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The Cost of Midnight Scrolling: Smartphone-Induced Bedtime Procrastination as a Predictor of Daytime Sleepiness and Life Satisfaction

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Abstract

Problematic smartphone use before bedtime has become a growing concern due to its adverse consequences on the daily functioning of university students. This study examined the level of smartphone-induced bedtime procrastination, its role in predicting daytime sleepiness and life satisfaction, and gender differences in smartphone-induced bedtime procrastination among undergraduate students in Malaysia. A total of 160 Malaysian undergraduate students completed Google Forms that included demographic information, the While-in-Bed Smartphone Use-Induced Sleep Procrastination Scale (WSPS), the Epworth Sleepiness Scale (ESS), and the Satisfaction with Life Scale (SWLS). Data from this quantitative study were analysed using SPSS, Version 26. The findings revealed that nearly half of the participants (43.75%) reported a high level of bedtime procrastination due to smartphone use. Smartphone-induced bedtime procrastination significantly predicted increased daytime sleepiness, but did not significantly predict life satisfaction. Furthermore, no significant gender differences were found in smartphone-induced bedtime procrastination. To reduce smartphone use before bedtime, digital health campaigns may be developed and implemented by university stakeholders.

Keywords: Smartphone-Induced Bedtime Procrastination, Daytime Sleepiness, Life Satisfaction, Undergraduate Students

Introduction

In the current digital era, smartphones have become ubiquitous, with nearly every undergraduate student owning at least one device. Smartphone usage in Malaysia has grown significantly, reaching over 20 million users in 2020 (Yusoff et al., 2022). Among undergraduates, smartphones serve as essential tools for academic, social, and entertainment purposes (Elsheikh et al., 2023). However, problematic smartphone use and bedtime procrastination are global issues that have been shown to disrupt circadian rhythms,

reduce sleep quality, increase daytime sleepiness, lower productivity, and negatively affect mental health and overall well-being (Harris et al., 2020; Kroese et al., 2014; Magalhães et al., 2020). Despite the known health risks, many university students continue to use smartphones excessively and delay sleep for various reasons.

University students often experience difficulty staying awake during the day due to delayed sleep (Babicki et al., 2023; Zhu et al., 2022). This is partly because sleep duration affects sleep quality (Kudrnáčová & Kudrnáč, 2023). Insufficient sleep may lead students to doze off during lectures or skip classes altogether due to excessive sleepiness (Correa-Iriarte et al., 2023). Daytime sleepiness is particularly concerning, as it significantly impairs students' mood, learning capacity, and academic performance (Mehta, 2022). In addition to causing daytime sleepiness, shortened sleep duration is associated with sleep-related issues such as insomnia and poor sleep quality, which, in turn, negatively correlate with well-being and life satisfaction (Kudrnáčová & Kudrnáč, 2023). Temporal Self-Regulation Theory is particularly useful in explaining why university students continue to delay sleep, even when aware of its adverse consequences. This theory emphasises how individuals tend to prioritise short-term rewards, such as relaxation and social media engagement, over the long-term benefits of obtaining sufficient sleep (Mao et al., 2022; Matthes et al., 2021). Quality sleep is essential for maintaining physical health, psychological well-being, and overall life satisfaction (Olivares-Guido et al., 2024; Wacks & Weinstein, 2021).

Regarding potential gender differences in smartphone-induced bedtime procrastination, Meng et al. (2024) found that male university students exhibited higher levels of procrastination than their female counterparts. However, other studies have shown that female university students report greater levels of bedtime procrastination, likely driven by social media use and communication-based behaviours (Mao et al., 2022; Pirdehghan et al., 2021). These gender differences appear to be influenced by distinct usage patterns and behavioural motivations. Males are more likely to relieve stress through gaming, whereas females tend to prioritise maintaining social connections (Pirdehghan et al., 2021).

To date, studies that have specifically examined smartphone-induced bedtime procrastination have been conducted among college students and undergraduates in China (Chen et al., 2022; Tu et al., 2023). In contrast, research from Turkey, Spain, and the United States has primarily focused on general bedtime procrastination rather than smartphone-induced bedtime procrastination. In Malaysia, empirical evidence on this maladaptive behaviour and its impact on daytime sleepiness and life satisfaction among undergraduates remains scarce. The only relevant past study conducted within the local context examined the predictive effects of self-control, chronotype, and future time perspective on bedtime procrastination among Malaysian young adults (Tan et al., 2024). However, this study focused on general bedtime procrastination rather than bedtime procrastination specifically attributable to smartphone use. Additionally, Tan et al. (2024) positioned bedtime procrastination as the outcome variable rather than a predictor. Moreover, the present study targets undergraduate students because they rely heavily on smartphones in their daily functioning. Therefore, it is essential to identify the level of smartphone-induced bedtime procrastination among undergraduate students in Malaysia, examine whether smartphone-induced bedtime procrastination significantly predicts daytime sleepiness and life satisfaction, and determine whether significant gender differences exist in smartphone-

induced bedtime procrastination. These insights are crucial for understanding the scope of the issue and informing targeted interventions for Malaysian undergraduate students. Aligned with the research objectives, the following research questions were formulated: 1) What is the level of smartphone-induced bedtime procrastination among undergraduate students in Malaysia?, 2) Does smartphone-induced bedtime procrastination significantly predict daytime sleepiness among undergraduate students in Malaysia?, 3) Does smartphone-induced bedtime procrastination significantly predict life satisfaction among undergraduate students in Malaysia?, and 4) Are there significant gender differences in smartphone-induced bedtime procrastination among undergraduate students in Malaysia?

Methods

Research Design

The study employed a cross-sectional quantitative design to examine smartphone-induced bedtime procrastination as a predictor of daytime sleepiness and life satisfaction among undergraduate students in Malaysia. A Likert scale was used to measure participants' responses, enabling the researcher to quantify the scores. Data were collected via Google Forms, capturing information on smartphone-induced bedtime procrastination, daytime sleepiness, and life satisfaction simultaneously. Ethical approval for the study was obtained from the Ethics Review Committee of Tunku Abdul Rahman University of Management and Technology (TAR UMT), ensuring compliance with established ethical standards.

Participants

The final sample consisted of 160 undergraduate students in Malaysia. The sample size satisfied the statistical power requirement of 80% at an alpha level of .05, in accordance with G*Power 3.1.9.4 software. Data were collected using convenience sampling. Undergraduate students who were available and willing to participate in the research were invited to complete the Google Forms, regardless of gender, age, or academic discipline. Table 1 presents the participants' demographic information. More than half of the respondents were female (55.60%), and more than half were aged between 19 and 21 years (53.75%). A significant proportion of respondents (approximately 70%) were enrolled in soft disciplines.

Table 1
Participants' Demographic Information

Demographic	Frequency (*n*)	Percentage (*%*)
Gender		
Male	71	44.40
Female	89	55.60
Age Range		
19-21 years	86	53.75
22-24 years	71	44.38
25-27 years	3	1.88
Academic Discipline		
Soft Discipline	111	69.50
Hard Discipline	49	30.50

Instruments

The While-in-Bed Smartphone Use-Induced Sleep Procrastination Scale (WSPS) is an instrument developed by Tu et al. (2023) to assess smartphone-induced sleep procrastination while in bed over the past two weeks. The WSPS consists of six items, such as "I sleep later than I had intended due to pre-sleep smartphone use in bed". All items are rated on a 5-point Likert scale ranging from 1 (almost never) to 5 (almost always). The WSPS includes reverse-coded items (Items 2 and 6) to mitigate response bias. The reverse-coded items are adjusted, and the scores for all six items are summed to calculate the total score. According to Tu et al. (2023), higher WSPS scores indicate greater severity of smartphone-induced bedtime procrastination. The levels of smartphone-induced bedtime procrastination are categorised as follows: scores of 6–13 indicate a low level, 14–22 a moderate level, and 23–30 a high level. The scale demonstrated strong psychometric properties, with a Cronbach's alpha of .74, indicating good internal consistency, and a two-week test–retest reliability coefficient of .78, demonstrating temporal stability (Tu et al., 2023).

The Epworth Sleepiness Scale (ESS), developed by Johns (1991), measures an individual's general level of daytime sleepiness. The ESS consists of eight items that assess the likelihood of dozing off in various everyday situations. Participants are asked to rate each item on a scale from 0 (no chance of dozing) to 3 (high chance of dozing). For example, "Sitting and reading". The scores for each item are summed to yield a total score ranging from 0 to 24, with higher scores indicating more frequent occurrences of daytime sleepiness (Yared et al., 2023). The ESS has demonstrated strong construct validity and is effective in assessing daytime sleepiness in both clinical and general populations (Johns, 1991; Jung et al., 2021). In terms of reliability, the ESS shows good internal consistency, with Cronbach's alpha values typically ranging from .73 to .86, indicating acceptable to excellent reliability (Johns, 1991; Kendzerska et al., 2014; Sap-Anan et al., 2021).

The Satisfaction with Life Scale (SWLS), developed by Diener et al. (1985), measures global cognitive judgments of an individual's overall life satisfaction. It is a five-item instrument rated on a 7-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree). For example, "I am satisfied with my life". The scores for each item are summed to yield a total score ranging from 5 to 35, with higher scores indicating greater life satisfaction (Espejo et al., 2022). The SWLS has been extensively validated and demonstrates strong construct validity. It also exhibits a high degree of internal consistency, with Cronbach's alpha values typically ranging from .72 to .83, indicating reliable performance across diverse populations (De Almeida Cardoso et al., 2023).

Data Analysis

IBM SPSS Statistics version 26 was used to analyse the data. Frequencies and percentages of score ranges were examined to identify the level of smartphone-induced bedtime procrastination among undergraduate students. In addition, linear regression analysis was conducted to assess whether smartphone-induced bedtime procrastination significantly predicts daytime sleepiness and life satisfaction. Furthermore, an independent samples t-test was performed to determine whether significant gender differences exist in smartphone-induced bedtime procrastination.

Results

The first research question of this study is "What is the level of smartphone-induced bedtime procrastination among undergraduate students in Malaysia?". Table 2 presents the participants' levels of smartphone-induced bedtime procrastination. Notably, nearly half of the participants (43.75%) reported a high level of smartphone-induced bedtime procrastination, while only 2.50% reported a low level. These findings suggest that this maladaptive behaviour is commonly practiced among undergraduate students.

Table 2
Participants' level of smartphone-induced bedtime procrastination

Level	Frequency (*n*)	Percentage (*%*)
Low	4	2.50
Moderate	86	53.75
High	70	43.75

The second research question is "Does smartphone-induced bedtime procrastination significantly predict daytime sleepiness among undergraduate students in Malaysia?". Table 3 presents the regression coefficients for smartphone-induced bedtime procrastination as a predictor of daytime sleepiness. The analysis revealed that smartphone-induced bedtime procrastination significantly predicted daytime sleepiness, $\beta = .24$, $p < .01$. The regression model yielded $R^2 = .058$, F (1 ,158) = 9.67, $p < .01$, indicating that 5.80% of the variance in daytime sleepiness was explained by smartphone-induced bedtime procrastination. The effect size was small, consistent with Cohen's (1988) guidelines. Overall, this finding suggests that elevated levels of smartphone-induced bedtime procrastination forecast a heightened prevalence of daytime sleepiness among undergraduate students.

Table 3
Regression coefficients for smartphone-induced bedtime procrastination as a predictor of daytime sleepiness

Path	*B* (Unstandardised Coefficient)	*SE B* (Standard Error)	*β* (Standardised Coefficients)	*p* (Significance)
Smartphone-Induced Bedtime Procrastination →Daytime Sleepiness	.29	.09	.24	.002

The third research question is "Does smartphone-induced bedtime procrastination significantly predict life satisfaction among undergraduate students in Malaysia?". Table 4 presents the regression coefficients for smartphone-induced bedtime procrastination as a predictor of life satisfaction. The analysis revealed that smartphone-induced bedtime procrastination did not significantly predict life satisfaction, $\beta = .038$, $p > .05$. Overall, this finding suggests that smartphone-induced bedtime procrastination does not forecast life satisfaction among undergraduate students.

Table 4
Regression coefficients for smartphone-induced bedtime procrastination as a predictor of life satisfaction

Path	*B* (Unstandardised Coefficient)	*SE B* (Standard Error)	*β* (Standardised Coefficients)	*p* (Significance)
Smartphone-Induced Bedtime Procrastination →Life Satisfaction	.03	.12	.038	.75

The fourth research question is "Are there significant gender differences in smartphone-induced bedtime procrastination among undergraduate students in Malaysia?". Table 5 presents the analysis of gender differences in smartphone-induced bedtime procrastination. The results indicated no significant gender differences in smartphone-induced bedtime procrastination, t (158) = .68, p > .05. This suggests that male and female undergraduate students exhibited similar patterns of smartphone use prior to sleep.

Table 5
Gender differences in smartphone-induced bedtime procrastination

	Gender	*n*	*M*	*SD*	*df*	*t*	*p*
Smartphone-induced bedtime procrastination	Male	71	21.72	3.94	158	.68	.50
	Female	89	21.31	3.53			

Discussion

In the first instance, the study aimed to identify the level of smartphone-induced bedtime procrastination among Malaysian undergraduate students. The finding that nearly half of the participants reported a high level of such procrastination suggests that a significant proportion of undergraduates are engaging in this unhealthy lifestyle. This result aligns with previous research highlighting the prevalence of digital distractions before bedtime (Chen et al., 2022; Tu et al., 2023). The adoption of this maladaptive behaviour may be attributed to students' frequent engagement in academic, social, and entertainment activities via smartphones before sleep, which often exceeds and interferes with their planned sleep hours (Elsheikh et al., 2023). Furthermore, the flexibility of university course schedules may diminish the immediate consequences of sleep delay, thereby reinforcing procrastination habits. This finding underscores the importance of addressing smartphone use in sleep hygiene promotion among young adults. Recognising the behavioural and cognitive components of smartphone-induced bedtime procrastination is essential for developing targeted educational and behavioural interventions.

Concerning whether smartphone-induced bedtime procrastination significantly predicts daytime sleepiness, the study found that bedtime delays due to smartphone use were significantly associated with increased daytime sleepiness. This finding aligns with previous studies that have reported similar associations between smartphone use before bedtime and disrupted sleep patterns, including delayed sleep onset and reduced sleep quality, both of which may contribute to daytime sleepiness (Chen et al., 2022; Zhu et al., 2022). This result is further supported by Temporal Self-Regulation Theory, which posits that

students tend to prioritise short-term smartphone gratification over the long-term benefits of quality sleep, ultimately leading to adverse outcomes (Mao et al., 2022; Matthes et al., 2021). The tendency to delay bedtime in favour of smartphone use may result in irregular sleep–wake cycles, poorer sleep quality, and increased daytime fatigue, which can negatively impact the daily functioning of undergraduate students.

Contrary to expectations, the study revealed that smartphone-induced bedtime procrastination does not predict life satisfaction among undergraduate students. This finding contrasts with previous studies, which have shown that delayed sleep is associated with sleep deprivation and poor sleep quality, both of which are correlated with lower life satisfaction (Kudrnáčová & Kudrnáč, 2023; Olivares-Guido et al., 2024). It is plausible that life satisfaction is not directly affected by smartphone-induced bedtime procrastination but may evolve over time, a dynamic that cross-sectional designs may fail to capture. While bedtime procrastination due to smartphone use does not appear to directly predict life satisfaction, it may impair daily functioning, which is known to influence life satisfaction in the long term. Future research should consider employing longitudinal designs or mediation models to better elucidate the relationship between smartphone-induced bedtime procrastination and life satisfaction.

In examining whether significant gender differences exist in smartphone-induced bedtime procrastination, the results revealed no such differences. Previous studies have reported that male university students tend to use smartphones before sleep more frequently, often engaging in activities such as gaming or video streaming (Meng et al., 2024; Pirdehghan et al., 2021; Shoukat et al., 2025). Conversely, other studies have found that female university students are more likely to use smartphones before bedtime, typically for social media engagement or communication-based behaviours (Mao et al., 2022; Pirdehghan et al., 2021). The absence of significant gender differences in the present study may suggest that sleep delays due to smartphone use have become increasingly normalised and prevalent across genders. This interpretation aligns with the Gender Similarities Hypothesis (Hyde, 2005), which posits that males and females are more alike than different in most psychological domains. Drawing on 46 meta-analyses, Hyde (2005) demonstrated that gender differences are generally negligible to small across psychological variables such as social behaviours, cognitive abilities, and communication styles.

Limitations and Recommendations

The primary limitation of this study lies in its use of convenience sampling. Approximately two-thirds of the participants were enrolled in soft disciplines, which may limit the representativeness of the sample in relation to the broader population of undergraduate students in Malaysia. Consequently, the generalisability of the findings is constrained. Future research should consider employing more rigorous sampling techniques, such as stratified sampling, to improve the representativeness and enhance the generalisability of the results. Another limitation of this study is its reliance on a quantitative design, which permitted only the collection of numerical data. While such data enabled the researchers to examine the intensity, predictive relationships, and group differences associated with smartphone-induced bedtime procrastination, it did not capture the underlying factors or the diverse perspectives that may influence this behaviour. Consequently, the study lacks the depth and contextual richness that a qualitative approach could offer. Future research is encouraged to

adopt a mixed-methods design. By integrating qualitative components, researchers will be better positioned to explore the underlying factors and subjective experiences related to smartphone-induced bedtime procrastination, in addition to assessing its intensity, predictive relationships, and group differences. Additionally, as this study relied on self-reported questionnaires to assess smartphone-induced bedtime procrastination, daytime sleepiness, and life satisfaction, concerns arise regarding the truthfulness of the responses. Although such limitations are often unavoidable, there is an inherent tendency for participants to provide socially desirable responses. Future studies may consider incorporating a lie scale or a social desirability scale to assess response authenticity. This, in turn, may enhance the validity of the findings.

Conclusion

The findings of this study are highly valuable in raising public awareness about the importance of addressing smartphone-induced bedtime procrastination. Early identification is likely to enhance the lifestyles of university students. In light of this, it is proposed that the Department of Student Affairs introduce this self-administered measure, While-in-Bed Smartphone Use-Induced Sleep Procrastination Scale (WSPS), to university students to increase their awareness of the intensity of such maladaptive behaviour. Psychoeducation and workshops promoting healthy lifestyles should also address the impact of smartphone-induced bedtime procrastination and daytime sleepiness on students' daily functioning. Approaches grounded in Cognitive Behavioural Therapy (CBT) may be employed to improve impulse control and foster healthier digital engagement.

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