Double-Edged Sword: The Impact of Devices and Screen Time on Medical Students' Health and Academic Performance

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ABSTRACT

INTRODUCTION: Devices, including mobile phones and the internet, have emerged as essential tools for communication, information sharing, and entertainment. However, excessive use may have negative impacts on health and academic outcomes. This study aimed to examine the association between screen-time, academic performance, and health-related outcomes among medical students. **MATERIALS AND METHODS:** A cross-sectional study was conducted among medical students. A total of 249 students consented to participate in the study. The study utilised a validated questionnaire in which students were asked to indicate their device usage patterns on a scale of 1-5, where 1 represented 'least frequent use' and 5 represented 'most frequent use.' The data were analysed using SPSS software. **RESULTS:** In our study, 100 (40%) participants spent more than 5 hours online daily, 108 (43%) spent time on the devices for learning purposes, 129 (52%) for leisure use, and 148 (59%) spent time on the devices for social networking. 149 (51%) participants said 'yes' to using devices in classrooms to play games, listen to songs, and communicate with family members. Participants experienced backache (162, 65%), headache (160, 64%), eye irritation (145, 58%), numbness in the fingers due to over-texting (87, 35%), and sleep disturbances (152, 61%). **CONCLUSION:** This study demonstrates that excessive screen time among medical students is associated with adverse physical health outcomes nd sleep disturbances. While digital devices support academic activities, increased awareness and targeted institutional strategies are required to promote balanced and healthy usage.

KEYWORDS: devices, screen time, medical students, academic performance, health.

INTRODUCTION

The internet, mobile phones, and devices have become essential for social interaction, information, and entertainment.[1] However, as the internet and devices enter homes, schools, offices, and businesses, there has been a rapidly expanding public awareness of the possible negative impacts of excessive, maladaptive, or addictive usage.[2,3] These technologies have a dual effect that oscillates between the benefits and adverse effects, especially on students. Devices are more widespread in developing countries, and their adoption is expanding rapidly. There are numerous applications and features on smartphones that can be utilised to enhance the quality of health care. More people are starting to realise how useful devices can be as teaching tools. These devices make information more accessible, which could alter the landscape of medical education and practice.[4] According to published data, mobile phones have become integral to students' daily routines, providing access to educational resources, communication, and learning tools.[5,6] In recent years, research has

grown significantly in examining both the academic utility and health implications of smartphone usage among students.

Studies show that these devices offer clear advantages, such as quick access to lecture materials whichfacilitate completing assignments and engaging in academic discussions. However, excessive use may impair students' physical and mental well-being. For instance, immersive social media and smartphone addiction have been linked to reduced academic performance and heightened distraction.[7,8] Some longitudinal evidence suggests that prior research may have overstated these negative effects by failing to control for student-level confounders.[9] A growing body of evidence documents the detrimental impact of device addiction and screen time on sleep quality among university students. Multiple cross-sectional investigations and reviews have associated greater device use, particularly in the evenings and before bedtime, with poor sleep quality, longer sleep latency, daytime dysfunction, anxiety, and mood disturbances.[10] Medical and nursing students in diverse global settings frequently report poor sleep linked to high mobile usage, negatively impacting their academic performance.[11,12] A study conducted on university students found that there was an occurrence of headache provoked by mobile phone use.[13] In this context, the study sought to examine the impact of devices and screen time on medical students' academic performance and health.

MATERIALS AND METHODS

This cross-sectional study was conducted among first and second-year MBBS students at Melaka Manipal Medical College, Manipal Academy of Higher Education, Manipal. A total of 249 students participated in the study, representing the three predominant ethnic groups in Malaysia: Indians, Chinese, and Malays. The participants were between 18-24 years old, comprising 90 males and 159 females. 49 students were from the first year and 200 students were from the second year. Participants were selected through a convenience sampling method, which involved students who were readily available and willing to take part in the study at the time of data collection.

Study tool

The questionnaires were developed with inputs from subject experts and validated by four independent reviewers. The content validation procedure includes four independent subject experts. Each reviewer assessed the questionnaire items based on their clarity, relevance, and comprehensiveness. They proposed changes as needed and scored each item on a 4-point scale (1: not relevant, 4: very relevant). Items with a Content Validity Index (CVI) of <0.75 were updated. Based on consensus, the final list of items was chosen for further testing.

A pilot study was conducted with a small sample size of 10 individuals from the target population. The questionnaire was evaluated based on its clarity, relevance, and comprehensibility. In response to comments and recommendations, minor adjustments were made, including rewording unclear passages and restructuring the text to improve readability.

To assess data reliability, Cronbach's alpha method is used. A Cronbach's alpha coefficient of at least 0.6 indicates the reliability of the questionnaire. A Cronbach's alpha value of 0.72 was obtained, indicating good

reliability of the instrument; hence, no further modification is required. The questionnaire has been updated based on the feedback and comments from respondents.

Study participants responded to the questionnaire using a 5-point Likert scale, indicating their level of agreement or frequency for each item. The scale ranged from 1 to 5, where 1: least frequent occurrence, and 5: most frequent, and participants expressed their views on selected questions. Responses were based on their personal experiences.

Statistical analysis

Data were systematically entered and analysed using the Statistical Package for the Social Sciences (SPSS) software 19. Descriptive statistical methods were employed to summarise the findings, with the results primarily presented in the form of frequencies and percentages.

RESULTS

In our study, 40% (n=100) spent more than 5 hours online daily. A total of 148 (59%) participants reported spending time on the devices for social networking purposes, 108 (43%) for learning purposes, 129 (52%) for leisure use, and 130 (52%) used the devices to chat with family and friends (Figure 1).

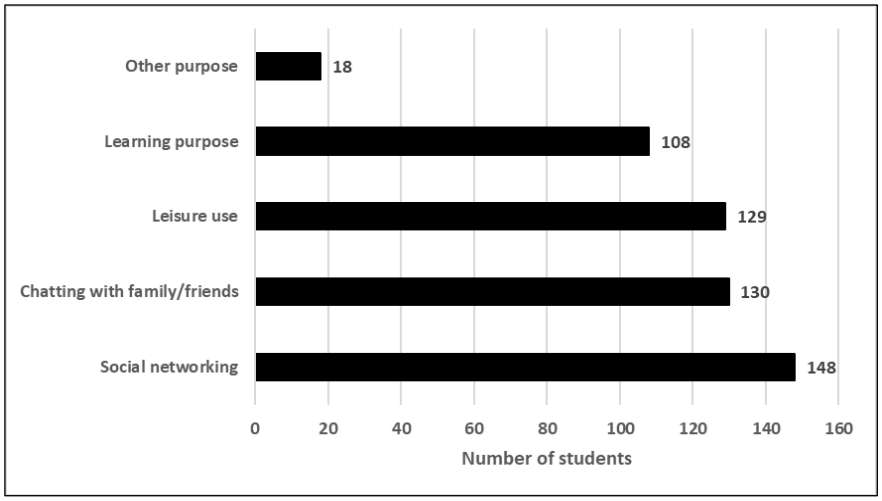

Figure 1: Study participants' utilisation of the internet (n=249)

The various ways participants use their mobile phones for studies are depicted in Figure 2. The most frequently reported use of mobile phones among participants was capturing images of schedules and lecture slides, as indicated by 66.3% of participants. This was followed by getting answers for assignments (52.6%), and accessing learning materials (47.4%). Additionally, 35.7% of participants use mobile phones for discussions on Facebook, while 25.3% use them to get updated news. A smaller proportion (16.5%) utilise mobile phones to complete lecture notes, and 13.7% record videos for learning purposes.

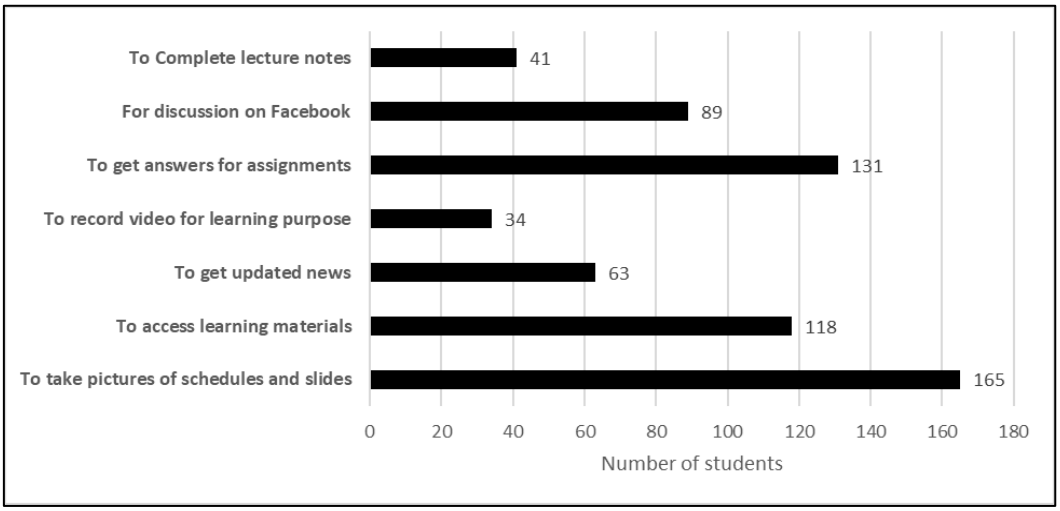

Figure 2: Mobile phone usage as a tool for academic learning (n=249)

Table I illustrates the usage of mobile phones while in classrooms. Out of the 249 participants, 149 (60%) reported using mobile phones in the classroom. 233 (94%) students used their phones for non-academic purposes; 81% to play games, 76% to listen to songs, and 84% to communicate with family members. 60% of the participants believe the internet and mobile phones are very useful for their studies. 80% agreed that they waste a lot of time on the internet. Notably, 190 (76%) agreed that their academic performance scores were low while using the internet and mobile devices.

Table I: Usage of mobile phones in classrooms by participants (n=249)

Statement	Yes n (%)	No n (%)	Not responded n (%)
Do you use your mobile phones in class	149 (60%)	95 (38%)	5 (2%)
Non-academic purpose	233 (93%)	16 (6%)	3 (1%)
To message friends or family	220 (89%)	21 (8%)	8 (3%)
To search for answers	205 (82%)	44 (18%)	0
To play games	202 (81%)	47 (19%)	0
Listen to songs	190 (76%)	56 (23%)	3 (1%)

The bar graph in Figure 3 displays the academic performance of participants across four blocks and the overall university, categorised into pass, distinction, and fail. We observed a positive correlation between mobile usage and academic performance. There was a gradual increase in the number of students passing from Block 1 to Block 4, suggesting either improved teaching strategies, student adaptation, or more effective academic support as students' progress through the blocks.

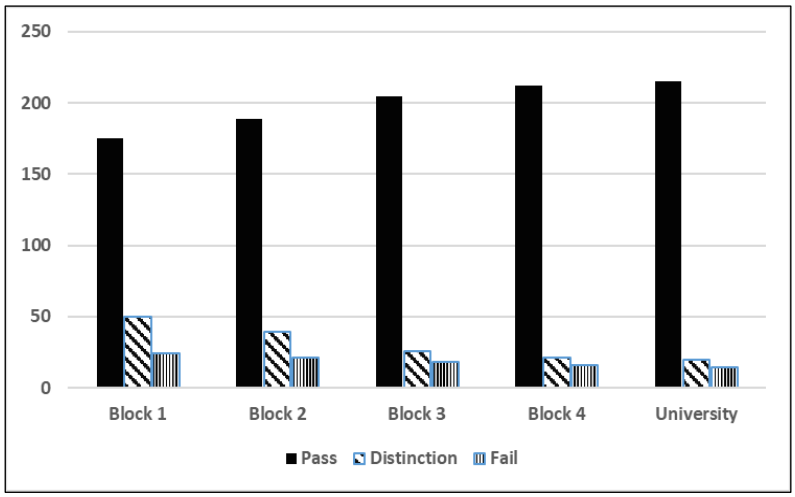

Figure 3: Academic performance of participants across the blocks and the university (n=249)

Table II illustrates the effects of screen time on participants 'physical health and sleep'. Most participants (67%) agreed that they spent more than 5 hours on their devices. A significant majority agreed that the use of devices causes backaches (65%), headaches (64%), and eye irritation (58%). Approximately one in four participants disagreed, indicating variation in sensitivity or habits. 35% agreed that mobile phone overuse causes physical issues, such as numbness in the fingers. However, 45% disagreed, possibly because this issue is either underestimated or less noticeable. 61% percent felt that using devices before sleep affects their sleep quality.

Table II: Effects of screen time on participants' physical health and sleep. (n=249)

Statement	Agree n (%)	Neutral n (%)	Disagree n (%)	Not responded n (%)
Backache	162 (65%)	24 (10%)	62 (25%)	1
Headache	160 (64%)	35 (14%)	54 (22%)	0
Eye irritation	145 (58%)	46 (18%)	56 (22%)	2
Numbness from over-texting (mobile phone overuse)	87 (35%)	45 (18%)	111 (45%)	6
Avoiding device use at night could enhance the quality of my sleep.	161 (65%)	34 (14%)	48 (19%)	0
Using electronic devices before bedtime disrupts my sleep.	152 (61%)	32 (13%)	65 (26%)	0

DISCUSSION

In our study, 40% of participants spent more than 5 hours per day on screen time. In terms of the type of websites accessed, social communication platforms were the most frequent. Additionally, studies have shown that university students use social networking sites more than any other group.[14] Although mobile phones have been consistently labelled as distracting, some participants used them productively to take photos of schedules and specimens and to access learning materials. Only 43% of the participants used the internet for learning purposes, primarily to find answers for their daily assignments. The internet enables rapid access to information, helping students to complete assignments efficiently and to stay informed with up-to-date knowledge. [15]

Among the participants, 66.3% reported using their phones to take photos of schedules and slides, making this the most common purpose. This was followed by obtaining answers for assignments (52.6%) and accessing learning materials (47.4%). In a study, it was noted that smartphones play a significant role in students' academic activities. For example, students utilise smartphones to register for courses, view lectures and exam schedules, check grades, participate in group discussions, and read announcements.[16]

We observed a positive correlation between device usage and academic performance. However, in contrast to our findings, some studies have reported negative outcomes associated with excessive smartphone use, indicating a detrimental impact on academic performance.[17,18] A multicentre study conducted on smartphone addiction on academic performance among undergraduate medical students in Karnataka revealed that a high proportion of undergraduate medical students suffer from smartphone addiction, significantly affecting their academic performance. Factors associated with smartphone addiction include male gender, regular mobile gaming, seeking recognition/popularity through social media, frequent smartphone checking, perceiving smartphones as more attractive than other activities, limited co-curricular activities, and increased smartphone use.[19]

In our study, participants stated that 93% use their phones for non-academic purposes such as to play games, listening to songs, and to communicate with family members. In a study, it was stated that the motivation measure for mobile games and the boredom perception scale showed a moderately positive association, indicating that university students' perception of boredom during their free time led them to play mobile games.[20] Mobile phones have grown ubiquitous and accessible to a diverse spectrum of users, including students. They use the most selected technology devices to communicate with family and friends and access the internet.[21] Excess screen time poses various physical hazards, the most common of which are eye strain, headaches, neck and shoulder pain, and back pain. Eye strain, often known as computer vision syndrome, is a common condition caused by extended contact with various electronic devices.[22] In our study, a significant majority agreed that use of computers/laptops causes backaches (65%), headaches (64%), and eye irritation (58%). Several research findings are consistent with the results of our study. According to Lee et al., maintaining static or improper postures places strain on the spine, leading to back pain.[23] Additionally, factors such as the design of furniture and the positioning of keyboards or screens also contribute to this discomfort and back pain.[24] Extended use of electronic devices can put strain on the wrist tendons, leading to discomfort in the hands and wrists, known as Carpal Tunnel syndrome.[25,26] Getting sufficient, high-quality sleep at the appropriate time can enhance both learning and memory.[27] Using a phone or laptop during late night disrupts sleep and will eventually cause fatigue, stress, and ocular effects. The effects of blue light exposure on sleep and cognitive performance differ significantly between age groups, particularly among adolescents, children, and adults.[28] Despite being aware of the health benefits associated with good sleep, many students tend to neglect sleep hygiene and show little motivation to develop healthy sleep routines.

Limitations of the study include the study sample unit confined to first and second-year MBBS students from a single institution, which may restrict the generalizability of the findings. The use of convenience sampling may have resulted in selection bias. Convenience sampling can also result in a disproportionate representation of students who are digitally engaged. The data was self-reported, which could lead to recall bias or socially desirable responses. Although the questionnaire was validated by professionals, replies based on personal experience and Likert scales may fail to capture the full range of students' behaviours and perceptions.

CONCLUSION

This study demonstrates that medical students spend over five hours daily on digital devices, predominantly for social networking activities. Although smartphones are utilised productively for academic purposed by some students, a substantial proportion of device use is driven by boredom, with high engagement in gaming and entertainment. Excessive screen time is associated with physical issues, including backache, headaches, and eye strain, as well as sub-optimal sleep practices. Despite being aware of the importance of good sleep, many participants reported neglecting healthy sleep habits. Overall, while digital devices offer considerable academic benefits, there is a pressing need for awareness and interventions to promote balanced device usage and healthier lifestyle behaviours among students.

CONFLICT OF INTEREST

The authors report no conflicts of interest.

INSTITUTIONAL REVIEW BOARD (ETHICS COMMITTEE)

The study received clearance from the Institutional Research Committee. All ethical guidelines were followed, ensuring voluntary participation, informed consent, and strict confidentiality of the respondents' data.

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