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Cultural Moderation in the Relationship between Smartphone Usage, Sleep Quality, and Life Satisfaction among Students

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Abstract

Background and Objectives: The utilization of smartphones has become essential in the everyday routines of university students and may significantly affect their sleep and psychological health. Nevertheless, scant study has investigated the impact of cultural background on the correlation between smartphone usage, sleep quality, and life happiness. This study sought to explore the relationships between smartphone usage, perceived sleep quality, and life happiness among university students, while also assessing the moderating influence of cultural background. **Methods:** A quantitative cross-sectional online survey was administered to 300 students (Male = 138 (46.0%) and Female = 162 (54.0%) at UCSI University via quota sampling. Participants administered the Smartphone Addiction Scale–Short Version (SAS-SV), Pittsburgh Sleep Quality Index (PSQI), and Satisfaction With Life Scale (SWLS). Correlation, analysis of variance, and hierarchical regression studies were conducted. **Results:** The utilization of smartphones was positively correlated with diminished reported sleep quality ($r = .22$, $p < .01$) and negatively correlated with life satisfaction ($r = –.32$, $p < .001$). Substantial cultural disparities were observed in both sleep quality and life satisfaction. International students indicated inferior sleep quality and diminished life satisfaction compared to domestic pupils. The cultural background did not notably influence the correlation between smartphone usage and sleep quality. Moderation was noted in life satisfaction, exhibiting a more pronounced negative correlation among overseas students. **Conclusions:** Excessive smartphone usage correlates with diminished sleep quality and decreased life satisfaction among university students, with cultural background affecting psychological results. These findings underscore the significance of culturally attuned interventions to foster healthy technology utilization and well-being in higher education environments.

Keywords: Smartphone Usage Pattern, Sleep Quality, Life Satisfaction, Cultural Moderation, University Students

Introduction

Smartphones are now part of everyday student life. Studies observed that smartphone ownership among Malaysian young adults, especially university students, has soared; these devices are now used for lectures, group chats and endless video marathons (Department of Statistics Malaysia, 2025; DataReportal, 2023; C. E. Lee et al., 2023). Easy access is certainly convenient, yet using too many hours resembles mild addiction, evident in repeated checking and anxiety when the phone is out of sight. A national survey shows roughly 37 percent of Malaysian teenagers meet that pattern (Lee et al., 2023). Among university students, the behaviour also disrupts sleep, leading to later bedtimes and shorter sleeping time because late-night scrolling exposes the brain to blue light and keeps the circadian rhythm misaligned (Kee et al., 2024). Foo and Lee (2023) claimed that poor sleep is widespread on campus and correlates strongly with daytime fatigue, difficulties in studying and mood swings.

Smartphone use appears to affect life satisfaction, which is a major aspect of how people judge their own well-being (Diener et al., 1985), beyond just interrupting sleep. In a survey of 463 Malaysian university students, Abdullah et al. (2022) linked heavier phone use to noticeably higher life satisfaction, explaining around 13% of the variation. One possible explanation is that constant access to friends eases loneliness and builds social support. Yet this optimistic view clashes with studies pointing to harm, especially when use causes addiction, as excessive screen time often raises stress and anxiety, demonstrating that benefits and risks depend on context (Nikolic et al., 2023).

Cultural background may moderate smartphone use and its effects (Hofstede, 2001; Jan et al., 2022). Malaysia has Malay, Chinese, Indian and foreign students who have distinct values, routines, and norms that are likely to shape both usage and outcomes. For instance, some groups emphasize academic achievement or family bonds, guiding when and how phones appear in daily life. International students, by contrast, often use devices to bridge time zones, a practice that can disrupt sleep (Alnjadat et al., 2022; Wang, 2023). Ethnic contrasts in life satisfaction and digital behaviour have been documented within Malaysia (Department of Statistics Malaysia, 2022; KKMM, 2021).

These patterns affect students in the university setting, since sufficient sleep and overall life satisfaction greatly influence academic productivity, mental health, and holistic wellness. Poor life satisfaction accompanied by inadequate sleep damages cognitive abilities, attentiveness, and raises the likelihood of experiencing mood disorders (Windmill et al., 2024; Wang et al., 2024; Nikolic et al., 2023; Yun et al., 2023). In recent years, smartphone use and sleep related problems as well as mental health issues have globally gained recognition (Notara et al., 2021; Nikolic et al., 2023). In Malaysia, there are certain cultural differences regarding patterns of smartphone usage; for example, Chinese students spend significantly more time online than their Malay and Indian peers do (Soh et al., 2012).

Yet much of the current literature still regards university students as a single, uniform cohort and fails to examine how cultural diversity shapes smartphone habits and their consequences (Mac Cárthaigh et al., 2020; Sánchez-Fernández & Borda-Mas, 2023). By ignoring this nuance, researchers cannot tell whether, and in what ways, Malay, Chinese, Indian, and international students differ in how their phone use affects sleep quality and overall life satisfaction.

The current study seeks to fill this literature gap by examining how students' cultural background moderates associations between smartphone use patterns, sleep quality, and life satisfaction at UCSI University. Exploring these cultural nuances could guide the design of culturally sensitive interventions that encourage healthier phone habits, improve sleep, and enhance students' overall sense of well-being.

Literature Review

Smartphone usage patterns refer to how students, in particular, use their smartphones in a habitual way, including their frequency and duration of usage, timing such as using phones before bedtime, application categories like social media, entertainment and academic tools, as well as problematic or compulsive usage (Kee et al., 2024).

Sleep quality and life satisfaction are accepted as two components of student well-being, and both can be affected by everyday habits such as smartphone use (Abdullah et al., 2022). The notion of sleep quality includes more than duration; it also includes how easy it is to fall asleep, stay asleep, and wake feeling genuinely refreshed (Elsheikh et al., 2024).

Based on the personal benchmarks an individual sets for themselves, life satisfaction is a feeling of fulfilment, contentment, and general happiness, as well as an individual's overall cognitive assessment of their life (Diener, 1984). It is the assessing part of subjective well-being which differentiates it from short-lived feelings and moods. It also means more global fulfilment in various domains of life (Diener, 1984; Diener et al., 1985).

Smartphone Use and Sleep Quality: Kee et al. (2024) noted that smartphones impede sleep not only through overstimulation of content but also through the emission of blue light which delays sleep onset. Sleep delays, in turn, decrease sleep quality. Sleep quality also impacts students' cognitive function, emotions, and academic performance (Foo & Lee, 2023; Balani et al., 2024). Higher smartphone addiction is linked to low sleep quality in university students and this relationship is well-documented (Nikolic et al., 2023).

Smartphone Use and Life Satisfaction: Diener (1984) defines life satisfaction as the cognitive appraisal of one's life and well-being. Life satisfaction can be impacted by smartphone use. A study found that social life and life satisfaction can be enhanced by moderate smartphone use (Abdullah et al., 2022). However, on the other hand, another research found that passive, compulsive, or excessive smartphone use leads to lower satisfaction because of heightened stress and anxiety (Chen et al., 2021; Cho & Kim, 2025).

Cultural Moderation: The smartphone behaviors of Malay, Chinese, Indian, and even foreign students in Malaysia's multicultural context differ. For instance, Chinese-Malays spend more time online compared to their Malay and Indian classmates (Soh et al., 2012). Similarly, foreign students tend to engage with their devices late in the evening in order to communicate with family back home (Alnjadat et al., 2022). Certain cultural behaviors like the Malay prayer practices may discourage excessive smartphone use during the night (Jiang, 2025). The study of smartphone usage and its effects within the context of one's culture is important but still lacks attention (Mac Cárthaigh et al., 2020; Sánchez-Fernández & Borda-Mas, 2023).

Theoretical Background

This study used Cultural Dimensions Theory (CDT), Behavioural Addiction Theory (BAT), Restoration Theory (RT), and Bottom-Up Theory (BUT) to explain the interplay of smartphone usage pattern, cultural background, sleep quality, and life satisfaction (see Figure 1).

Cultural Dimensions Theory

Hofstede's cultural dimensions theory distinguishes critical societal values such as individualism versus collectivism and uncertainty avoidance, and this theory offers a basis for analysing the impact of national culture on customs and preferences, including technology use (Hofstede, 2001). A recent meta-analysis by Jan, Alshare, and Lane (2022) found that Hofstede's cultural dimensions, particularly the individualism-collectivism, directly and indirectly affect technology acceptance, showing that personal device use often aligns with family or community expectations in more collectivist contexts (Hofstede, 2001; Jan et al., 2022). In other words, tendencies such as high uncertainty avoidance or high collectivism can raise the risk of problematic smartphone use. This shows that smartphone habits should not be viewed as culture-free, but rather potentially moderated by cultural context (Alshare et al., 2024; Cho & Kim, 2025; Wenwen et al., 2024).

Behavioural Addiction Theory

Griffiths (2005) defines behavioural addiction as a behaviour that is rewarding, repetitive, and continues to exist despite adverse consequences, even in the absence of substance use. From the behavioural addiction perspective, too much smartphone use is increasingly seen as a form of addiction. This body of theory argues that dependence can form around rewarding activities that are purely psychological, not only around drugs or alcohol (Brand et al., 2025; Griffiths, 2005). Because smartphones deliver social updates, alerts, and quick entertainment, users can have compulsive habits that resemble those seen in gambling or classic internet addiction (Brand et al., 2025). In fact, several scholars now use the term smartphone addiction to describe compulsive phone behaviour that persists when it causes harm (Brand et al., 2025). Such addiction is like a sudden urge to grab the device, an inability to set meaningful time limits, and real-world problems such as missed work or growing anxiety (Brand et al., 2025). Research in Malaysia, for example, shows that addicted students report feeling isolated, earning lower grades, and facing mental health troubles (Sahimi et al., 2022; Rathakrishnan et al., 2021).

One specific concept, "nomophobia" (no-mobile-phone-phobia), shows this theoretical view: research suggests that nomophobia has become widespread. One survey reported around 85 percent of young adults experiencing at least mild anxiety when separated from their phones (Notara et al., 2021). The perspective of behavioural addiction clarifies why many students struggle to limit their smartphone time; the device activates reward circuits and satisfies social impulses, creating conditions conducive to compulsive use.

Restoration Theory

The restoration theory of sleep claims that sleep functions provide physical and cognitive recovery for functioning throughout the day (Oswald, 1974). Nowadays, more studies support this theory, claiming that restoration during sleep helps recovery for activities such as immune system recovery, hormonal regulation, and neurological functioning (Garbarino et al., 2021; Bishir et al., 2020; Shivalingaiah et al., 2021). When considering the university students, poor

sleep quality diminished by late-night smartphone usage (Abdullah et al., 2022; Kee et al., 2024), which may in turn impacts cognitive abilities, academic performance, emotional regulation, and psychological well-being. Thus, restoration theory supports the need for maintaining sleep quality from disruptive habits such as smartphone usage at night.

Bottom-Up Theory of Life Satisfaction

The bottom-up theory claims that overall life satisfaction is a synthesized result of satisfaction in different aspects such as health, social relationships, leisure activities, and education (Malvaso & Kang, 2022; Rohrer et al., 2024). Current research supports this theory about the impact of students' daily social experiences, whether facilitated through smartphone interactions or hindered by problematic smartphone use, on their overall life satisfaction assessments (Abdullah et al., 2022; Amat et al., 2024; Jiang et al., 2022). Smartphone usage, as described, can lead to poor sleep, negative social comparisons, and diminished social interactions, which significantly reduce specific satisfaction and, in turn, overall life satisfaction (Abdullah et al., 2022; Choi, 2022; Jiang et al., 2022; Marttila et al., 2021). Therefore, the bottom-up theory explains the impacts of social and sleep quality changes from smartphone use on university students' life satisfaction.

Integrative summary

The current research draws upon four theoretical frameworks: Cultural Dimensions Theory, Behavioural Addiction Theory, Restoration Theory, and Bottom-Up Theory, which together describe the impact of cultural factors on the use of smartphones and, in turn, the sleep quality and life satisfaction of university students.

This study seeks to enrich existing scholarship by analyzing the cultural paradigm regarding smartphone use and its effects on sleep quality and life satisfaction, which are, at least theoretically, understudied. From an empirical perspective, this study contributes to the limited literature on multicultural student populations studying at Malaysian universities, as it narrows focus to Malay, Chinese, Indian, and international students. From a practical standpoint, the results could lead to the development of targeted culturally appropriate strategies for digital wellness, sleep hygiene, and psychological health and academic functioning enhancement tailored to students' needs.

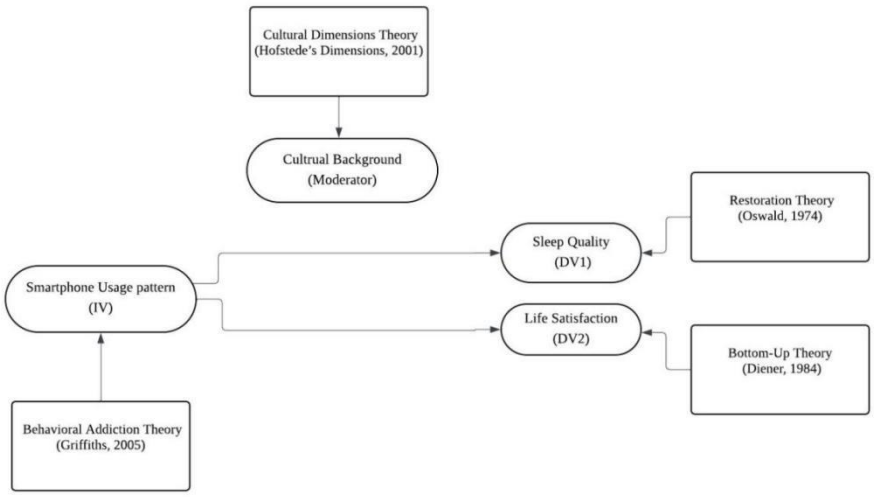

Figure 1. Proposed Theoretical Framework

Hypotheses development

Smartphone usage patterns and sleep quality

Sleep quality and life satisfaction are accepted as two components of student well-being, and both can be affected by everyday habits such as smartphone use (Abdullah et al., 2022). The more recent findings indicate that many Malaysian university students have experienced poor sleep, which correlates with fatigue, low energy, and mood swings (Foo & Lee, 2023). Moreover, further research shows that using smartphones in the dark reduces melatonin release through blue light; it also keeps the brain overactive, often making bedtime later and reducing sleep quality (Kee et al., 2024). For these concerns, Abdullah and colleagues observed that students scoring higher on the smartphone addiction also reported poorer sleep and greater daytime impairment (Abdullah et al., 2022). In accordance with the above evidence, the present study proposes:

- H1: There is a significant relationship between smartphone usage and quality of sleep among UCSI University students.

Sleep quality and life satisfaction

The notion of sleep quality includes more than duration; it also includes how easy it is to fall asleep, stay asleep, and wake feeling genuinely refreshed (Elsheikh et al., 2024). Based on the personal benchmarks an individual sets for themselves, life satisfaction is a feeling of fulfilment, contentment, and general happiness, as well as an individual's overall cognitive assessment of their life (Diener, 1984). Evidence suggests that the life satisfaction is lowered as a result of sleep disruption due to heavy phone use (Abdullah et al., 2022).

In this study, sleep quality and life satisfaction are examined as key outcomes that may be influenced by smartphone usage patterns.

Smartphone usage patterns and life satisfaction

Smartphone use appears to affect life satisfaction, which is a major aspect of how people judge their own well-being (Diener et al., 1985), beyond just interrupting sleep. In a survey of 463 Malaysian university students, Abdullah et al. (2022) linked heavier phone use to noticeably higher life satisfaction, explaining around 13% of the variation. Yet this optimistic view clashes with studies pointing to harm, especially when use causes addiction, as excessive screen time often raises stress and anxiety, demonstrating that benefits and risks depend on context (Nikolic et al., 2023).

Therefore, the present study proposes:

- H2: There is a significant relationship between smartphone usage and life satisfaction among UCSI University students.

The mediating role of sleep quality

Critically, inadequate quality of sleep may mediate the impacts of smartphone use on one's life satisfaction. Evidence suggests that the life satisfaction is lowered as a result of sleep disruption due to heavy phone use (Abdullah et al., 2022). Because of this, students may become trapped in a cycle where addictive phone use deteriorates sleep, which subsequently leads to a decline in morale, motivation, and life satisfaction.

This section develops a theoretical mechanism in line with the literature reviewed.

Cultural background as a moderator.

Cultural groups may vary in how and how much they go online. Chinese-Malaysian students, for instance, typically log on longer than their Malay or Indian classmates do (Soh et al., 2012), and many international learners reach for their phones mainly to stay in touch with family back home, creating a distinct pattern (Xie & Chung, 2022). Cultural norms such as early prayer habits in Malay communities might serve to limit screen usage before bed (Dossi et al., 2022; Irfan & Yaqoob, 2024; Motevalli et al., 2022). These cultural norms might mitigate or amplify the impact of smartphones on sleep. In addition, the relationship between life satisfaction and smartphone use is likely to differ across cultures: in collectivist cultures, smartphones are widely utilized to sustain social and familial relationships which enhances well-being; on the contrary, within more individualistic or high-pressure academic environments, excessive smartphone usage can cause guilt or social comparison, thus reducing overall satisfaction (Choi, 2022; Jiang et al., 2022; Alshare et al., 2024). **Hence, the present study proposes:**

- H3: There is a significant difference in sleep quality among UCSI University students from different cultural groups.
- H4: There is a significant difference in life satisfaction among UCSI University students from different cultural groups.
- H5: There is a significant moderating effect of cultural background on the relationship between smartphone use and sleep quality at UCSI University.
- H6: There is a significant moderating effect of cultural background on the relationship between smartphone use and life satisfaction at UCSI University.

Conceptual Framework

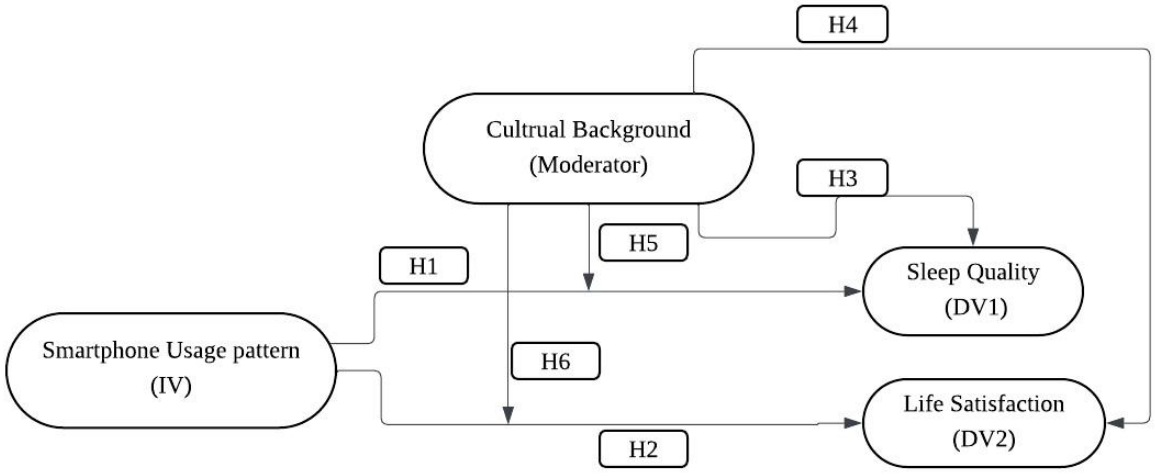

Figure 2. Conceptual Framework of this study

The figure above is the visual representation of the conceptual framework that explores the moderating role of cultural background in the relationship between smartphone usage patterns and two key factors: sleep quality and life satisfaction among university students.

Research Hypotheses

H1: There is a significant relationship between smartphone usage and quality of sleep among UCSI University students.

H2: There is a significant relationship between smartphone usage and life satisfaction among UCSI University students.

H3: There is a significant difference in sleep quality among UCSI University students from different cultural groups.

H4: There is a significant difference in life satisfaction among UCSI University students from different cultural groups.

H5: There is a significant moderating effect of cultural background on the relationship between smartphone use and sleep quality at UCSI University.

H6: There is a significant moderating effect of cultural background on the relationship between smartphone use and life satisfaction at UCSI University.

Methods

This study conducts a quantitative cross-sectional survey to assess the relationships between smartphone usage, sleep quality, life satisfaction, and the cultural differences of students at UCSI University, Kuala Lumpur. Three hundred undergraduate students from UCSI University in Kuala Lumpur formed the study's participants. The sample was evenly divided across the Malay, Chinese, Indian, and international student cohort, to include about 75 students from each cultural group. Eligibility criteria included being a current student at UCSI University, above 18 years of age, and possessing a functional command of the English language. This study used non-probability quota sampling, and participants were recruited via WhatsApp while distributing QR code for form filling in person at UCSI University.

Instrumentations

Respondents filled out an online questionnaire that included demographic data (age, sex, cultural background) as well as three standardized instruments: the Smartphone Addiction Scale–Short Version (Kwon et al., 2013), the Pittsburgh Sleep Quality Index (Buysse et al., 1989), and the Satisfaction With Life Scale (Diener et al., 1985). The SAS-SV includes 10 items assessed with a 6-point scale. Sleep quality was assessed using the PSQI overall sleep-quality item (0 = very good, 3 = very bad), with higher scores indicating poorer sleep quality. The SWLS contains 5 items scored on a 7-point scale, and a score greater than 25 is interpreted as high life satisfaction. These measures have been extensively validated for use in student populations.

Data Collection Procedure

The data collection was finished in October 2025 and lasted for two weeks. Data collection was conducted via Google Forms. Participants gave informed consent with measures to protect their anonymity. It was estimated that the time to complete the survey was 10-15 minutes. There was no compensation for participation.

Data Analysis

Analysis was performed using the SPSS software. The first and second hypotheses were tested using Pearson correlations. One-way ANOVAs or Welch ANOVAs with Tukey's (H3) and Games–Howell (H4) post-hoc tests were used to evaluate cultural differences for hypotheses three and four. Moderated regression analyses were conducted to examine the

hypotheses on cultural moderation (H5 and H6). A p-value of less than .05 was significant in hypothesis testing provided that the relevant prerequisites were satisfied. The chosen approaches guarantee that the relationships and cultural differences are analyzed as intended for the development of targeted strategies to promote the well-being of students.

Ethics

The study was approved by the UCSI University Research Ethics Committee (IEC-2025-FOSSLA-0070). Participation was entirely voluntary, with the assurance of complete anonymity, and informed consent was secured from all respondents prior to data collection. No financial or material incentives were offered, thereby maintaining the integrity of the voluntary nature of the research.

Results

This part lists the results of hypotheses H1 to H6 using Pearson correlations, one-way ANOVAs/Welch ANOVAs, and hierarchical multiple regressions. The main figures are contained in Tables 3 to 5. For easier perception of the patterns, we also include visual aids in Figures 3 and 4.

Participant Demographics

The target population of this study consisted of 300 students from UCSI University. Participants had to provide demographic information (age and gender), but no data of an identifying nature was collected to protect their privacy. As per Table 1, 138 were male (46.0%) and 162 were female (54.0%). Participants were 18 to 27 years old (M = 21.62, SD = 2.07). To ensure a diverse sample, quota sampling was implemented to ensure each of the four self-identified ethnic groups (i.e. Native Malay, Chinese, Indian, and International) were represented equally, each consisting of 75 participants (25.0%), as shown in Table 1.

Table 1
Participant demographics (N = 300)

Characteristic	Category	n	%	
Gender	Male	138		46.0
	Female	162		54.0
Age (years)	M (SD)	21.62 (2.07）	—	
	Range	18–27	—	
Cultural group	Malay	75	25.0	
	Chinese	75	25.0	
	Indian	75	25.0	
	International*	75	25.0	

Note. Cultural groups were balanced by quota sampling (n = 75 per group). "International" refers to non-Malaysian students (coded as "Others" in the dataset).

Descriptive Statistics

Descriptive data for the primary variables in the study are presented in table 2. The sample (SAS-SV total scores) showed a mean of 41.27 (SD = 9.83, range = 19–60) in overall smartphone usage. The evaluated sleep quality (PSQI overall item score), where 0 = very good, and 3 = very bad, showed a mean of 1.36 (SD = 0.91, range = 0–3). The mean life satisfaction (SWLS total) score was 22.75 (SD = 2.61, range = 11–32). These aggregate results in the present study (smartphone usage, sleep quality and life satisfaction) are presented in table 2.

Table 2
Descriptive statistics of study variables (N = 300)

Variable	N	Min	Max	Mean	SD
Smartphone use (SAS-SV total)	300	19	60	41.27	9.83
Sleep quality (PSQI overall item, 0–3)	300	0	3	1.36	0.91
Life satisfaction (SWLS total)	300	11	32	22.75	2.61

Note. SAS-SV = Smartphone Addiction Scale–Short Version (total score; higher scores indicate greater smartphone use). PSQI overall item is scored 0 (very good) to 3 (very bad); higher scores indicate poorer perceived sleep quality. SWLS = Satisfaction with Life Scale (total score; higher scores indicate higher life satisfaction).

Inferential Statistics

H1: There is a significant relationship between smartphone usage and quality of sleep among UCSI University students.

The correlation analysis showed a small but significant positive relationship between the smartphone usage with the quality of sleep, $r(298) = .22$, $p < .01$ (two-tailed). It can be concluded that students with greater smartphone addiction showed a greater degree in self-reporting their sleep quality as worse. Specifically, the higher the SAS-SV total scores, the higher the score on the PSQI overall sleep-quality item, which suggests greater impairment in the sleep quality. Hence, the Hypothesis is supported. Descriptive statistics are shown in Table 3.

H2: There is a significant relationship between smartphone usage and life satisfaction among UCSI University students.

Correlation analysis indicated small-to-moderate negative effect of smartphone use on life satisfaction, possibly due to the presence of other factors explaining a greater proportion of variance in life satisfaction. The more students reported being addicted to their smartphones, the less life satisfaction they reported. The results of the studies were $r(298) = –.32$, $p < 0.001$, showing a statistically significant relationship. Hence, the Hypothesis is supported. Descriptive statistics are shown in Table 3.

Table *3*

Summary of key descriptive statistics and hypothesis test results (N = 300). Descriptive statistics and correlations with smartphone use

Variable	M	SD	r with smartphone use
Smartphone use (SAS-SV total)	41.27	9.83	—
Perceived sleep quality (PSQI overall item)	1.36	0.91	.22**
Life satisfaction (SWLS total)	22.75	2.61	–.32***

Note. Higher scores on the PSQI overall item indicate poorer perceived sleep quality. P < .01. p < .001 (two-tailed).

H3: There is a significant difference in sleep quality among UCSI University students from different cultural groups.

According to Levene's test results, the assumption of homogeneity of variance should be accepted, F (3, 296) = 1.19, p = .31. A one-way ANOVA results demonstrated a significant main effect of culture on the perception of one's sleeping quality F (3, 296) = 5.47, p = .001, η^2 = .053, thus evidenced a small to a medium influence of one's culture background on the PSQI results. Tukey post hoc comparisons revealed that international students perceived and reported their sleep quality to be significantly worse in comparison to the Malay students (mean difference = 0.49, p = .004), and also the Indian students (mean difference = 0.52, p = .002). Comparisons made between the international and Chinese students yielded non-significant results (p = .099), and differences that were seen between the three local groups also yielded non-significant results (all ps > .56). Descriptive statistics are shown in Table 4.

H4: There is a significant difference in life satisfaction among UCSI University students from different cultural groups.

For H4, we ran a one-way ANOVA using cultural background (Malay, Chinese, Indian, International) as the independent variable and life satisfaction (SWLS total score) as the dependent variable. Levene's test for homogeneity of variance, F(3, 296) = 12.24, p < .001, showed that variances of life satisfaction were not the same across the four cultural groups. Based on this violation, the omnibus group difference must have been calculated using Welch's accurate test, which modifies the F value and the df when variances are not equal. Welch ANOVA showed a significant main effect of culture on life satisfaction, F(3, 156.50) = 26.13, p < .001. Based on the sums of squares of the regular ANOVA, the corresponding effect size was η^2 = .215, suggesting that cultural background impacted students' life satisfaction at a considerable level. Because of the equal group sizes, Games–Howell post hoc testing showed that international students had significantly less satisfaction with life compared to the Malay, Chinese, and Indian students (all ps ≤ .010).

Also, compared to Malay (p = .001) and Indian students (p = .021), Chinese students reported significantly lower life satisfaction; however, Malay and Indian students were similar to each other, not showing any significant difference (p = .206). Descriptive statistics are shown in Table 4.

Table 4
Sleep quality and life satisfaction by cultural group (n = 75 per group)

Cultural group	Sleep quality, M (SD)	Life satisfaction, M (SD)
Malay	1.20 (0.93)	24.03 (1.29)
Chinese	1.36 (0.93)	22.47 (3.06)
Indian	1.17 (0.89)	23.60 (1.37)
International	1.69 (0.79)	20.91 (2.96)
Total	1.36 (0.91)	22.75 (2.61)

Note. Sleep quality uses the PSQI overall item (0 = very good, 3 = very bad). Life satisfaction uses SWLS total score (higher = more satisfied).

H5: There is a significant moderating effect of cultural background on the relationship between smartphone use and sleep quality at UCSI University.

A hierarchical multiple regression was used to test H5 using the PSQI overall sleep-quality item (0 = very good; 3 = very bad) as the dependent variable. The F statistic for Model 1 was significant, $F(4, 295) = 7.22$, $p < .001$, and revealed that the model was able to explain 8.9% of the variance in perceived sleep quality ($R^2 = .089$). After considering every one of the three interaction terms in Model 2, the overall model maintained its significance, $F(7, 292) = 5.34$, $p < .001$, and the explained variance, though the increase was small, pushed the figure up to 11.3% ($R^2 = .113$). The data suggest that cultural background only weakly influences how smartphone use and perceived sleep quality are related. While adding the interaction terms produced a small statistically significant increase in explained variance, none of the interaction terms were significant. Thus, Hypothesis 5 is not supported and should be seen as a case of, at best, a slight moderation effect. hierarchical regression summaries, and the moderation model is shown in Figure 3.

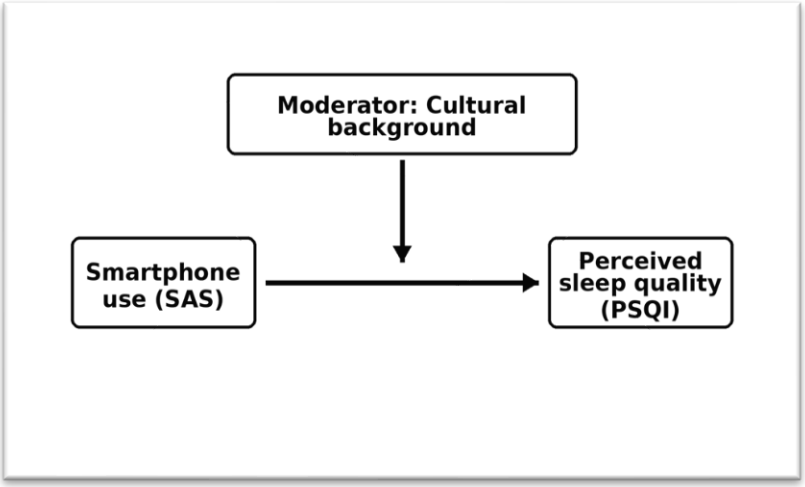

Figure 3 Moderation model of cultural background on the relationship between smartphone use and perceived sleep quality (H5).

Note. Smartphone use is measured by the Smartphone Addiction Scale (SAS). Sleep quality is measured by the PSQI overall sleep-quality item (0 = very good, 3 = very bad); higher scores indicate poorer perceived sleep quality. Cultural background includes Malay, Chinese, Indian, and international student groups. N = 300.

H6: There is a significant moderating effect of cultural background on the relationship between smartphone use and life satisfaction at UCSI University.

Hierarchical multiple regression was conducted with life satisfaction (SWLS total score) as the dependent variable to address H6. Model 1: $R^2 = .284$, $F(4, 295) = 29.28$, $p < .001$. After adding the three interaction terms, the overall model (Model 2) remained significant, $F(7, 292) = 18.61$, $p < .001$, and the explained variance increased from 28.4% to 30.9% ($R^2 = .309$). The change in explained variance was small but statistically significant, $\Delta R^2 = .024$, $\Delta F(3, 292) = 3.43$, $p = .017$, implying that cultural background provides a slight moderation of the relationship between smartphone use and life satisfaction. There was statistically significant interaction for international status ($B = -0.089$, $\beta = -0.20$, $t = -2.64$, $p = 0.009$), however, for the Chinese and Indian groups, the interaction effects were not statistically significant (both $ps > .80$). Thus, H6 is supported since Cultural background does play some moderating role in the association between smartphone use and life satisfaction. This effect is the strongest for international students. Descriptive statistics are shown in Table 5, and the moderation model is shown in Figure 4.

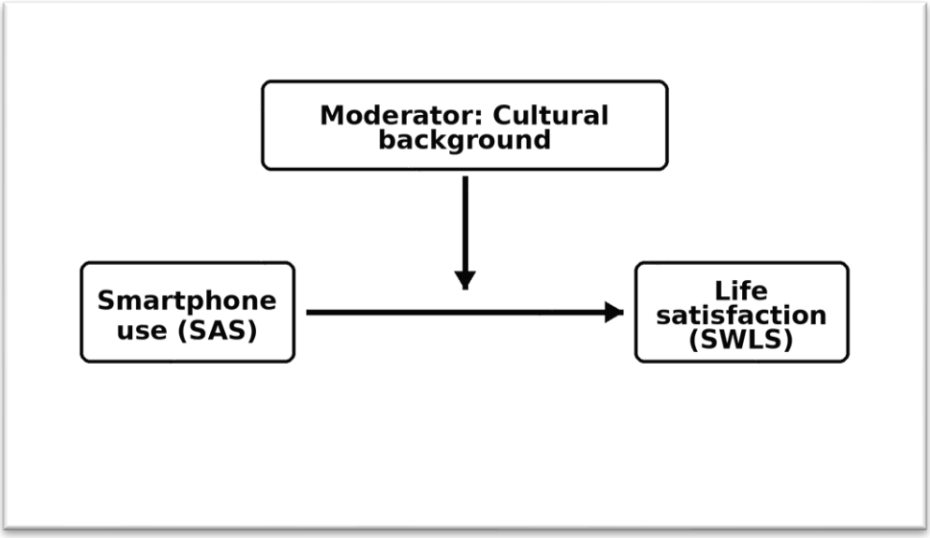

Figure 4 Moderation model of cultural background on the relationship between smartphone use and life satisfaction (H6).

Note. Smartphone use is measured by the Smartphone Addiction Scale (SAS). Life satisfaction is measured by the Satisfaction with Life Scale (SWLS); higher scores indicate greater life satisfaction. Cultural background includes Malay, Chinese, Indian, and international student groups. N = 300.

Table 5
Hierarchical regression summaries for moderation tests

Hyp.	DV	Model 1 R^2	Model 2 R^2	ΔR^2	ΔF (df)	Key moderation result
H5	Sleep quality	.089	.113	.024	2.67 (3, 292)*	No significant interactions (ps > .05)
H6	Life satisfaction	.284	.309	.024	3.43 (3, 292)*	SAS × International: B = –0.089, p = .009

Note. ΔF is the change in F from Model 1 to Model 2 after adding interaction terms. $p < .05$.

Discussion

Discussion of Hypothesis 1

The data supported the hypothesis. This form of positive association is in line with previous data indicating that smartphones are related to sleep problems of students in a Malaysian context. In their study, Foo and Lee (2023) discussed how the insufficient sleep experienced by students is typically linked with tiredness during the day, struggles with their studies, and emotional problems. Abdullah et al. (2022) proposed that the use of smartphones during the late at night is likely to distract from the necessary conditions that would otherwise foster good sleep, and thus, frequent users of smartphones would experience a greater level of compromised sleep quality. As noted within the thesis, there is a growing abundance of literature related to the adverse effects of smartphone use late at night (e.g. blue light, notifications, etc.), and it also can inhibit melatonin production, alter circadian rhythms, and lead to a decline in sleep quality (Kee et al., 2024). However, this correlational finding does not imply causality.

Discussion of Hypothesis 2

The data supported the hypothesis. This result is consistent with prior research showing that inappropriate smartphone use associates with diminished students' well-being. Problematic smartphone use is correlated with poor psychological well-being among college students in Malaysia (Chen et al., 2021). In contrast, it is not all negative. Meaningful smartphone usage could in fact improve student well-being by allowing social contact and emotional support (Park & Choi, 2022). From a theoretical perspective, this aligns with the Bottom-Up Theory of life satisfaction, which posits that overall life satisfaction is shaped by the aggregation of experiences in different domains (Diener, 1984). If students' excessive smartphone use does, in fact, contribute to poorer sleep, weakened in-person relationships, and negative comparisons, these disruptions on the domain level may aggregate to a decrease in global life satisfaction for students. However, this correlational finding does not imply causality.

Discussion of Hypothesis 3

The data supported the hypothesis. The results indicated that no significant differences were found between the three local groups. Thus, the greatest differences in sleep quality might have been limited to international students and three local groups, as opposed to all cultures. International students also utilize smartphones to communicate with relatives and friends in their home countries. Considering the differences in time zones and irregular communication

schedules, one can certainly understand how these factors lead to the various issues while overseas studying (Alnjadat et al., 2022). While specific cultural values were not the main focus of this study, the Cultural Dimensions Theory provides a framework in explaining the possible reasons as to why sleep quality would differ to a larger extent for local versus international students, even in the same university setting. According to Hofstede (2001) and Jan et al. (2022), the Cultural Dimension Theory indicates that one's interaction with technology and the arrangement of resting periods is governed by a certain value system. Given the cross-sectional nature of this research, the cultural varying dimensions discussed within this study should also be treated cautiously.

Discussion of Hypothesis 4

The data supported the hypothesis. The students from the host country (particularly the Malay and Indian groups) report the highest life satisfaction. The Chinese students report a bit lower satisfaction while international students report the least life satisfaction. Hypothesis four considered whether life satisfaction differs significantly across cultures within university students. This means the greatest well-being gap is between international and local students, with an additional smaller gap within the local group. Analysis from the theoretical perspective, Diener (1984) posits that life satisfaction is a broad assessment of the various events and circumstances that an individual encounters during their lifetime. Cultural Frameworks also provide a point of view to understand the situation above, even if it is within the same university environment. According to Hofstede (2001), cultural value systems are important factors that influence the ways behaviours are shaped, and the ways social expectations and coping mechanisms are regulated. More recent studies have been linking the culture to the use of technology and to behaviours impacting the quality of life (Jan et al., 2022). Ultimately, these results indicate the need for the UCSI well-being initiatives to adapt to the cultural context. Consequently, rather than a one-size-fits-all strategy, tailored adjustment assistance, peer integration, and available counselling services would be beneficial for international students. Given the cross-sectional nature of this research, the cultural varying dimensions discussed within this study should also be treated cautiously.

Discussion of Hypothesis 5

The data do not support the hypothesis. The fifth hypothesis expected that university students' cultural backgrounds would moderate the relationship between one's smartphone usage and sleep quality, but the data were not strong enough to support this hypothesis. This thesis has mentioned previous literature explaining how certain cultural groups may differ from each other in technology routines and patterns of late-night use which could theoretically produce distinct levels of risk regarding sleep disturbance. While there may be variation in cultural groups, the physiological aspect of using phones during the night may be universal. An instance of this would be the late exposure to smartphone light and alerting content, which has been found to decrease the amount of melatonin released and interrupt one's circadian rhythm, and it is likely to affect the sleep of all students regardless of their background (Kee et al., 2024). However, there is a chance that the culturally specific digital routines in this study may have been minimized because of the shared university context. Students in the same university are likely to have comparable academic workload, social media use, and lifestyle on the campus, which may reduce the possible behavioural differences one might expect in the different groups, as well as the moderation effects. Future researchers may aim to more narrowly define

cultural values or to other contextual elements to clarify when culture is likely to affect the association between the smartphone and sleep.

Discussion of Hypothesis 6

The data supported the hypothesis. Hypothesis six argued that among university students, cultural background would act as a moderating variable in the relationship between smartphone usage and their overall life satisfaction. After integrating interactions, the main effect of smartphone use became non-significant, indicating the connection between smartphone use and life satisfaction was influenced by cultural context, particularly varying to a greater extent for international students. The interaction terms, only the international students term was significant, and Chinese and Indian students were not. This pattern also fits the discussion in the literature review that the relation between smartphone use and life satisfaction is not one-way. Chen et al. (2021) connected problematic smartphone usage to lower psychological well-being of Malaysian university students which may provide a rationale for the drop in life satisfaction. At the same time, Park and Choi (2022) argued that smartphone usage may relate to quality of life through social means, suggesting that the outcomes of phone usage may be determined by the purpose and function of the usage rather than usage itself. According to Hofstede (2001), self-regulation and self-governing daily behaviour patterns are a result of culturally embedded values. Similarly, Jan et al. (2022) suggested that culture may also interact with technology-related attitudes and outcomes. These findings suggest that well-being interventions should be universally applicable and also culturally sensitive. Nonetheless, international students might need extra support from the university, incorporating adjustment resources, peer connection and culturally adaptive counseling. As with the other hypotheses, the cross-sectional design offers no grounds for claiming causation.

Implications

Several implications emerge from the findings for the students and UCSI University. The examination of smartphone usage, sleep quality, and life satisfaction with regard to Malay, Chinese, Indian and international students, enable a fuller understanding of students' well-being on a multicultural campus.

The results support the value of a behavioral addiction approach to understanding problem smartphone use among students. As explained by Griffiths (2005), the behavioral addiction theory holds that, even when adverse consequences such as ill health or diminished functioning in the day-to-day are incurred, the habits are still repetitively engaged in, as the health risks are masked by immediate rewards. This indicates that education on digital wellness should emphasise reward-driven smartphone behaviours instead of only screen time habits.

Hofstede's Cultural Dimensions Theory suggests that there could be difference in self-regulation, social norms, and lifestyle patterns across cultures (Hofstede, 2001). Furthermore, a meta-analytic review claims that technology in everyday life can be accepted and used in different ways depending on the culture (Jan et al., 2022). From this, it can be inferred that the cultural differences in self-regulation and technology usage habits should be taken into account when designing self-regulation and technology usage workshops for the students.

The lack of cultural moderation in the smartphone-sleep connection suggests that the sleep disruption mechanisms associated with problematic smartphone use may be relatively homogeneous across different groups. Heavy smartphone use has been associated with negative sleep-related outcomes within the student population (Abdullah et al., 2022; Kee et al., 2024). By contrast, in this study, cultural moderation in relation to the smartphone-life satisfaction connection was found primarily with international students. Previous studies indicate that international students may undergo some unique strain which may interact with their technology use and well-being (Alnjadat et al., 2022). UCSI University can use these findings to enhance student support and wellness programming. Also this research indicates that culturally sensitive forms of support are beneficial for international students.

Limitations

First, the cross-sectional study design does not let the researcher draw causal conclusions. This is often a limitation of cross-sectional evidence and should be interpreted in behavioral and health research (Wang & Cheng, 2020). Second, the research heavily depended on the self-report mechanisms used to evaluate the addiction to the smartphone, the quality of the sleep, and the satisfaction with life. Such aspects may have caused some biases in the responses and some errors in the measurement which might have some degree of negative impact to the accuracy within the relationships (Paulhus, 1991; van de Mortel, 2008).

Third, in this research, sleep quality was measured using only the overall self-reported sleep quality indicator from the PSQI, as opposed to taking a full, multidimensional approach. Relying only on a single dimension of sleep quality could compromise measurement sensitivity and limit the capacity to describe the nature of sleep problems (Buysse et al., 1989). Fourth, the sample was obtained through quota sampling. Yet the sample's non-probabilistic nature likely limits the findings' generalizability. Students in public universities or non-English contexts may also have different usage patterns and well-being profiles (Golzar et al., 2022; Department of Statistics Malaysia, 2025; Universiti Kebangsaan Malaysia, n.d.).

Fifth, the cultural groupings in the present study may have overlooked some important within-group differences. Finally, the data was gathered using a single survey and one time snapshot, we cannot completely eliminate common method variance. With all the anonymization and reducing evaluation apprehension, the shared measurement context may still distort the real relationships within the variables (Rodríguez-Ardura & Meseguer-Artola, 2020).

Future Directions

Considering both findings and limitations of this study, the understanding of smartphone usage, satisfaction with life, and the quality of sleep of university students from various cultures can be expanded in several areas.

First, addressing longitudinal or experimental designs would enhance understanding of the relationship. While cross-sectional research is beneficial in identifying relationships, it is unable to determine the direction of the linkage. For instance, it is unknown if problematic smartphone use causes declining sleep and life satisfaction or if the cycle is the other way. Such changes in methodology would strengthen the evidence for future interventions. Shadish et al. (2002) stated that single-measure designs are inadequate for the causal interpretation.

Second, Future work can further strengthen measurement strategies to reduce self-reporting bias. Although self-reported scales like the Smartphone Addiction Scale–Short Version (SAS-SV) are psychometrically sound, they could be enhanced through the combination of objective measurement like screen-time record and app-use logs. Kwon et al. (2013) provided evidence for the reliability and validity of the SAS-SV, but multi-method approaches could still mitigate bias. Paulhus (1991) and van de Mortel (2008) noted how self-report data is susceptible to social desirability, selective memory and self bias and how these response trends will affect the findings on behavioral research.

Third, one future direction is the extension of sampling techniques for the generalizability. Given that the current study is focused only on UCSI University, the experiences of other Malaysian institution students, as well as those from other academic settings, are likely not to be represented. Widening the data collection to incorporate public universities, remote campuses, and various academic fields would likely enhance the perspective at the national level. Taking a more varied sampling technique may help in capturing a wider range of cultural and lifestyle frameworks. Golzar et al. (2022) examined how convenience sampling may adversely impact the representativeness of the results, and the issue becomes more prominent in studies with behavioral and health.

Fourth, future research may consider a more nuanced role of culture. In this study, we compare cultures at a broad level. Future work could more narrowly examine cultural values that inform self-regulation and digital behaviours. Such a values based approach may also clarify why cultural moderation was more apparent in life satisfaction, and not in sleep. Hofstede (2001) provides an framework to understand value differences that might affect the use of technology. Furthermore, Jan et al. (2022) claims that the cultural dimensions shape the manner in which individuals use technology in their daily activities.

Fifth, studies should analyze the different types and purposes to which smart phones are used. The body of research indicates that smart phone engagement are not universally detrimental, and the effects tend to vary with whether the engagement is active, socially supportive and goal directed, or whether the engagement is passive and compulsive. Abdullah et al. (2022) pointed out that some behavioral patterns with respect to smart phone use in some students were positively associated with life satisfaction, while in Kee et al. (2024) and Mohd Salleh Sahimi et al. (2022) study more severe use of phones was associated with more detrimental sleep and psychological conditions. Further research which investigates the academic, social, and recreational smartphone use may provide insight into the contexts where the smartphone may assist or detriment students. This method may be particularly important to international students, as their reliance on smartphones may be influenced by adjustment-related stress and maintenance of long distance social ties. Alnjadat et al. (2022) elaborated on how international students are likely to experience unique stressors which may have implications towards their sleep and well-being.

Conclusion

This study aimed to analyze the relationships between the smartphone usage and sleep quality and life satisfaction differences among the students of UCSI University. The results indicated that more problematic smartphone use related to poorer quality of sleep and life satisfaction, showing the importance of digital habits for students' well-being. Cultural differences were

observed: international students had the worst sleep quality and the lowest life satisfaction, while local students, in particular, Malay and Indian students, tended to report more favourable outcomes, whereas Chinese students reported lower life satisfaction. The effect of cultural background was not significant regarding the impact of smartphone usage on sleep, but when it came to smartphone usage and life satisfaction the impact was significant, particularly for international students. The study contributes a cultural perspective to the scholarly understanding of the relationship between smartphone usage, sleep, and life satisfaction. It also serves as a groundwork for universities to establish more tailored, culturally attuned interventions that promote healthy digital practices and enhance student wellness on a multicultural campus.

References

Abdullah, H., Marzuki, N. F., Ma'rof, A. A., & Sham, F. M. (2022). *Mobile phone usage, sleep quality, and life satisfaction among university students in Malaysia*. *International Journal of Academic Research in Business and Social Sciences, 12*(14), 72–88. https://doi.org/10.6007/IJARBSS/v12-i14/15816

Alnjadat, R., Al-farajat, L., Al-Hadid, L., Jaradat, H., & Al-Rawashdeh, A. (2022). *Confounding factors affecting the sleep quality among international students during the lockdown*. *Journal of Positive School Psychology, 6*(6), 6241–6248. https://journalppw.com/index.php/jpsp/article/view/8566

Alshare, K. A., Moqbel, M., Merhi, M. I., Bartelt, V., & Alam, M. (2024). The impact of cultural dimensions and quality of life on smartphone addiction and employee performance: The moderating role of quality of life. Information Systems Frontiers. https://doi.org/10.1007/s10796-024-10544-4

Amat, M. A. C., Tugiman, N., & Asri, A. S. (2024). The relationship between life satisfaction, self-esteem, fear of missing out (FOMO), and social media addiction among university students in Malaysia. Journal of Institutional Research South East Asia, 22(1), 22–46. https://www.seaairweb.info/journal/articles/JIRSEA_v22_n01/JIRSEA_v22_n01_Article02.pdf

Balani, S. O., Al-Hussainy, A. F., Shalal, A. A. A. H., Ubaid, M., Aluquaily, Z., Alamoori, J., & Motevalli, S. (2024). Exploring brain activity in different mental cognitive workloads. Iranian journal of psychiatry, 19(4), 356. https://doi.org/10.18502/ijps.v19i4.16549

Bishir, M., Bhat, A., Essa, M. M., Ekpo, O., Ihunwo, A. O., Veeraraghavan, V. P., … Guillemin, G. J. (2020). Sleep deprivation and neurological disorders. BioMed Research International, 2020, 5764017.

Brand, M., Antons, S., Bőthe, B., Demetrovics, Z., Fineberg, N. A., Jimenez-Murcia, S., King, D. L., Mestre-Bach, G., Moretta, T., Müller, A., Wegmann, E., & Potenza, M. N. (2025). Current advances in behavioral addictions: From fundamental research to clinical practice. American Journal of Psychiatry, 182(2), 155–163. https://doi.org/10.1176/appi.ajp.20240092

Buysse, D. J., Reynolds, C. F., Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). The Pittsburgh Sleep Quality Index: A new instrument for psychiatric practice and research. *Psychiatry Research, 28*(2), 193–213. https://doi.org/10.1016/0165-1781(89)90047-4

Chen, Y. Y., Medi, A. S. B., Muhammad Shamsudin, S. S. A. I., Ng, K. D., & Abdul Malek, K. (2021). Smartphone usage and psychological well-being among Malaysian university students. Global Business and Management Research: An International Journal, 13(2), 177–188. https://www.gbmrjournal.com/pdf/v13n2/V13N2-15.pdf

Cho, J., & Kim, H. (2025). *The role of impulsivity and emotional dysregulation in smartphone overdependence: A cross-cultural network analysis*. *Scientific Reports, 15*, Article 1852. https://doi.org/10.1038/s41598-025-85680-1

Choi, J. (2022). Do Facebook and Instagram differ in their influence on life satisfaction? A study of college men and women in South Korea. Cyberpsychology: Journal of Psychosocial Research on Cyberspace, 16(1), Article 2. https://doi.org/10.5817/CP2022-1-2

DataReportal. (2023, February 13). Digital 2023: Malaysia. https://datareportal.com/reports/digital-2023-malaysia

Department of Statistics Malaysia. (2022). Malaysia happiness index report 2021 [Report]. https://www.dosm.gov.my/site/downloadrelease?admin_view=&id=malaysia-happiness-index-report-2021&lang=English

Department of Statistics Malaysia. (2025, April 24). ICT use and access by individuals and households survey report, 2024. https://www.dosm.gov.my/portal-main/release-content/ict-use-and-access-by-individuals-and-households-survey-report-2024

Diener, E. (1984). Subjective well-being. *Psychological Bulletin, 95*(3), 542–575. https://doi.org/10.1037/0033-2909.95.3.542

Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. Journal of Personality Assessment, 49(1), 71–75. https://doi.org/10.1207/s15327752jpa4901_13

Dossi, F., Buja, A., & Montecchio, L. (2022). Association between religiosity or spirituality and internet addiction: A systematic review. Frontiers in Public Health, 10, 980334. https://doi.org/10.3389/fpubh.2022.980334

Elsheikh, A. E., Abdelfattah, S. A., & Sadek, D. (2024). Impact of smartphone use at bedtime on sleep quality and academic activities among medical students at Al-Azhar University in Cairo. Journal of Public Health. https://doi.org/10.1007/s10389-023-01964-8

Foo, A. Y. K., & Lee, C. N. (2023). *Sleep quality among university students in Malaysia: Associations with daytime fatigue, academic performance, and mood disturbances*. *Sleep Medicine Research, 14*(1), 43–49. https://doi.org/10.17241/smr.2022.01536

Garbarino, S., Lanteri, P., Bragazzi, N. L., Magnavita, N., & Scoditti, E. (2021). Role of sleep deprivation in immune-related disease risk and outcomes. Communications Biology, 4, 1304

Golzar, J., Tajik, O., & Noor, S. (2022). Convenience sampling: benefits and drawbacks. International Journal of English Language & Literature Studies, 1(2), 72–82. https://www.ijels.net/article_162981.html

Griffiths, M. D. (2005). A 'components' model of addiction within a biopsychosocial framework. Journal of Substance Use, 10(4), 191–197. https://doi.org/10.1080/14659890500114359

Hofstede, G. (2001). Culture's consequences: Comparing values, behaviors, institutions, and organizations across nations (2nd ed.). Sage.

Irfan, B., & Yaqoob, A. (2024). Between Fajr and Isha: Understanding sleep dynamics in Islamic prayer timings and astronomical considerations. Cureus, 16(4), e58911. https://doi.org/10.7759/cureus.58911

Jan, J., Alshare, K. A., & Lane, P. L. (2022). Hofstede's cultural dimensions in technology acceptance models: A meta-analysis. Universal Access in the Information Society, 23, 717–741. https://doi.org/10.1007/s10209-022-00930-7

Jiang, L. (2025). Does religion suppress internet addiction? An instrumental variable approach using data from China. Religions, 16(10), 1261. https://doi.org/10.3390/rel16101261

Kee, D. M. H., Jim, B. B., Razman, F. M. A., & Risby, D. M. (2024). *Screen time and university students' life: Exploring the impact of smartphone usage on sleep quality, well-being, social behavior, and academic performance*. *Asia Pacific Journal of Management and Education, 8*(1), 93–109. https://doi.org/10.32535/apjme.v8i1.3859

Kementerian Komunikasi dan Multimedia Malaysia. (2021). Internet users survey – Percentage distribution of internet users by ethnicity (since 2012) [Data set]. Malaysia Open Data Portal. Retrieved December 19, 2025, from https://archive.data.gov.my/data/en_US/dataset/internet-users-survey-percentage-distribution-of-internet-users-by-ethnicity

Kwon, M., Kim, D. J., Cho, H., & Yang, S. (2013). The smartphone addiction scale: Development and validation of a short version for adolescents. *PLoS ONE, 8*(12), e83558. https://doi.org/10.1371/journal.pone.0083558

Lee, C. E., Chern, H. H., & Azmir, D. A. (2023). WhatsApp use in a higher education learning environment: Perspective of students of a Malaysian private university on academic performance and team effectiveness. Education Sciences, 13(3), 244. https://doi.org/10.3390/educsci13030244

Lee, K. W., Ching, S. M., Ali, N., Ooi, C. Y., Sidek, S. K. H., Amat, A., Yatim, Y., Yahaya, Z., Shamsuddin, N., Ibrahim, I., Abdul Majid, F., Othman, F. S., Zakaria, N. S., Abidin, A., Talib, N. H., & Sivaratnam, D. (2023). Prevalence and factors associated with smartphone addiction among adolescents–A nationwide study in Malaysia. International Journal of Mental Health Promotion, 25(2), 237–247. https://doi.org/10.32604/ijmhp.2023.013407

Mac Cárthaigh, S., Griffin, C., & Perry, J. (2020). The relationship between sleep and problematic smartphone use among adolescents: A systematic review. Developmental Review, 55, 100897. https://doi.org/10.1016/j.dr.2020.100897

Malvaso, A., & Kang, W. (2022). The relationship between areas of life satisfaction, personality, and overall life satisfaction: An integrated account. Frontiers in Psychology, 13, 894610. https://doi.org/10.3389/fpsyg.2022.894610

Marttila, E., Koivula, A., & Räsänen, P. (2021). Does excessive social media use decrease subjective well-being? A longitudinal analysis of the relationship between problematic use, loneliness, and life satisfaction. Telematics and Informatics, 59, 101556. https://doi.org/10.1016/j.tele.2020.101556

Mohd Salleh Sahimi, H., Norzan, M. H., Nik Jaafar, N. R., Sharip, S., Ashraf, A., Shanmugam, K., Bistamam, N. S., Mohammad Arrif, N. E., & Midin, M. (2022). Excessive smartphone use and its correlations with social anxiety, self-esteem, and quality of life among medical students in a public university in Malaysia: A cross-sectional study. Frontiers in Psychiatry, 13, 956168. https://doi.org/10.3389/fpsyt.2022.956168

Motevalli, S., Saffari, N., Michael, M. T. A., & Abadi, F. H. (2022). Enculturation, Education and Sustainable Development: Understanding the Impact of Culture and Education on Climate Change. International Education Studies, 15(4), 31-41. https://doi.org/10.5539/ies.v15n4p31?urlappend=%3Futm_source%3Dresearchgate.net%26utm_medium%3Darticle

Nikolic, A., Bukurov, B., Kocic, I., Vukovic, M., Ladjevic, N., Vrhovac, M., Pavlović, Z., Grujicic, J., Kisic, D., & Sipetic, S. (2023). Smartphone addiction, sleep quality, depression, anxiety, and stress among medical students. Frontiers in Public Health, 11, 1252371. https://doi.org/10.3389/fpubh.2023.1252371

Notara, V., Vagka, E., Gnardellis, C., & Lagiou, A. (2021). The emerging phenomenon of nomophobia in young adults: A systematic review study. Addiction & Health, 13(2), 120–136. https://doi.org/10.22122/ahj.v13i2.309

Oswald, I. (1974). Sleep (3rd ed.). Penguin Books. https://archive.org/details/sleep0000oswa

Park, J. H., & Choi, J. M. (2022). Smartphone overdependence and quality of life in college students: Focusing on the mediating effect of social withdrawal. Frontiers in Public Health, 10, 997682. https://doi.org/10.3389/fpubh.2022.997682

Paulhus, D. L. (1991). Measurement and control of response bias. In J. P. Robinson, P. R. Shaver, & L. S. Wrightsman (Eds.), Measures of personality and social psychological attitudes (pp. 17–59). Academic Press. https://doi.org/10.1016/B978-0-12-590241-0.50006-X

Rathakrishnan, B. (2021). Smartphone addiction and sleep quality on academic performance of university students: An exploratory research. International Journal of Environmental Research and Public Health, 18(16), 8291. https://doi.org/10.3390/ijerph18168291

Rodríguez-Ardura, I., & Meseguer-Artola, A. (2020). Editorial: How to prevent, detect and control common method variance in electronic commerce research. Journal of Theoretical and Applied Electronic Commerce Research, 15(2), i–v. https://doi.org/10.4067/S0718-18762020000200101

Rohrer, J. M. (2024). The effects of satisfaction with different domains of life on general life satisfaction. Collabra: Psychology, 10(1), 121238.

Sánchez-Fernández, M., & Borda-Mas, M. (2023). Problematic smartphone use and specific problematic Internet uses among university students and associated predictive factors: A systematic review. Education and Information Technologies, 28, 7111–7204. https://doi.org/10.1007/s10639-022-11437-2

Soh, P. C.-H., Yan, Y. L., Ong, T. S., & Teh, B. H. (2012). Digital divide amongst urban youths in Malaysia—Myth or reality? Asian Social Science, 8(15), 75–89. https://doi.org/10.5539/ass.v8n15p75

Universiti Kebangsaan Malaysia. (n.d.). How to apply. Centre for Academic Management. Retrieved December 21, 2025, from https://www.ukm.my/akademik/how-to-apply/

van de Mortel, T. F. (2008). Faking it: Social desirability response bias in self-report research. Australian Journal of Advanced Nursing, 25(4), 40–48.

Wang, X., & Cheng, Z. (2020). Cross-sectional studies: Strengths, weaknesses, and recommendations. Chest, 158(1S), S65–S71. https://pubmed.ncbi.nlm.nih.gov/32658654/

Wang, L. (2023). Starting university during the pandemic: First-year international students' complex transitions under online and hybrid-learning conditions. Frontiers in Psychology, 14, 1111332. https://doi.org/10.3389/fpsyg.2023.1111332

Wang, W., Zhu, Y., Yu, H., Wu, C., Li, T., Ji, C., Jiang, Y., & Ding, D. (2024). The impact of sleep quality on emotion regulation difficulties in adolescents: A chained mediation model involving daytime dysfunction, social exclusion, and self-control. BMC Public Health, 24, 1862. https://doi.org/10.1186/s12889-024-19400-1

Wenwen, M., Motevalli, S., & Razak, R. B. A. (2024). Enhancing University Students' Performance Tests, Motivational Strategies for Learning, and Social Skills through Cooperative Learning: A Study on Chinese Traditional Culture Education in China. International Journal of Body, Mind & Culture (2345-5802), 11(4). https://doi.org/10.22122/ijbmc.v11i4.696

Windmill, H., Dyer, A., Smith, A. D., Roser, M. E., Dhanda, A., & Hall, S. D. (2024). Characterising the inconsistency between perceived and actual sleep and its impact upon cognition and mood. Scientific Reports, 14, 29342. https://doi.org/10.1038/s41598-024-80683-w

Shadish, W. R., Cook, T. D., & Campbell, D. T. (2002). Experimental and quasi-experimental designs for generalized causal inference. Houghton Mifflin.

Shivalingaiah, S. B., et al. (2021). Sleep and gonadotrophin hormones: An integrative review. Indian Journal of Neuropsychiatry, 7(Suppl 1), S13–S17.

Xie, M., & Chung, C.-C. (2022). The interplay between social media and cultural adjustment: Analysis of the subjective well-being, social support, and social media use of Asian international students in the U.S. Journal of Intercultural Communication, 22(2). https://www.immi.se/index.php/intercultural/article/view/967-Ming-Xie-and-Chin-Chung-59-3/68

Yun, L. J., Motevalli, S., Talib, M. A., & Garmjani, M. G. (2023). Resilience, loneliness, and impulsivity among adolescents: A systematic review of the literature. Iranian journal of educational sociology, 6(4), 1-17.