 0.55 |

messaging app which is very popular among Indonesian adolescents. The frequency of SNS use at least four times and greater than 1 hour were reported in 122 respondents (67.8%). However, 58 respondents (32.2%) did not experience the frequency of SNS use as four times

TABLE 2 Activities performed while using SNS in adolescents, respondents can choose more than one activity

| Activities while using SNS | n | % |
|--|----|------|
| Send and receive messages or chat | 56 | 31.1 |
| Add, edit, send, and tag photos | 32 | 17.9 |
| Add and post videos | 8 | 4.4 |
| Conduct discussions with groups (groups) | 42 | 23.3 |
| Stalk other people's posts | 25 | 13.9 |
| Shop online | 16 | 8.9 |
| Looking for ideas | 1 | 0.5 |

Abbreviation: SNS, social network site.

TABLE 3 Reasons using SNS in adolescents, respondents can choose more than one activity

| Reasons for using SNS | n | % |
|-----------------------------------|----|------|
| Following the current trend | 12 | 6.7 |
| Search and share information | 66 | 36.7 |
| Make it easy to find new friends | 22 | 12.2 |
| Make it easy and find old friends | 28 | 15.6 |
| Ease of use | 46 | 25.5 |
| Means of communication | 4 | 2.2 |
| Entertainment purposes | 2 | 1.1 |

Abbreviation: SNS, social network site.

TABLE 4 Distribution of respondents by social media types, frequency, duration, types of social media use, family support, school burden, and insomnia in adolescents

| Respondent distribution | n | % |
|------------------------------|-----|------|
| Social media type | | |
| LINE | 49 | 27.2 |
| Instagram | 28 | 15.5 |
| Youtube | 25 | 13.9 |
| WhatsApp | 22 | 12.2 |
| Twitter | 16 | 8.9 |
| Path | 14 | 7.9 |
| Facebook | 11 | 6.1 |
| Lawyer | 7 | 3.9 |
| Snapchat | 2 | 1.1 |
| Pinterest | 2 | 1.1 |
| BBM (BlackBerry Messenger) | 2 | 1.1 |
| Kaskus | 2 | 1.1 |
| KakaoTalk | 2 | 1.1 |
| Frequency of SNS use | | |
| >4 times | 122 | 67.8 |
| <4 times | 58 | 32.2 |
| Duration of SNS use, h/d | | |
| >5 | 125 | 69.4 |
| <5 | 55 | 30.6 |
| Types social media addiction | | |
| Saliency | 14 | 7.8 |
| Mood modification | 47 | 26.1 |
| Tolerance | 76 | 42.2 |
| Withdrawal | 3 | 1.7 |
| Conflict | 24 | 13.3 |
| Relapse | 16 | 8.9 |
| Family support | | |
| Low | 9 | 5 |
| Medium | 92 | 51.1 |
| High | 79 | 43.9 |
| School Load | | |
| Low | 2 | 1.1 |
| Medium | 105 | 58.3 |
| High | 73 | 40.6 |
| Insomnia | | |
| No insomnia | 84 | 46.7 |
| Insomnia | 96 | 53.3 |

and greater than 1 hour (Table 4). The duration of SNS use of 5 hours or more per day was reported in 125 respondents (69.4%). However, 55 respondents (30.6%) did not experience using social media with a duration of 5 hours or more per day. *Tolerance* was reported by 42.2% of respondents in this study to be the most common level for social media use (Table 4). The level of family support provided to the respondents was in the moderate category (51.1%). The school load perceived by the respondents was in the medium category (58.3%). In addition, 84 respondents (46.7%) did not experience insomnia, whereas 96 respondents (53.3%) experienced insomnia (Table 4).

The type of SNS was not associated with insomnia ($P = 0.965$). The frequency of SNS use of at least four times and greater than 1 hour was not associated with insomnia ($P = 0.645$). The duration of SNS use of 5 hours or more per day was not associated with insomnia ($P = 0.011$). The level for using social media was to have a relationship with insomnia ($P = 0.004$) (Table 5). Based on these study results, family support was not associated with insomnia ($P = 0.150$), whereas school loads were associated with insomnia ($P = 0.013$). Based on the results of the hypothesis testing, the duration, type of social media use levels, and school load were found to have a significant association with insomnia. However, the types of social media, frequency, and family support were not associated with insomnia. An

TABLE 5 Results of the influence of SNS types, frequency, duration, SNS use type, family support, and school expenses against insomnia in adolescents ($n = 180$)

| Factors | Insomnia | | |
|-------------------------|----------|--------|---------------------|
| | P value | Exp B | 95% CI for Exp (B) |
| Type of SNS | 0.965 | 1.003 | 0.965 (0.889-1.131) |
| LINE | 0.907 | 0.907 | 0.046-17.988 |
| Instagram | 0.569 | 2.431 | 0.114-51.840 |
| Youtube | 0.518 | 2.739 | 0.129-58.292 |
| WhatsApp | 0.417 | 3.555 | 0.166-76.210 |
| Twitter | 0.458 | 3.307 | 0.141-77.851 |
| Path | 0.589 | 2.380 | 0.103-55.240 |
| Facebook | 0.854 | 1.353 | 0.054-34.110 |
| Snapchat | 0.958 | 0.912 | 0.030-27.788 |
| Pinterest | 0.999 | 0.000 | 0.000- |
| BBM | 0.587 | 3.073 | 0.053-177.416 |
| Kaskus | 0.999 | 0.000 | 0.000- |
| Frequency | 0.391 | 1.402 | 0.648-3.036 |
| Duration | 0.039 | 0.455 | 0.216- 0.961 |
| Levels of SNS addiction | 0.004 | 0.710 | 0.562-0.897 |
| Saliency | 0.155 | 3.69 | 0.610-22.334 |
| Mood modification | 0.100 | 3.012 | 0.809-11.222 |
| Tolerance | 0.048 | 3.609 | 1.010-12.896 |
| Withdrawal | 0.404 | 5.965 | 0.090-396.654 |
| Conflict | 0.846 | 0.858 | 0.183-4.015 |
| Family support | 0.150 | 0.667 | 0.384-1.158 |
| Medium | 0.045 | 12.321 | 1.063-142.187 |
| High | 0.850 | 1.063 | 0.517-2.227 |
| School load | 0.013 | 2.016 | 1.157-3.513 |
| Medium | 0.014 | 0.096 | 0.015-0.616 |
| High | 0.378 | 0.717 | 0.343-1.502 |

Abbreviation: CI, confidence interval.

adolescent who uses SNS in the level of tolerance is 3.6 times more likely to experience insomnia ($P = 0.048$; $\text{Exp } B = 3.609$). Adolescents who use SNS with duration greater than 5 hours per day is 0.45 times more likely to experience insomnia than who do not ($P = 0.039$; $\text{Exp } B = 0.455$). An adolescent who has moderate school load is 0.9 times more likely to experience insomnia ($P = 0.14$; $\text{Exp } B = 0.09$).

4 | DISCUSSION

The results showed that the type of SNS was not significantly associated with insomnia in adolescents. This is not similar with the previous study,³⁶ which states that features offered in each social media can also affect sleep disorders, such as insomnia. This condition can occur because the type of social media used varies for each individual, and the number of types of social media used per day also varies. *LINE* is an SNS type which highest used by adolescents.³⁷ These findings are the same with a previous study,³⁸ which stated that the highest number of *LINE* users is adolescents and has currently become a part of the life of adolescents. Because *LINE* has many features, *LINE* is in great demand by teenagers.

Another study stated that individuals using Using SNS more than 1 hour showed greater prevalence of insomnia, which was not in accordance with our results. This condition can occur because individuals use SNS while performing other activities and not during bedtime; hence, it does not significantly affect the occurrence of insomnia.

The duration of SNS use for 5 hours or more per day was associated with insomnia ($P = 0.011$). This finding is in accordance with a previous study,³⁹ which stated that the circadian rhythm is disturbed if an individual uses SNS more or exposed to light longer, such as in mobile phones. Circadian rhythm is a system that regulates when a person will sleep and wake up. One of its functions is to regulate melatonin secretion. SNS use can trigger emotional, cognitive, and physiological conditions. These conditions cause the individual to have sleep deprivation or sleeping difficulties.³⁰ In addition, another study⁴⁰ stated that the more adolescents use SNS before bedtime, the shorter their sleep duration, the longer their *sleep onset latency*, and *presleep arousal*. Therefore, when adolescents access SNS before bedtime, sleeping is disturbed, leading to insomnia.

Based on the findings in this study, the most common level for SNS use is *tolerance*. *Tolerance* is a progressive increase in the duration of social media use to gain satisfaction. Thus, *online* activity on SNS exceeds the planned time¹⁸, which causes increased exposure to light emitted from mobile devices. The light emitted from mobile devices can interfere with the circadian rhythm and decrease melatonin secretion, causing an individual to have sleeping difficulties,^{30,41} which could lead to sleep deprivation and insomnia.

The finding in this study stated that family support was not associated with insomnia, which was contradicts the Spielman theory and another previous study,⁴² which stated that family support affected sleep deprivation in adolescents. This condition can occur

because adolescents are in the stage where they seek self-identity and start to be independent from their parents,⁴³ which could be observed by adolescents spending more time with their peers than with their parents. Adolescents have less time to discuss their problems with their parents, but they are more open to their peers, and they obtain more information from their peers than from their parents. Therefore, researchers believe that adolescents will more likely share their problems, including sleep disorders, with peers. Adolescents often seek information through the media, particularly electronic media.

The finding of this study that school load had an effect on insomnia was in accordance with the Spielman theory and another previous study,⁴⁴ which stated that school load can affect the occurrence of insomnia. School load is a stressor for students,³¹ which can increase cortisol levels and disturb the circadian rhythm.^{45,46} This study found that the respondents experience heavy burden of school load in task demands. *Task demands* are assigned tasks that must be performed in relation to the learning process. *Task demands* include tasks both at school and at home, taking exams, obeying school rules, following extracurricular activities, etc.³⁴ This finding is in accordance with a previous study,⁴⁷ which stated that the tasks assigned by the school and taking tests are sources of school burden for students. The status of Senior High School will determine the number of tasks and exams that must be conducted by their students to improve competence and maintain the image of the school as a prestigious school. The competition among students can increase stressors, which could lead to heavy burden to the students. The findings are in accordance with a previous study,⁴⁸ which stated that these situations occur as one of the top 10 stressors in high school students. Limitation of this study is cross-sectional study which cannot explain causality.

Recent studies in social media and sleep have heightened the need for further research on negative effect on sleep deprivation.⁴⁹ The negative consequences have been noted as the results of insufficient sleep among adolescents such as poor academic performance and inattentiveness.⁵⁰ Similarly, study conducted among Turkish adolescent found out that lower grade performance among those who engage in multitasking behavior on social media sites.⁵¹ However, the evidence for this relationship is inconclusive.⁵²

5 | CONCLUSIONS

Most adolescents reported that the activities performed while using SNS is sending and receiving messages or chatting, with seeking and sharing information as reasons for using SNS. This study found that the SNS type has no effect on insomnia in adolescents. However, SNS use frequency has no effect on adolescent insomnia. Most adolescents use SNS 5 hours or more per day. The duration of SNS use has an influence on insomnia in adolescents. The most common level for SNS use is *tolerance*, which has an influence on insomnia in adolescents. Most adolescents have family support in the medium category. However, family support has no effect on insomnia in

adolescents. Most school burdens are in the medium category, which has an influence on insomnia in adolescents. Educational intervention on SNS issue is recommended for both adolescents and parents. The school could consider policies regarding restricted access to SNS use in the school area and create an academic environment that is less stressful for students. Further studies should investigate the nursing interventions for adolescents who experience insomnia to improve the quality of adolescent health.

6 | NURSING IMPLICATIONS

This study suggests that insomnia will cause psychological and physical problems in adolescents, which can lead to psychological problems such as depression or physical illness. Pediatric nurses and mental health nurses should be able to assess the amount of sleep that adolescents experience and if sleep disruption is occurring. Further, if sleep disruption is an issue, nurses can determine if it is caused by technological use or other causes. Nurses should be able to provide health education about the importance of sleep and technological use boundaries, the importance of family support and school burden. Future study should look at the direction of the SNS effect among these variables in a longitudinal design.

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