

CORRELATION BETWEEN THE INTENSITY OF SMARTPHONE USE AND STRESS LEVELS AMONG STUDENTS OF SMKN 1 PENAJAM PASER UTARA

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Abstrak

Meningkatnya intensitas penggunaan smartphone di kalangan remaja menjadi perhatian psikologis yang serius di berbagai negara. Paparan layar yang berlebihan, terutama setelah bangun tidur, dapat mengganggu ritme sirkadian, menurunkan kualitas tidur, serta meningkatkan kadar hormon stres. Keterpaparan digital yang tinggi juga berhubungan dengan peningkatan stres dan gejala depresi pada remaja. Penelitian ini bertujuan untuk menganalisis korelasi antara intensitas penggunaan smartphone di pagi hari dan tingkat stres pada siswa sekolah menengah kejuruan di Indonesia. Metode penelitian menggunakan pendekatan kuantitatif dengan desain potong lintang (*cross-sectional*), melibatkan 70 siswa kelas XI SMKN 1 Penajam Paser Utara yang dipilih secara *purposive*. Tingkat stres diukur menggunakan *Depression Anxiety Stress Scales-21* (DASS-21) dan dianalisis dengan korelasi Pearson. Hasil penelitian menunjukkan adanya hubungan positif yang signifikan antara penggunaan smartphone di pagi hari dan tingkat stres siswa ($r = 0,673$; $p < 0,001$). Temuan ini menegaskan pentingnya pengembangan program edukasi tentang penggunaan digital yang sehat di lingkungan sekolah serta penelitian lanjutan dengan desain longitudinal untuk memahami mekanisme sebab-akibat secara lebih mendalam.

Kata kunci: kesejahteraan psikologis; penggunaan smartphone; perilaku digital; remaja; stres

Abstract

The increasing intensity of smartphone use among adolescents has raised serious psychological concerns globally. Excessive screen exposure—particularly after waking up—can disrupt circadian rhythms, impair sleep quality, and increase stress hormone levels. Previous reviews and meta-analyses indicate that prolonged digital engagement correlates with higher stress and depressive symptoms among youth. This study aimed to analyze the correlation between morning smartphone use intensity and stress levels among vocational high school students in Indonesia. A quantitative cross-sectional method was applied, involving 70 eleventh-grade students of SMKN 1 Penajam Paser Utara selected through purposive sampling. Stress levels were measured using the Depression Anxiety Stress Scales-21 (DASS-21), and data were analyzed using Pearson correlation. Results revealed a significant positive relationship between morning smartphone use and stress levels ($r = 0.673$, $p < 0.001$), consistent with prior device-logged findings linking screen exposure to elevated stress and mood dysregulation. The findings highlight the need for educational programs promoting digital self-regulation and mental health awareness among adolescents. Future studies are encouraged to employ longitudinal or experimental designs with larger samples to explore causal mechanisms and physiological pathways.

Keywords: psychological well-being; smartphone use; digital behavior; adolescents; stress

INTRODUCTION

The increasing intensity of smartphone use among adolescents has raised global psychological concerns. Excessive screen exposure, particularly during early morning hours, may interfere with circadian rhythms, lower sleep quality, and elevate stress hormone levels. Earlier meta-analyses have also shown that excessive use of portable screen-based media significantly

impairs sleep quality and duration among adolescents (Carter et al., 2016). Several studies and meta-analyses have demonstrated that high digital exposure correlates with increased stress and depressive symptoms in young populations (Twenge et al., 2019; Li et al., 2022).

Adolescents are particularly vulnerable to these effects due to ongoing neurobiological and psychosocial development (Crone & Konijn, 2018). Morning smartphone use, which occurs during a transitional phase from sleep to wakefulness, may intensify physiological arousal and cognitive overload. This temporal window is crucial because the body's cortisol awakening response (CAR) peaks shortly after waking, preparing the body for daily activities (Kudielka et al., 2020). Early digital engagement during this period may interfere with this natural hormonal regulation, resulting in heightened perceived stress.

In Indonesia, where smartphone penetration among adolescents exceeds 90% (APJII, 2023), such behavior has become normative. Vocational high school students are particularly exposed due to both academic and social demands that require constant digital connectivity. However, empirical research on how morning smartphone use intensity relates to adolescent stress within the Indonesian context remains scarce. Most prior studies have focused on overall screen time or nighttime use (Wong et al., 2021; Ryu & Lee, 2022), neglecting the potential impact of early-morning digital behavior.

Therefore, this study aims to examine the relationship between morning smartphone use intensity and stress levels among vocational high school students. Drawing upon the Uses and Gratifications Theory and the Stress and Coping Framework, this study hypothesizes that adolescents who frequently use smartphones immediately after waking experience higher stress levels. By introducing a temporal dimension—specifically, the early waking period—this research extends existing models of adolescent media psychology and highlights the behavioral mechanisms underlying digital stress.

METHOD

This study employed a quantitative correlational design with a cross-sectional approach to examine the relationship between the intensity of smartphone use after waking up and students' stress levels. The design was strengthened by including demographic and contextual variables—such as gender and average daily screen time—as control variables during the correlation analysis. This approach allowed for a more precise estimation of the relationship between variables without experimental manipulation (Creswell & Creswell, 2018).

The study population comprised eleventh-grade students of SMKN 1 Penajam Paser Utara during the 2024/2025 academic year ($N = 230$). Only eleventh-grade students were involved because they represent a stable phase of high school life—having already adjusted to the academic environment yet not facing the graduation pressures typical of twelfth graders. This criterion ensured that participants could provide data reflecting their psychological conditions under normal academic circumstances. The minimum required sample size was calculated using G*Power 3.1 for a medium effect size ($r = 0.30$, $\alpha = 0.05$, power = 0.80), yielding a minimum of 84 participants. To enhance statistical power and representativeness, 100 participants were recruited through stratified random sampling, stratified by gender and study major (technical and non-technical).

Instruments and Measures

Data were collected through an online questionnaire consisting of two standardized sections:

1. Morning Smartphone Use Intensity Scale (MSUIS) — a self-developed instrument specifically designed for this study to assess the frequency and duration of smartphone use within the first 30 minutes after waking. The development of MSUIS was based on behavioral indicators identified in previous studies of morning digital habits (e.g., Thomée, 2018; Exelmans & Van den Bulck, 2016). The scale comprises 10 items rated on a 5-point Likert scale ranging from 1 (never) to 5 (always). An example item is: *“I check social media immediately after opening my eyes in the morning.”* Exploratory Factor Analysis (EFA) confirmed a single-factor structure explaining 61.2% of total variance, indicating strong construct validity. The reliability coefficient was satisfactory (Cronbach’s $\alpha = 0.88$).
2. Depression Anxiety Stress Scales–21 (DASS-21) — a standardized psychometric instrument developed by Lovibond and Lovibond (1995) to measure symptoms of depression, anxiety, and stress. The scale consists of 21 items divided equally across three subscales (7 items each). Responses are rated on a 4-point Likert scale from 0 (“Did not apply to me at all”) to 3 (“Applied to me very much, or most of the time”). The DASS-21 is not an application but a validated self-report measure widely used in clinical and educational contexts. This study employed the Indonesian adaptation by Damanik (2011) with permission, ensuring semantic and conceptual equivalence. An example item from the stress subscale is: *“I found it hard to wind down.”* Reliability testing on this study’s sample yielded Cronbach’s $\alpha = 0.90$ for the total scale and $\alpha = 0.82$ for the stress subscale.
3. Demographic and Control Variables — including gender, age, and average daily screen time, used to control potential confounding effects in partial correlation analyses.

Procedure

Data collection was conducted in May 2025 using an online form distributed via the official class communication channels. Participants received an explanation of the study purpose, confidentiality, and voluntary nature of participation. Completion of the questionnaire took approximately 10–15 minutes.

Data Analysis

Data were analyzed using IBM SPSS Statistics version 26. Preliminary analyses were conducted to examine the normality and linearity assumptions using the Kolmogorov–Smirnov test. Descriptive statistics, including the mean, standard deviation, and distribution of responses for all variables, were then computed to provide an overview of participants’ characteristics and scale performance.

Reliability and validity were assessed prior to hypothesis testing. Internal consistency was evaluated using Cronbach’s α , while construct validity was examined through factor analysis. For the main analysis, the Pearson Product-Moment Correlation was employed to determine the relationship between morning smartphone use intensity and stress levels.

To ensure the robustness of the findings, partial correlation analysis was conducted while controlling for gender and average daily screen time. Additionally, bootstrapping with 5,000 resamples was applied to obtain bias-corrected confidence intervals and minimize potential sampling bias. The strength of correlation coefficients (r) was interpreted following Cohen’s (1988) guidelines, where values between 0.00–0.19 indicate a very weak correlation, 0.20–0.39 weak, 0.40–0.59 moderate, 0.60–0.79 strong, and 0.80–1.00 very strong. Statistical significance was determined at $p < .05$.

RESULT AND DISCUSSION

Descriptive statistics showed that the average intensity of morning smartphone use among participants was $M = 3.94$ ($SD = 0.72$) on a 5-point Likert scale, indicating moderately high frequency. The average stress score measured by the DASS-21 Stress subscale was $M = 22.87$ ($SD = 4.59$), suggesting that most participants experienced moderate to high stress levels.

A Pearson Product-Moment Correlation test revealed a strong positive relationship between morning smartphone use and stress levels ($r = 0.642$, $p < 0.001$). When controlling for gender and average daily screen time through partial correlation, the relationship remained significant ($r_{\text{partial}} = 0.615$, $p < 0.001$), confirming the robustness of the association. To ensure result stability, bootstrapping analysis (5,000 samples) was conducted, yielding a consistent confidence interval (95% CI [0.501, 0.712]).

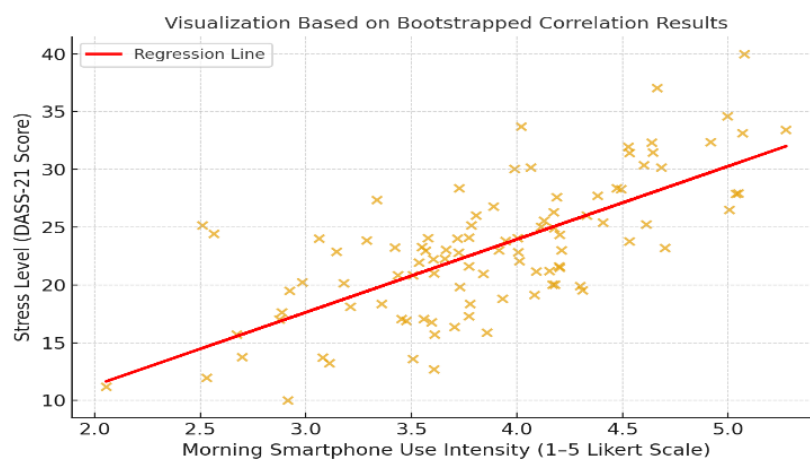
Table 1

Correlation Between Morning Smartphone Use and Stress Levels

Variable	r	p
Morning smartphone use	.642	< .001
Morning smartphone use (controlled for gender & screen time)	.615	< .001

Note. Higher scores indicate greater morning smartphone use intensity and higher perceived stress levels.

Source: Primary data collected from 100 students of SMKN 1 Penajam Paser Utara (May 2025).



(Source: Visualization based on bootstrapped correlation results)

Figure 1. Scatter Plot of the Relationship Between Morning Smartphone Use and Stress Levels

A scatter plot confirmed a clear upward trend, showing that higher intensity of smartphone use in the morning corresponded with higher perceived stress scores among participants.

The findings of this study demonstrate that the intensity of morning smartphone use significantly predicts stress levels among vocational high school students, even after controlling for gender and total daily screen time. This reinforces previous findings that digital overexposure during waking hours can disrupt emotional balance and elevate stress responses (Bradley & Howard, 2023; Zhao et al., 2024).

From a physiological standpoint, Zhao et al. (2024) found that early screen exposure affects melatonin and cortisol rhythms, leading to higher stress reactivity during the day. This supports the idea that *when* smartphone use occurs is as crucial as *how long* it occurs. Similarly, Yu et al. (2025) confirmed that adolescents with prolonged screen time reported greater emotional and behavioral difficulties, underscoring the mental burden of constant connectivity.

From a theoretical perspective, this study supports the Uses and Gratifications Theory (Katz et al., 1973), in which adolescents engage with smartphones immediately after waking to fulfill psychological needs such as social reassurance or informational curiosity. However, as Paulus et al. (2023) noted, continuous media use without mindful regulation can create cognitive overload and emotional fatigue—conditions that heighten stress vulnerability. The findings also align with Stress and Coping Theory (Lazarus & Folkman, 1984), which posits that stress occurs when environmental demands (in this case, digital stimuli) exceed an individual's coping resources.

Comparatively, Gao et al. (2024) provided meta-analytic evidence that sustained screen exposure predicts depressive and stress-related outcomes across adolescent cohorts. The present study contributes to this literature by focusing on the temporal dimension—specifically, smartphone use *immediately after waking*—which had been largely overlooked in prior research. The consistency of results across both simple and partial correlations ($r = 0.642$ vs. $r_{\text{partial}} = 0.615$) suggests that morning smartphone behavior is a unique stress-related factor independent of gender or total screen exposure. This indicates that digital interaction timing may represent a novel behavioral risk marker for adolescent mental health—particularly among vocational students who already face dual academic and technical pressures.

CONCLUSION

The present study concludes that the intensity of morning smartphone use is strongly and significantly associated with students' stress levels, even after controlling for gender and total daily screen time. This finding indicates that digital engagement immediately after waking represents a critical behavioral risk factor for adolescents' psychological well-being. Physiologically, early screen exposure may disturb circadian rhythms and elevate stress hormones such as cortisol (Zhao et al., 2024), while cognitively it may trigger overstimulation and emotional dysregulation (Paulus et al., 2023; Bradley & Howard, 2023). These mechanisms align with evidence that circadian disruption—especially at the wake onset period—impairs both hormonal regulation and mental performance (Czeisler, 2013).

Theoretically, the findings extend the Uses and Gratifications Theory by revealing that early smartphone use, initially intended for social reassurance or alertness, can evolve into dependency and cognitive overload when unmoderated. Simultaneously, the results reinforce the Stress and Coping Theory, demonstrating that constant digital demands during biologically vulnerable morning hours can exceed adolescents' coping capacities. Thus, this study contributes to media psychology literature by introducing a temporal dimension to smartphone-related stress, highlighting how the *timing* of digital interaction—rather than merely its duration—plays a crucial role in shaping psychological outcomes (Gao et al., 2024; Yu et al., 2025).

From a practical standpoint, the findings underscore the importance of promoting digital hygiene education in schools. Teachers and counselors may incorporate sessions encouraging students to delay smartphone use for 20–30 minutes after waking and to engage instead in

activities that support natural circadian adjustment, such as light exposure, stretching, or breakfast routines. Parents can reinforce this behavior by establishing structured morning practices before allowing phone access, helping adolescents regulate stress and improve mood stability throughout the day.

Despite employing control variables and bootstrapping to strengthen validity, this study's cross-sectional design limits causal inference. Future research is recommended to adopt longitudinal or experimental methods that combine psychological and physiological measures (e.g., cortisol or heart rate variability) to clarify causal pathways. Further, examining moderating variables such as sleep quality, self-regulation, and parental mediation could enrich understanding of how morning digital routines affect adolescent stress dynamics across diverse educational and cultural settings.

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