

The Need for Digital Detoxification to Improve Sleep Quality among Students: A Narrative Review

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ABSTRACT

Smartphones, laptops, and social media platforms have become inseparable from student life, supporting learning and social connection while simultaneously reshaping sleep behaviour. A growing body of cross-sectional, longitudinal, and interventional research — including a substantial and expanding literature from India — links heavy and late-night digital device use to delayed sleep onset, shortened sleep duration, and impaired sleep quality among secondary school, undergraduate, and medical students worldwide. This narrative review synthesises recent evidence on the prevalence of problematic smartphone and social media use among students globally and in India specifically, the physiological and behavioural mechanisms connecting screen exposure to poor sleep, and the emerging evidence base for “digital detox” interventions — structured, time-limited reductions in device use — as a countermeasure. Across randomised trials and systematic reviews, digital and behavioural sleep interventions show consistent, though heterogeneous, improvements in sleep quality, sleep efficiency, and insomnia severity, while Indian studies using both self-report and objective sensor-based measurement confirm the same broad association between device use and disrupted sleep. The review concludes with evidence-based recommendations for students, educators, and university administrators, including those in the Indian higher-education context, and identifies gaps that future controlled trials should address, including long-term follow-up, objective screen-time measurement, and cultural generalisability.

Keywords: digital detox, screen time, sleep quality, students, smartphone addiction, circadian rhythm, melatonin, sleep hygiene.

INTRODUCTION

Digital devices are now woven into nearly every aspect of student life, from note-taking and online learning platforms to social communication and entertainment. This convenience has come with a cost to sleep. Population and campus-based studies consistently report that a majority of students use smartphones, tablets, or laptops in the hour before bedtime, and often after lights are off, and that this behaviour is repeatedly and independently associated with poor subjective sleep quality (Fallahmorad, Variiani, Hematgar, Kouhi, & Varmazyar, 2026; Elsheikh, Elsharkawy, & Ahmed, 2024).

The scale of the problem is considerable. Systematic reviews estimate that problematic smartphone use affects roughly one in three to two in three university students, with a pooled prevalence near 52 percent, and that it is significantly associated with poorer sleep, depression, and anxiety (Candussi, Kabir, & Sivasubramanian, 2023). Several campus-based surveys report that a large majority of medical and health-sciences students use a blue-light-emitting device at bedtime and that a substantial minority score in the poor-sleep range on the Pittsburgh Sleep Quality Index (PSQI) (Qanash et al., 2021). Because sleep is foundational to memory consolidation, mood regulation, and academic performance, the accumulation of evidence linking digital device habits to disrupted sleep has prompted growing interest in “digital detoxification” — deliberate, structured reductions in device use — as a low-cost, non-pharmacological intervention for student populations. This review synthesises the evidence on (a) patterns of digital media use among students, (b) the mechanisms linking such

use to poor sleep, (c) the consequences of poor sleep for students, and (d) the effectiveness of digital detox interventions, before outlining practical implications.

DIGITAL MEDIA USE AMONG STUDENTS: SCOPE OF THE PROBLEM

Smartphone ownership among university and secondary students now approaches saturation in most world regions, and social media, messaging, and short-video platforms account for the largest share of discretionary use. Systematic reviews of problematic smartphone use (PSU) among university students report prevalence estimates ranging from roughly 36 to 67 percent depending on the screening instrument and cultural context, with a pooled average near 52 percent (Candussi et al., 2023). PSU is not simply heavy use; it describes a pattern of use that interferes with daily functioning and is associated with elevated risk of poor sleep quality, depression, and anxiety (Yang et al., 2020).

Cross-national studies reinforce this picture. In a large cross-sectional study of 608 health-care students across three universities in Jeddah, Saudi Arabia, smartphone addiction was significantly associated with poorer sleep quality, although it was not independently associated with lower grade point average (Qanash, Al-Husayni, Falata, Halawani, Jahra, Murshed, Alhejaili, Ghabashi, & Alhashmi, 2021). Comparable associations between problematic device use and poor sleep have been documented in cross-sectional samples of secondary and university students in several other countries, and a broad systematic review covering 117 studies of problematic smartphone use, problematic social media use, internet gaming disorder, and problematic online pornography use identified negative affectivity as a common predictor across these behaviours, with fear of missing out (FoMO) and psychological well-being emerging as shared predictors of problematic smartphone and social media use specifically (systematic review indexed as PMC9707285).

Evidence from India

India offers one of the largest and fastest-growing smartphone-owning student populations in the world, and a substantial body of Indian research documents the same association between device use and poor sleep seen internationally. A cross-sectional study of Indian medical students using the Smartphone Addiction Scale alongside the PSQI found that smartphone addiction was significantly associated with poorer sleep quality, with the majority of students meeting criteria for poor sleep (Chatterjee & Kar, 2021). In a study of 450 medical undergraduates, students who used their smartphones for more than two hours at bedtime showed significantly longer sleep latency, reduced sleep duration, poorer sleep efficiency, and greater daytime dysfunction than lighter users, and lack of awareness of night-shift display modes was itself correlated with poorer sleep (Krishnan, Sanjeev, & Latti, 2020).

Findings extend beyond medical colleges. A multicentre study conducted at two tertiary-care hospitals in north India, which combined self-reported PSQI data with objective actigraphy and polysomnography in a subset of participants, found that higher mobile phone use was significantly associated with poorer sleep quality and with a shorter latency to deeper (N2 and N3) sleep stages, providing rare physiological confirmation of self-reported findings in an Indian sample (Sinha et al., 2022). A sensor-based study that tracked 40 Indian college students' actual phone use and sleep through a custom mobile application, rather than relying on self-report, found that most students maintained a fairly regular sleep cycle, with only about a quarter showing irregular patterns and no measurable phone-related interruptions more than 30 minutes after bedtime — a useful reminder that objectively measured use does not always match the more alarming picture drawn from survey-based research (Vaghela & Sasidhar, 2023). Elsewhere, a study of 1,175 college students across medicine, dentistry, engineering, and paramedical courses in Gujarat examined smartphone-related predictors of social jetlag — the mismatch between an individual's internal circadian rhythm and their externally imposed class or work schedule — and found that patterns of smartphone use were associated with the severity of this mismatch among Indian students (Mehta, Mahajan, Upadhyay, Jadeja, & Sevak, 2023). Early telemetric work using objective app-monitoring in Indian medical students similarly linked heavier smartphone use to distinct psychological correlates, reinforcing the value of combining self-report with device-level data in this population (Prasad, Harshe, Kaur, Jangannavar, Srivastava, & Achanta, 2018). Taken together, the Indian literature broadly mirrors global findings while also cautioning, through the sensor-based studies, that self-report alone may sometimes overstate the extent of nighttime device disruption.

MECHANISMS LINKING DIGITAL DEVICE USE TO POOR SLEEP

Circadian and Melatonin Suppression

The best-established biological mechanism concerns short-wavelength (“blue”) light emitted by screens. Light in this range stimulates melanopsin-containing intrinsically photosensitive retinal ganglion cells, which project to the suprachiasmatic nucleus and suppress pineal melatonin secretion, delaying the circadian phase and postponing the subjective sense of sleepiness (Gooley et al., 2011; Brainard et al., 2001; Zisapel, 2018, as cited in Fallahmorad et al., 2026). Experimental sleep-laboratory work confirms that reading on a smartphone without a blue-light filter measurably attenuates evening

melatonin secretion in both adolescents and young adults, although adolescents recover their melatonin levels more quickly than adults do after device use ends (Höhn et al., 2024).

Cognitive and Emotional Arousal

Independent of light exposure, the content of digital engagement — social comparison, messaging, gaming, or emotionally engaging video — raises psychological and physiological arousal in ways that delay sleep onset, a process captured by cognitive models of insomnia (Harvey, 2002, as cited in Fallahmorad et al., 2026). Displacement of sleep time is a related mechanism: time spent scrolling or messaging directly substitutes for time that would otherwise be spent sleeping, shortening total sleep duration even when sleep quality per se is unaffected (Cheng et al., 2025).

Behavioural and Environmental Disruption

Notifications, alerts, and the mere presence of a phone within reach of the bed fragment sleep continuity and prolong sleep latency (Fallahmorad et al., 2026). Nighttime messaging in particular has been linked to poorer next-day academic performance and daytime sleepiness even after accounting for total sleep duration (Wang et al., 2017, as cited in Fallahmorad et al., 2026), suggesting that the timing and disruptiveness of use matter as much as its total volume.

It is worth noting that the strength of the blue-light mechanism specifically has recently been debated: a large Canadian population survey found broadly similar overall sleep health among nightly screen users and non-users, with the poorest sleep reported by intermittent users, suggesting that individual differences in light sensitivity, timing, and content may moderate outcomes more than blue light exposure alone (Carney et al., cited in TMU/Université Laval study, 2026). This nuance does not overturn the broader association between problematic, late-night device use and poor sleep, but it cautions against attributing the effect to a single mechanism.

CONSEQUENCES FOR STUDENT SLEEP AND FUNCTIONING

The downstream consequences of device-related sleep disruption extend beyond tiredness. A study of Iranian university students found that longer smartphone use before bedtime was significantly associated with poorer PSQI scores, slower reaction times, and reduced total and concentration performance on standardised attention tasks, with students using phones for more than an hour with lights on showing 2.4 to 3.7 times higher odds of poor sleep quality (Fallahmorad et al., 2026). Similarly, a cross-sectional study of medical students in Cairo found smartphone use at bedtime was associated with markedly higher odds of poor sleep quality and reduced academic engagement (Elsheikh et al., 2024). Systematic reviews confirm that problematic smartphone use carries roughly double the odds of poor sleep quality, alongside elevated odds of depression and anxiety (Yang et al., 2020). A two-wave longitudinal study of 385 undergraduates further found that increases in problematic smartphone use predicted subsequent increases in psychological inflexibility and anxiety symptoms, which in turn predicted increases in sleep disturbance, indicating that psychological processes help explain the well-being consequences of problematic use, beyond the device use itself (Peltz, Bodenlos, Kingery, & Abar, 2023).

DIGITAL DETOX AS AN INTERVENTION

“Digital detox” refers to a structured, time-limited reduction in the use of digital devices, ranging from full abstinence to targeted curfews (e.g., no screens for one to two hours before bed), often paired with sleep-hygiene education or behavioural coaching. Several recent trials have tested this approach directly in student populations.

A randomised controlled trial protocol in Austria is evaluating a three-week structured screen-time reduction programme in healthy students, using validated instruments including the Insomnia Severity Index (ISI), the WHO-5 well-being index, and the Perceived Stress Questionnaire, alongside objective heart-rate-variability and physical-activity tracking (Digital Detox Study RCT, NCT06353451, registered on ClinicalTrials.gov). A parallel programme targeting adolescents aged 10 to 19 is testing a ten-session digital detox curriculum against a no-intervention control, measuring screen time, sleep quality, and healthy lifestyle behaviours before and roughly ten weeks after the intervention (Digital Detox Training study, ClinicalTrials.gov registration, 2026). In Pakistan, a mixed-methods digital-detox programme for medical students grounded in stress-recovery and self-regulation theory hypothesised, and preliminarily supports, reductions in perceived stress and improvements in autonomic balance (heart-rate variability) following reduced digital load, with qualitative themes of “mental reset” and improved academic control (Springer BMC Medical Education, 2025).

Beyond full digital-detox designs, the broader category of technology-assisted and behavioural sleep interventions offers the strongest quantitative evidence to date. A systematic review and meta-analysis of 13 randomised trials involving 5,251 college students and young adults found that digital sleep interventions — including cognitive behavioural therapy for insomnia delivered via app or web platform, mindfulness training, and sleep-education programmes — produced large

improvements in sleep quality (Hedges $g = -1.25$) and insomnia severity (Hedges $g = -4.08$), with smaller but significant gains in sleep efficiency, sleep hygiene, and sleep-related knowledge (Lu, Lin, & Tsai, 2025). Heterogeneity across studies was substantial, reflecting variation in intervention content, delivery mode, and population, which limits precise generalisation but does not undermine the overall direction of effect.

A separate randomised controlled trial targeting short-video addiction among Chinese college students combined cognitive behavioural therapy, digital tools such as time-window controls and brightness adjustment, and a peer social-support system, reporting improved sleep parameters relative to a comparison arm and illustrating that combining behavioural, technological, and social-support components may outperform simple screen-time restriction alone (randomised controlled trial reported in PMC12929400, 2025).

Dedicated digital-detox trials remain comparatively scarce in the Indian setting itself, and most Indian evidence to date is observational rather than interventional (Chatterjee & Kar, 2021; Krishnan et al., 2020; Sinha et al., 2022). This is a notable gap given the scale of India's student smartphone-owning population and strengthens the case for locally conducted randomised trials of structured digital-hygiene programmes, sleep-education curricula, and app-based curfew tools, ideally combined with the kind of objective, sensor-based measurement already piloted in Indian college samples (Vaghela & Sasidhar, 2023), rather than relying solely on self-report.

PRACTICAL RECOMMENDATIONS

Drawing on the mechanisms and intervention evidence above, several evidence-based, low-cost strategies can be recommended to students, campus health services, and universities:

- Establish a “digital curfew” of 30 to 60 minutes before intended sleep time, during which smartphones and laptops are put away rather than merely silenced (Fallahmorad et al., 2026; Höhn et al., 2024).
- Disable non-urgent notifications overnight and keep the phone outside arm's reach of the bed to reduce fragmentation of sleep onset and continuity.
- Where a digital curfew is impractical, use built-in night-mode or blue-light-filtering settings, while recognising that filtering light alone does not address the arousal caused by stimulating content (Randjelović et al., 2023, as cited in Fallahmorad et al., 2026).
- Incorporate structured sleep-hygiene and digital-wellness education into student orientation and wellness curricula, mirroring the content used in trialled digital-detox and technology-assisted sleep programmes (Lu et al., 2025).
- Encourage consistent sleep–wake schedules and daytime physical activity, both of which are independently associated with better student sleep and may buffer against evening device-use effects.
- For students showing signs of problematic smartphone or social media use (loss of control, functional impairment), refer to campus counselling services, given the documented associations with depression and anxiety alongside poor sleep (Candussi et al., 2023).
- In Indian institutions specifically, given the high prevalence of smartphone-related poor sleep already documented among medical and other professional students (Chatterjee & Kar, 2021; Sinha et al., 2022), sleep-hygiene modules could usefully be embedded within existing student wellness and induction programmes, paired with objective, low-burden monitoring tools of the kind piloted by Vaghela and Sasidhar (2023) to track real-world impact rather than relying on self-report alone.

LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH

Most evidence linking device use to student sleep remains cross-sectional and reliant on self-reported screen time, which is vulnerable to recall and social-desirability bias (Fallahmorad et al., 2026). Digital-detox trials to date vary widely in duration, intensity, and outcome measures, and several are ongoing or recently completed with limited long-term follow-up. The apparent inconsistency between strong laboratory evidence for blue-light-driven melatonin suppression and more equivocal population-level survey findings on nightly screen use (TMU/Université Laval, 2026) suggests that individual differences — chronotype, content type, and pre-existing sleep vulnerability — deserve more attention. Future randomised trials would benefit from objective screen-time measurement (device logs rather than self-report), longer follow-up to assess durability of gains, larger and more culturally diverse samples, and designs that isolate the relative contribution of light exposure, content arousal, and sleep displacement.

CONCLUSION

Converging evidence from cross-sectional surveys, physiological studies, and randomised trials indicates that heavy and late-night digital device use is a modifiable risk factor for poor sleep quality among students, operating through circadian,

cognitive-arousal, and behavioural-displacement pathways. Structured digital-detox interventions and related technology-assisted sleep programmes show encouraging, though heterogeneous, evidence of benefit for sleep quality, insomnia severity, and associated stress and well-being outcomes. Given the low cost and low risk of these interventions relative to their potential benefit for academic performance and mental health, universities and student-health services have a clear rationale to incorporate structured digital-hygiene education and support into routine student wellness programming, while the research community continues to refine the evidence base through larger, longer, and more objectively measured trials.

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