University Students and Excessive Screen Time: Links to Sleep Disturbance and Acute Health Issues

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ABSTRACT

Background: University students often spend a significant amount of time on screens due to academic demands, entertainment and social interactions. However, excessive screen time may negatively affect sleep quality and contribute to deterioration in health. This study aimed to determine the association between sleep disturbance and acute health effects associated with prolonged screen time among students at a higher education institution. **Methods:** A cross-sectional study was conducted among undergraduate students at a public university in Kuantan, Pahang. A self-administered questionnaire was distributed to eligible participants who owned personal screen-based devices and had sufficient English proficiency to understand the questionnaire. Students who were on study leave and had been diagnosed with insomnia and pre-existing eye disorders that are known not to be caused by excessive screen usage were excluded. Screen device addiction was measured using the Manolis/Roberts Cell-Phone Addiction Scale (MRCPAS), while sleep behaviour was assessed using the Pittsburgh Sleep Quality Index (PSQI). **Results:** With 155 participants, the findings indicate that the majority preferred using smartphones primarily for educational and entertainment purposes, with an average daily screen time of 7.32 hours. The mean addiction score to the screen device was 12.81 out of 20, indicating a high level of screen device dependency. Despite this, the majority (97.4%) reported good sleep quality. Participants reported several acute health effects due to prolonged screen time, including eye strain, musculoskeletal discomfort (e.g. back pain, neck pain), headaches, and a decline in physical fitness. Chi-square analysis revealed significant associations between sleep disturbance and dry eyes (p=0.022), blurred vision (p=0.023), burning eyes sensation (p=0.048), double vision (p=0.014), difficulty focusing for near vision (p=0.012), feeling that eyesight is worsening (p=0.029), and back pain (p=0.028). **Conclusion:** Our findings indicate that sleep disturbance had significant associations with several acute health effects caused by prolonged screen time. The results obtained in this study may not accurately reflect the general university student population, as the sample size was limited; however, they may serve as a helpful starting point for larger epidemiological studies.

INTRODUCTION

University students are often committed to having high screen time in their daily lives, as they must complete assignments, attend group discussions, and sometimes participate in online classes. Student's screen time should be controlled because excessive screen use can harm their physical health and well-being. Excessive screen time was found to be prone to developing many adverse health effects, such as headaches, eye problems, musculoskeletal disorders, cardiovascular disease, mental health issues and sleep disturbance.

The World Health Organisation [WHO] (2019) describes screen time as the "*time spent passively watching screen-based entertainment (TV, computer, mobile devices) and does not include active screen-based games where physical activity or movement is required*". This statement is also commonly referred to as sedentary screen time, in which screen time activities are performed in a resting position, such as sitting or lying down (Bull et al., 2020). Ross et al. (2020) recommend that adults limit sedentary activities to 8 hours or fewer per day, increase physical activity, and adopt a healthy lifestyle that includes regular exercise.

Focusing on screen time, screen-based activities differ across individuals because screens can perform various functions simultaneously. In daily life, electronic devices are primarily used to facilitate tasks such as socialising, searching for knowledge, and entertainment (Kaye et al., 2020). With the readily available internet connection in recent years, compared to the past, Malaysians have spent most of their time on screens browsing or surfing the internet. According to The New Straits Times (2023),

Malaysia ranked third among the ten leading nations with the highest internet usage frequency, averaging eight hours and six minutes daily. It has been stated that almost all citizens of Malaysia are active online users, with an estimated 96.8 per cent, and this is one of the elements that leads this country to occupy such a high rank (New Straits Times, 2023).

Impact of Excessive Screen Time on Sleep Quality

Excessive screen time may disrupt the sleep cycle and reduce sleep quality. Research conducted by Hale et al. (2018) confirms a relationship between excessive screen time and poor sleep quality, increased bedtime delay, and heightened daytime exhaustion. A study conducted by Cain & Gradisar (2010, as cited in Perrault et al., 2019) hypothesised three possibilities could be involved in how screen time affects sleep: (i) screen activities that usually last long will mess up the person's sleep schedule; (ii) raising feelings of emotion at night that influence sleep time; and (iii) screen light that prevents the synthesis of melatonin, a hormone known to promote sleep in the human body. However, subjection to light from 12:00 a.m. to 4:00 a.m. may restrict the release of the melatonin hormone, where this early light detection will accelerate the circadian rhythm, which causes the production of melatonin to reach its highest point ahead of time, yet light exposure in the evening delays the stage of melatonin secretion (Poza et al., 2022).

Screen activities, such as playing online games, can be extremely exciting and require intense concentration to succeed (Hale et al., 2018). Thus, this can result in delayed bedtimes for students. Being active on a screen, especially at night, can shorten the sleep cycle. When students do not get enough sleep, it can disrupt their daily lives and lead to poor academic performance. Insufficient sleep is known to worsen a person's medical conditions, impair cognitive ability, elevate stress and depression, and also weaken the body's immunity, which raises the possibility of getting injured (Alshoaibi et al., 2023).

Acute Health Effects of Excessive Screen Time on the Human Body

A study by Kaur et al. (2022) describes digital eye strain as eye or vision concerns arising from prolonged use of screen devices. This digital eye strain can be divided into two categories, which are ocular symptoms such as dry eyes, itching, tearing, tired eyes, blurred vision, burning sensation, redness and double vision and the associated non-ocular symptoms like stiff neck, general fatigue, headache, and back pain (Kaur et al., 2022; Agarwal et al., 2022). In addition to excessive screen usage, digital eye

strain, also known as computer vision syndrome, has been linked to several issues, including poor sitting posture, an inappropriate distance between the eyes and the screen, and an incorrect angle of view for the screen user (Lema & Anbesu, 2022). The American Optometric Association noted that two hours of non-stop screen time is enough to cause digital eye strain (Kaur et al., 2022). A study conducted by AlQarni et al. (2023) found that 68.5% of university students experienced digital eye strain due to back-to-back online classes during the COVID-19 pandemic, leading to prolonged screen use. In addition, a study by Ccami-Bernal et al. (2023) found that the prevalence of digital eye strain was approximately 69.0%, with female university students affected more than male students.

Excessive screen time also contributes to a high prevalence of headaches among university students, including medical students (Montagni et al., 2016). In addition to one of the symptoms of digital eye strain, headaches are said to be caused by an improper distance between the user and the screen, and may also result from back muscle pain experienced by individuals who use screens excessively (Lucchetti, 2023; Shah & Hameed, 2023). Moreover, the prolonged screen time has been linked to musculoskeletal pain, particularly neck and back pain (Khan et al., 2021). As such, this study aims to assess screen behaviour and device addiction among university students at a public university and to determine the prevalence of sleep disturbances and related acute health effects associated with excessive screen time.

MATERIALS AND METHODS

Study Design and Participants

This cross-sectional study was approved by the IIUM Research Ethics Committee (ID: IREC 2024-KAHS/DBMS8). This study utilised convenience sampling to recruit undergraduate students from a public university in Kuantan, Pahang. Students were eligible to participate in this study if they owned any screen devices, such as smartphones, laptops, or tablets, and could read and understand English to complete the questionnaire. Students diagnosed with insomnia or eye problems known not to be caused by excessive screen use were excluded from the study.

Data Collection

Data collection was conducted from April to June 2024 using a self-administered questionnaire distributed via WhatsApp and Telegram to undergraduate students from various medical and health sciences programmes of a

public university. Participation was voluntary, and informed consent was obtained before completing the survey. All responses were anonymous and treated confidentially, and participants were free to withdraw at any time.

Questionnaire Design, Validity and Reliability

The questionnaire consisted of four sections, which are (i) socio-demographic characteristics; (ii) screen behaviour and addiction; (iii) sleep behaviour and (iv) acute health effects of excessive screen time. Screen behaviour and addiction were measured using the Manolis/Roberts Cell-Phone Addiction Scale (MRCPAS), while sleep behaviour was assessed using the Pittsburgh Sleep Quality Index (PSQI). In addition, several questions have been adapted from previous studies that have a similar scope to the aim of this study (Dwajani, 2021; Bharadwaj, 2021; Roberts et al., 2014; Buysse et al., 1989; Mohd Kamaruzihan & Soe, 2023; Agarwal et al., 2022; Seguí et al., 2015). Two experts in the field validated the questionnaire and underwent a pilot study to assess its reliability (SPSS, α = 0.721).

Data Analysis

The data were analysed using SPSS. Descriptive statistics were used to summarise the frequency and percentage of screen time duration, types of screen devices, and purposes of screen time among participants. A chi-square test was applied to determine the association between categorical variables. Screen addiction was measured using questions adapted from the Manolis/Roberts Cell-Phone Addiction Scale (MRCPAS). Each respondent's score was obtained by summing the scores of four items, rated from 1 (Strongly Disagree) to 5 (Strongly Agree), with higher scores indicating greater screen addiction (maximum score of 20). Sleep behaviour was assessed using the Pittsburgh Sleep Quality Index (PSQI), which consists of seven components: sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbances, sleep medication, and daytime dysfunction. Each component is scored from 0 to 3, and the total score (0–21) indicates overall sleep quality. Based on the validated PSQI cut-off, a global score greater than five indicates poor sleep quality, while scores of 5 or below indicate good sleep quality (Insana et al., 2013; Park, 2020).

RESULTS

Response Rate and Socio-demographic Characteristics

The response rate obtained in this study was 43.0% (n=155) of the targeted sample size, which closely aligns with the weighted mean response rate of 44.1% (95% CI: 42.3%–46.0%) typically observed in online surveys within education-related fields as reported by Wu et al. (2022). The sample size was also considered sufficient based on a power calculation targeting 80% power to detect medium effect sizes at a significance level of 0.05. This sample size is also comparable to similar studies investigating screen time, sleep disturbances, and related health effects among university students (Mohd Kamaruzihan & Soe, 2023; Meghji et al., 2025).

The mean age was 22 years, and the average BMI was 22.36, indicating normal body weight (61.3%). Most participants were female (85.2%), reflecting the university's higher proportion of female students. About 41.3% were from the M40 income group (RM5,250–RM11,819 per month for the parents' household income). More than half (52.3%) were scholarship recipients, and almost all (97%) stayed in university accommodation. Nearly half (45%) reported having a sedentary lifestyle with little or no exercise per week.

Screen Behaviour and Addiction

All participants reported owning their own smartphones, and 92.3% own a laptop, while 78.7% own a tablet or iPad. University students used screen devices for a variety of purposes, with educational purposes being the most common (99.4%), followed by social media (97.4%) and entertainment purposes (96.1%). On average, daily screen time was 7.32 hours on smartphones, 4.29 hours on tablets, and 3.19 hours on laptops. The average recreational screen time among the participants was 4.54 hours.

As assessed by the screen addiction level through Manolis/Roberts Cell-Phone Addiction Scale (MRCPAS), the mean for the total score of screen addiction was 12.81, which ranged from 4 to 20, indicating that the average addiction level exceeded the midpoint value. Table 1 presents the participant responses to the screen addiction items. Most of the respondents disagreed (32.9%) or remained neutral (29.7%) regarding agitation when their smartphone or screen device was not in sight. Similarly, a moderate proportion reported feeling nervous when the device's battery was nearly depleted. In contrast, a majority of participants agreed (34.8%) or strongly agreed (24.5%) that they spent more time than intended on their devices and that their screen time had increased progressively.

Table 1: Screen Addiction Scores of study participants (Based on MRCPAS)

Questions	Response	N (%)
I feel agitated or uneasy when my smartphone/device is not within sight.	Strongly Disagree	20 (12.9)
	Disagree	**51 (32.9)**
	Neutral	**46 (29.7)**
	Agree	28 (18.1)
	Strongly Agree	10 (6.5)
I feel nervous or anxious when my smartphone/device's battery is running low.	Strongly Disagree	20 (12.9)
	Disagree	**43 (27.7)**
	Neutral	**43 (27.7)**
	Agree	37 (23.9)
	Strongly Agree	12 (7.7)
I often spend more time on my smartphone/device than I should.	Strongly Disagree	10 (6.5)
	Disagree	10 (6.5)
	Neutral	43 (27.7)
	Agree	**54 (34.8)**
	Strongly Agree	**38 (24.5)**
I have noticed that I am spending increasing amounts of time on my smartphone/device.	Strongly Disagree	10 (6.5)
	Disagree	16 (10.3)
	Neutral	**42 (27.1)**
	Agree	**47 (30.3)**
	Strongly Agree	40 (25.8)

Sleep Behaviour

In the assessment of sleep behaviour using the Pittsburgh Sleep Quality Index (PSQI), 97.4% of participants had good sleep quality, while only 2.6% had poor sleep quality. As illustrated in Figure 1, the PSQI questionnaire comprises seven components with the following mean scores: (i) 1.18 for quality, (ii) 1.23 for latency, (iii) 1.88 for duration, (iv) 0.43 for efficiency, (v) 1.15 for disturbance, (vi) 0.07 for medication, and (vii) 1.04 for daytime dysfunction. Each component yields a score of 0 to 3, and their sum yields a global PSQI score of 0 to 21. The present study reported an average global PSQI score of 2.48, indicating good overall sleep quality. A higher PSQI score reflects poorer sleep quality, and a global PSQI score greater than five is classified as poor sleep (Insana et al., 2013; Park, 2020).

Participants were also asked about their device usage before bedtime. Most of them reported frequently bringing the devices to bed and using them before sleep, primarily for browsing social media (82%) and texting or messaging (70%). In comparison, only a quarter of participants play games before sleep (25%). Additionally, the majority of students (94.2%) used their screen devices as alarms to wake up in the morning.
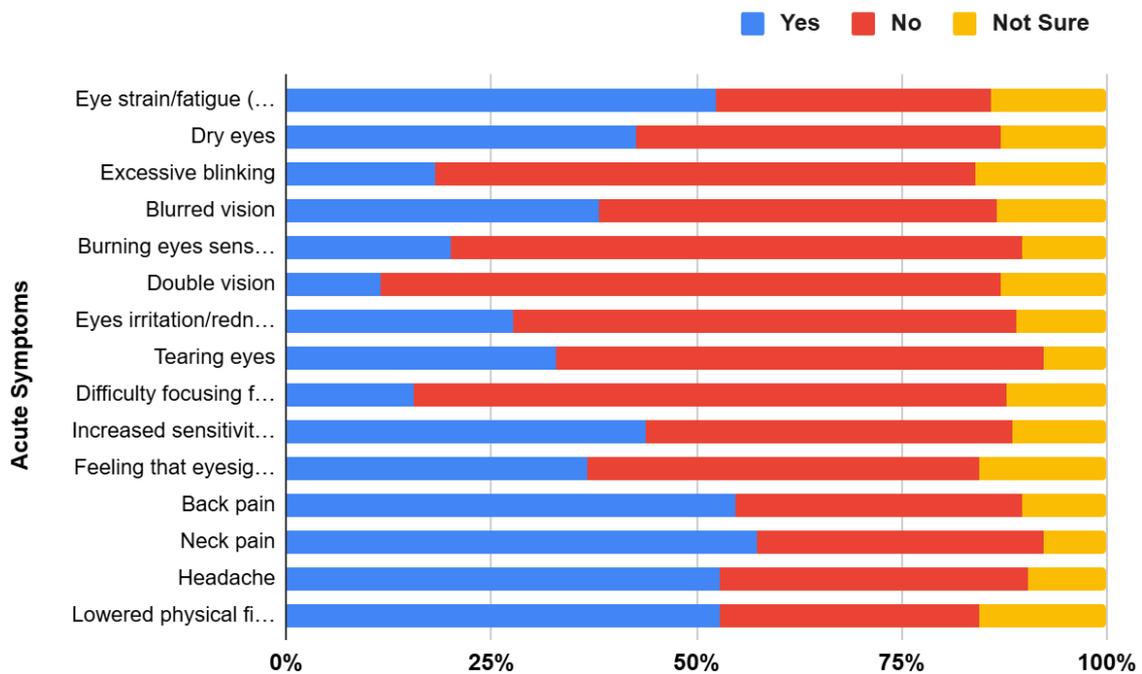
Acute Symptoms After Prolonged Screen Time

Figure 2 illustrates the acute health effects experienced by participants following prolonged screen use. More than half of the participants reported experiencing eye strain (52.3%), back pain (54.85%), neck pain (57.4%), headache (52.9%), and reduced physical strength (52.9%) after extended periods of screen exposure. The remaining participants either did not experience these symptoms or were not sure about them.

Other acute symptoms, such as excessive blinking, blurred vision, burning eyes sensation, double vision, eye irritation, tearing eyes, difficulty focusing for near vision, and feeling that eyesight is worsening, were only experienced by a small group of participants, ranging between 11% to 38% of the total study population. Meanwhile, the distribution of participant's opinions on "dry eyes" and "increased sensitivity to light" was almost the same between agree and disagree.
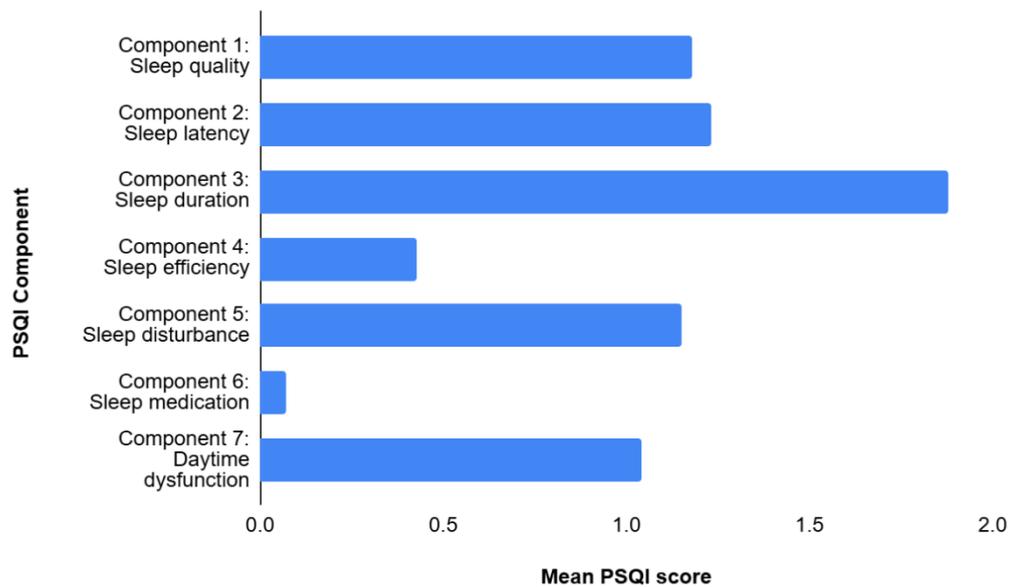
Figure 1: Mean PSQI Component Scores of Study Participants

Figure 2: Acute Symptoms Reported by Study Participants Following Prolonged Screen Exposure

Association Between Sleep Disturbance and Acute Health Effects

The association between sleep disturbance and acute health effects following prolonged screen exposure has been assessed statistically. The results show significant associations with symptoms of dry eyes (p = 0.022), blurred vision (p = 0.023), burning eyes sensation (p = 0.048), double vision (p = 0.014), difficulty focusing for near vision (p = 0.012), feeling of worsening eyesight (p = 0.029) and back pain (p = 0.028) (Chi-square Test; n=155).

DISCUSSION

The present study reported that participants owned various devices, including smartphones, laptops, tablets, and iPads, similar to Mohd Kamaruzihan and Soe's (2023) study, which found that all university students at a public university owned these mobile gadgets. Nowadays, it has become a necessity for university students to have at least a smartphone for communication, online banking or digital payments. In addition, they use these devices for a variety of purposes, including education (online classes or discussions), social media, and entertainment. A study by

Ataş and H.Çelik (2019) reported that more than 80% of university students used smartphones for online searches, social media, and communication, including messaging and calling. The present study found that the mean screen time across all devices exceeded 3 hours (smartphones: 7.32 hours, laptops: 3.19 hours, and tablets/iPads: 4.29 hours), which was considered high and associated with poor health outcomes (Biaani et al., 2020).

Due to the prolonged screen time among the study population, this study hypothesised that the participants would experience sleep disturbances. However, as assessed by the PSQI, the results contradicted this assumption, with only 2.6% (n=4 out of 155) of participants reporting poor sleep quality (PSQI score of 2.48). These findings also contrast with the earlier study by Mohd Kamaruzihan and Soe (2023), who reported that 56% (n=56 out of 100) of pharmacy students from the same population experienced poor sleep (PSQI score of 6.7). The lower proportion of students experiencing sleep disturbances in the present study may be attributed to factors such as the data-collection period and the sample's demographic characteristics. As data collection occurred during the non-exam period, students were likely experiencing lower academic stress, which may have contributed to better sleep quality (Khan et al., 2025). In addition, the present study included students from various health-related programmes and study years. In contrast, the earlier study by Kamaruzihan and Soe (2023) focused solely on pharmacy students, who generally face heavier academic workloads, credit units and practical hours (Hanapi et al., 2021). This difference may partly explain the higher percentage of poor sleepers reported in their study.

The majority of participants in the present study report experiencing eye strain, back pain, neck pain, headaches, and reduced physical strength after prolonged screen time. Previous studies support these findings, including a study by Yıldız et al. (2023), which found that 58.8% of participants experienced reduced physical activity, 85% had low back pain, and 79.4% had neck pain as the aftereffects of prolonged screen time. In addition, 52.8% of participants reported eye strain and 31.3% reported headache after prolonged screen use in a study by Agarwal et al. (2022).

Association Between Sleep Disturbance Due to Prolonged Screen Time and Acute Health Effects

The present study found several statistically significant associations between sleep disturbance due to prolonged screen time and acute health symptoms, including dry eyes, blurred vision, burning eye sensations, double vision,

difficulty focusing for near vision, worsening eyesight, and back pain (p-value < 0.05, Chi-square Test, n = 155). This finding was consistent with the previous study by Albalawi et al. (2023), which found that college students with more than 6 hours of screen time had severe sleep-wake disturbances, and that almost half of the participants experienced mild to moderate dry eye symptoms. They postulated that female sex hormones, particularly a decrease in estrogen, might play an essential role in the association with dry eye syndrome. As the majority of the participants in the present study were female (85.2%), this may have been an important confounding variable that affected the results.

A study by Chu et al. (2023) also found that students with high smartphone usage of more than 4 hours per day were more likely to experience digital eye syndrome, including blurred vision. In the present study, the mean duration of smartphone use among participants was more than 7 hours per day, suggesting that their blurred vision may be indirectly linked to prolonged screen time. Similarly, Liu et al. (2020) found that nearsightedness, or myopia, characterised by blurry vision, was associated with late-night sleep habits.

Regarding the burning eye sensation, a significant association was observed in the present study, consistent with findings from the previous studies by Chu et al. (2023) and An & Kim (2022), who reported that the majority of their participants experienced burning eye sensation after using the smartphone for more than 4 hours daily or having a sleep time of less than 5 hours per day. Furthermore, regarding worsening eyesight symptoms, a significant association was also observed in the present study. A similar observation was reported by Dhafira et al. (2023); however, this previous study did not find a significant association between screen time and worsening eyesight (p-value=0.094; multivariate logistic regression), even though the screen time duration (6 hours) and the sample size were almost similar to those in the present study.

The results of the present study show a significant association between prolonged screen time and back pain. A previous meta-analysis by Yue et al. (2023) comprehensively examined the relationship among these variables and found that for every 1 hour of screen time, such as daily computer use, the risk of back pain increased by up to 8.2% (Yue et al., 2023). It shows that back pain may be related to poor posture when a person is using devices. A study conducted by Thamrin et al. (2023) found that prolonged use of screen devices, averaging 7 hours or more per day, is associated with a 2.19 times higher risk of

developing low back pain. An ophthalmology expert stated that lowering one's head to view a smartphone can add weight and pressure to the neck, which is considered bad posture and should be avoided by screen users (MalaysiaNow, 2021). It is also recommended to avoid lying down while watching the screen, as this can cause muscle spasms and neck, back, and shoulder pain.

CONCLUSION

This study concludes that smartphones were the most commonly used screen devices among undergraduate students at a public university in Kuantan, Pahang. The mean addiction score to screen devices, measured using the Manolis/Roberts Cell-Phone Addiction Scale (MRCPAS) on a 5-point Likert scale, was 12.81. Overall sleep quality, assessed using the global PSQI score, showed that the majority of students were good sleepers, with only 2.6% classified as having poor sleep quality. However, excessive screen time was significantly associated with several acute health effects, including sleep disturbance, dry eyes, blurred vision, a burning-eye sensation, double vision, difficulty focusing on near vision, a feeling that eyesight is worsening, and back pain.

These findings have practical implications for students' health by highlighting the importance of promoting healthy digital habits. To minimise the risk of acute health effects from prolonged screen time, several methods can be implemented, including taking regular breaks during screen time, practising the 20-20-20 eye test rules to reduce eye strain, and limiting screen time in bed. The institutions may also run an awareness campaign to offer digital well-being education and ergonomic workshops to reduce musculoskeletal symptoms.

This study has several limitations. The limited sample size restricts the generalisations of the findings and may not represent the broader population of university students in Malaysia. Although the present study achieved a 43% response rate, which is considered acceptable for online surveys, the potential for non-response bias remains and may affect the study's statistical power. Additionally, the use of a self-reported questionnaire may have introduced response bias or inaccurate reporting. Future studies should aim to establish more precise definitions and standard guidelines for "excessive screen time" among adults. They should also consider incorporating additional behavioural, environmental and psychological factors to provide a more comprehensive understanding of the effects of screen use.

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