The Impact of Smart Phone Addiction on Sleep Quality and Mental Health in University Students: Exploring Effective Interventions

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***Abstract*—Smartphones have become universal in modern society, especially among university students who rely on them for communication, entertainment and learning. While mobile technology offers many benefits, excessive or poorly controlled smartphone use is now recognised as a behavioural addiction associated with impaired sleep and diminished psychological well-being. This dissertation critically examines the impact of smartphone addiction on sleep quality and mental health in university students and explores evidence-based interventions. After reviewing current theories and empirical evidence, the dissertation presents a qualitative methodology designed to capture students lived experiences of smartphone overuse, poor sleep and psychological distress. The data analysis plan uses thematic analysis and triangulation with validated scales for smartphone addiction (Smartphone Addiction Scale-Short Version) and sleep quality (Pittsburgh Sleep Quality Index) to interpret the findings. Synthesising results from recent studies, the report discusses how excessive smartphone use negatively correlates with sleep quality is linked to depression, anxiety and stress, and is moderated by factors such as physical exercise, gender and negative emotions. Evidence-based interventions including mindfulness-based cognitive-behavioural therapy, physical activity programs and digital detox strategies are examined. Finally, the dissertation provides recommendations for university administrators, counsellors and policy-makers to promote healthier smartphone use while supporting student sleep and mental health.**

I. INTRODUCTION

1.1 Background and significance

Smartphones have transformed how people communicate, access information and entertain themselves. For university students, mobile devices provide an essential lifeline for academic resources, social networking, navigation and time management. Ownership has risen
dramatically; surveys show that more than 90 % of young adults worldwide own a smartphone, and in some countries like Saudi Arabia the penetration rate exceeds 95 %. While the flexibility of mobile technology enhances learning and connectivity, a growing body of research highlights a darker side: patterns of excessive, compulsive or uncontrolled smartphone use that mirror behavioural addictions. Terms such as “problematic smartphone use,” “technological addiction” and “smartphone addiction” all refer to a persistent pattern of smartphone behaviour that interferes with other domains of life and produces symptoms like substance addictions.

Among university students, smartphone addiction is of particular concern because it coincides with developmental transitions, academic pressures and emerging independence. University life involves navigating new social networks, coping with stress and balancing freedom with responsibility. Students may turn to smartphones to alleviate boredom, manage social anxieties or procrastinate. As usage escalates, the boundary between functional tool and addictive behaviour blurs, leading to neglect of academic tasks, social isolation and mental health problems. Recent meta-analyses estimate that roughly one in four young people exhibit problematic smartphone use. This prevalence underscores an urgent need to understand the consequences of smartphone addiction and to identify interventions that can mitigate harm.

1.2 Problem statement

Emerging evidence links smartphone addiction to disturbed sleep, depression, anxiety and stress. University students often use their devices late at

night for messaging, gaming or streaming media. This nocturnal use displaces sleep time and exposes users to blue light that suppresses melatonin secretion, delaying sleep onset. Studies consistently show that higher levels of smartphone addiction correlate with poorer sleep quality. Poor sleep, in turn, contributes to emotional dysregulation, diminished cognitive performance and increased vulnerability to mental health disorders. For students, sleep difficulties can jeopardise academic success and exacerbate stress.

Psychological consequences of excessive smartphone use extend beyond sleep. A large meta-analysis found that problematic smartphone uses triples the odds of depression and anxiety and nearly doubles perceived stress. Qualitative research reveals that students experience withdrawal symptoms, constant preoccupation with their phones and conflicts with family or academic responsibilities. The interplay between smartphone addiction, sleep disruption and mental health remains complex, moderated by factors such as gender, physical exercise and emotional states. Understanding these relationships is essential for designing targeted interventions.

1.3 Objectives and research questions

This dissertation aims to: (1) synthesise current knowledge about the effects of smartphone addiction on sleep quality and mental health in university students; (2) design and describe a qualitative research methodology to explore students' lived experiences of smartphone addiction; (3) analyse qualitative data through thematic analysis and integrate findings with quantitative measures of addiction and sleep; and (4) evaluate evidence-based interventions that address smartphone addiction and its consequences. The overarching research questions guiding this study are:

1. How do university students describe their experiences of smartphone addiction and its impact on their sleep and mental health?
2. What factors mediate or moderate the relationship between smartphone addiction and sleep quality, including physical exercise, negative emotions and gender differences?
3. Which interventions have demonstrated efficacy in reducing smartphone addiction and improving sleep quality and mental health among university students?

The investigation addresses gaps in existing research by combining qualitative inquiry with a synthesis of recent evidence, thereby providing nuanced insights into the phenomenon and informing practical recommendations.

II. LITERATURE REVIEW

2.1. Defining smartphone addiction and measurement tools

Smartphone addiction is conceptualised as a subtype of behavioural addiction involving excessive or poorly controlled preoccupation with smartphone use to the detriment of daily activities. Core features parallel substance addiction: tolerance, withdrawal, salience (constant thinking about the device), conflict with other obligations and loss of control. Kwon and colleagues developed the Smartphone Addiction Scale-Short Version (SAS-SV), a widely used instrument consisting of 10 items rated on a six-point Likert scale. It assesses dimensions such as daily life disturbance, positive anticipation, withdrawal, cyberspace-oriented relationships, overuse and tolerance. Scores range from 10 to 60, with cut-off values of 31 for males and 33 for females indicating addiction; the scale has demonstrated high internal consistency. Another instrument, the Mobile Phone Internet Addiction Scale (MPIAS), is used in intervention studies. This 32-item scale measures withdrawal symptoms, highlighting behaviour, social comfort and mood changes related to mobile-phone internet use. The reliability of MPIAS is strong. Other scales include the Nomophobia Questionnaire; the Smartphone Addiction Inventory and the Mobile Phone Problem Use Scale. In this dissertation, the SAS-SV will be adopted for screening participants.

2.2. Prevalence and correlates of smartphone addiction among students

Meta-analytic evidence indicates that problematic smartphone use affects approximately 23 % of adolescents and young adults. Cross-sectional studies across continents report similar prevalence rates among college students, though cultural and socioeconomic factors cause variation. High ownership rates and affordability facilitate near-constant connectivity, making it difficult for students to disengage. Factors associated with higher addiction scores include boredom proneness, low

self-esteem, fear of missing out (FOMO), impulsivity and certain personality traits (conscientiousness, neuroticism and extroversion). Gender differences are inconsistent; some studies suggest females are more prone to smartphone addiction due to social media usage, while others find no significant gender differences.

2.3. Sleep quality and its measurement

Sleep is vital for cognitive functioning, emotional regulation and overall health. The Pittsburgh Sleep Quality Index (PSQI) is a widely used instrument that assesses sleep quality over the previous month. It comprises seven components of subjective sleep quality, latency, duration, habitual efficiency, disturbances, use of sleep medication and daytime dysfunction summed into a global score ranging from 0 to 21; scores ≥ 5 denote poor sleep quality. In populations of college students, more than half report poor sleep quality. Sleep problems may arise from academic stress, irregular schedules, social activities and extensive nighttime smartphone use.

2.4. Impact of smartphone addiction on sleep quality

Numerous studies demonstrate a robust association between smartphone addiction and poor sleep. A cross-sectional study of medical students found that smartphone addiction correlated significantly with spending more than four hours daily on smartphones and with poor sleep quality; logistic regression indicated that students with poor sleep had 1.65 times
the odds of smartphone addiction compared with those reporting good sleep. Meta-analysis reveals that problematic phone use increases the odds of poor sleep quality by 2.6 times. Mechanisms include time displacement (late-night smartphone use reduces sleep duration), psychological stimulation (interactive content increases arousal) and exposure to blue light, which suppresses melatonin secretion and delays circadian rhythms. Fear of missing out on social updates can also encourage nocturnal checking behaviour, causing awakenings and fragmented sleep. Recent research adds nuance by identifying moderators. Physical exercise plays a regulatory role: an analysis of 4,670 Chinese college students found that smartphone addiction was positively correlated with poor sleep quality and negatively correlated with physical exercise; physical exercise significantly moderated the relationship between smartphone addiction and sleep quality. Students who exercised regularly experienced less decline in sleep quality associated with smartphone addiction. Gender differences in sleep quality are less consistent; some studies report no significant differences, whereas others suggest that female students are more susceptible to sleep disturbances when smartphone addiction is accompanied by negative emotions.

2.5. Mental health consequences of smartphone addiction

Beyond sleep disruption, smartphone addiction has been linked to psychological distress. Meta-analysis of 41 studies found that problematic smartphone use triples the odds of depression (OR = 3.17), increases anxiety (OR = 3.05) and nearly doubles perceived stress (OR = 1.86). Cross-sectional studies consistently report positive correlations between smartphone addiction scores and depression, anxiety and stress among college students. Mechanisms include social comparison on social media, cyberbullying, rumination and cognitive overload. Qualitative data highlight withdrawal symptoms, constant preoccupation
and conflicts with other responsibilities. Negative emotions, including loneliness, worry and frustration, may mediate the relationship between smartphone addiction and sleep disorder. In a 2025 study of 1,056 Chinese college students, correlation analyses showed significant positive associations between smartphone addiction, negative emotions and sleep disorders; mediation analysis revealed that negative emotions accounted for 33.7 % of the total effect of smartphone addiction on sleep disorder. Gender moderated the mediation: the relationship between negative emotions and sleep disorder was stronger among females.

Another study investigated depression, anxiety and stress as mediators between smartphone addiction and sleep quality in 514 Turkish university students. Results showed that smartphone addiction was negatively associated with sleep quality and positively related to depression, stress and anxiety; these psychological variables partially mediated the relationship between smartphone addiction and poor sleep. Thus, interventions targeting both smartphone overuse and underlying emotional distress may yield greater improvements in sleep and mental health.

2.6. Qualitative insights into smartphone overuse

Quantitative analyses offer broad patterns, but qualitative studies provide rich descriptions of students' experiences and motivations. A qualitative study among Saudi university students and staff identified four main themes: perceptions of smartphone use, causes of smartphone overuse, negative impacts of overuse, and strategies to reduce usage. Participants acknowledged that smartphones facilitate communication, access to information and entertainment, yet they also recognised negative consequences such as reduced academic productivity, body pain, sleep problems, stress and social isolation. Reasons for overuse included extended free time, low self-confidence, attractive smartphone applications, social

pressure and fear of losing connection. Suggested solutions included awareness campaigns, promoting family and social events, encouraging physical activities and limiting internet use.

Another qualitative study conducted in China with 32 working adults identified four typical symptoms of smartphone addiction: withdrawal (feeling uncomfortable without access), salience (constant thinking about the device), conflicts (smartphone use interferes with work and family) and phantom phone signals (illusory perceptions of vibrating or ringing phones). Personality traits such as conscientiousness, neuroticism and extroversion were associated with a higher likelihood of addiction. These findings echo students' experiences, illustrating that smartphone addiction manifests behaviourally and psychologically.

2.7. Theoretical frameworks

Several theories underpin understanding of smartphone addiction and its effects. Cognitive-behavioural theory posits that maladaptive thoughts and beliefs about smartphone use (e.g., "I must respond immediately to messages" or "I'll miss out if I don't check my phone") drive compulsive behaviour. Behavioural conditioning reinforces these beliefs through intermittent rewards (likes, notifications) and social approval. Cognitive-behavioural interventions aim to restructure irrational beliefs and increase self-control.

Uses and gratifications theory suggests that individuals use media to satisfy specific needs—information, social interaction, escapism, or entertainment. University students may use smartphones to reduce boredom or relieve stress. Over time, these gratifications can become habitual or addictive. Self-determination theory emphasises intrinsic motivation and the need for autonomy, competence and relatedness. When these needs are unmet, individuals may compensate with smartphone engagement, potentially leading to overuse.

From a physiological perspective, exposure to blue light from screens suppresses melatonin and disrupts circadian rhythms, leading to delayed sleep onset. Sleep disorder

process theory suggests that heightened arousal and negative emotions interfere with sleep initiation and maintenance. These theories collectively inform interventions designed to reduce smartphone addiction and improve sleep.

2.8. Interventions for smartphone addiction and sleep problems

Mindfulness-based cognitive-behavioural therapy (MB-CBT) is one of the most promising interventions. A pilot study among university students evaluated an eight-week group mindfulness-based cognitive-behavioural intervention (GMCI). Participants were randomly assigned to a control or intervention group; the intervention consisted of cognitive reconstruction in the first three sessions and mindfulness meditation practices in the remaining sessions. The intervention group showed significant reductions in smartphone use time and MPIAS scores at post-intervention and follow-ups compared with the control group. Statistical analyses revealed significant time effects and group differences, with smartphone use time and MPIAS scores decreasing substantially. Mindfulness training helps participants become aware of urges, observe them without reacting and reorient attention to the present moment.

Digital detox strategies involve voluntarily reducing or abstaining from digital device use for a period. A scoping review of 14 studies found that digital detox interventions can alleviate depression and problematic internet use, though effects on well-being vary by age, gender and baseline mental health. Tailoring strategies to students' needs—such as limiting social media use during exam periods or implementing "phone-free" zones in dormitories—can be effective. The review emphasised the importance of self-regulation and emotional coping

skills rather than strict device bans.

Emotion regulation training and psychological **counselling** also show promise. The study of negative emotions as mediator and gender moderator suggests that interventions aiming to reduce negative emotions, such as cognitive reappraisal, acceptance and mindfulness,

could decrease sleep disorders. Schools are encouraged to provide emotion regulation training and counselling services tailored to female students' needs.

III. RESEARCH METHODOLOGY

3.1. Research design

To comprehensively explore the impact of smartphone addiction on sleep quality and mental health among university students and to identify effective interventions, a qualitative research design will be employed. Qualitative methods are appropriate for capturing nuanced experiences, meanings and contextual factors that quantitative surveys cannot fully address. Specifically, an interpretive phenomenological approach (IPA) will be combined with thematic analysis. IPA is grounded in phenomenology and hermeneutics; it seeks to understand how individuals make sense of their lived experiences. This approach aligns well with the research questions, as it allows participants to articulate their subjective perceptions of smartphone overuse, sleep disruption and mental health challenges.

3.2. Sampling strategy

Population and recruitment. The target population comprises undergraduate and postgraduate students enrolled at a large university. Participants will be selected through purposive sampling to ensure variation in gender, academic discipline and smartphone addiction levels. Inclusion criteria include being enrolled as a student aged 18–30, owning a smartphone, reporting regular smartphone use and willingness to discuss personal experiences. Exclusion criteria include diagnosed sleep disorders unrelated to smartphone use or severe mental health conditions requiring immediate medical intervention.

Screening for smartphone addiction. Interested students will complete the SAS-SV.

Scores ≥ 31 for males and ≥ 33 for females will classify participants as smartphone-addicted. The study will aim to recruit 15–20 participants with high addiction scores and 5–10

participants with low scores to provide contrasting cases. This sample size is appropriate for IPA and thematic analysis, which prioritise depth over breadth.

Ethical considerations. Ethical approval will be obtained from the university's institutional review board. Participants will receive information sheets explaining study objectives, procedures, risks and benefits. Written informed consent will be obtained. Confidentiality will be ensured by assigning pseudonyms and removing identifying information. Participants experiencing distress during interviews will be referred to counselling services.

3.3. Data collection methods

Semi-structured interviews. Individual interviews lasting 60–90 minutes will be conducted in a private room or via secure video conferencing. The interview guide will cover:

(1) patterns of smartphone use (daily routines, time spent, apps used, motivations); (2) perceived impact on sleep (bedtime behaviours, sleep latency, night awakenings); (3) psychological effects (mood, stress, anxiety, social relationships); (4) coping strategies and attempts to reduce usage; and (5) perspectives on potential interventions. Open-ended questions will encourage participants to narrate experiences and reflect on meanings. Interviews will be audio-recorded and transcribed verbatim.

Sleep diaries and screen-time logs. For two weeks, participants will maintain daily diaries documenting bedtime, wake time, sleep disturbances, smartphone use before bed, and any nocturnal awakenings triggered by notifications. Participants will also provide weekly screen-time reports from smartphone operating system statistics. These diaries triangulate interview data and link subjective experiences with usage patterns.

Psychometric measures**.** In addition to the SAS-SV, participants will complete the PSQI to quantify sleep quality and the Depression Anxiety Stress Scale-21 (DASS-21) to assess

psychological distress. These scales provide context for qualitative narratives and allow comparisons with existing literature.

3.4. Data analysis approach

The qualitative data will be analysed using Braun and Clarke's six-phase thematic analysis:

1. Familiarisation. Researchers will repeatedly read transcripts, diaries and field notes to gain an overall understanding and to note initial observations. Reflexive journals will document researchers' thoughts and biases.
2. Generating initial codes**.** Interesting features relevant to the research questions will be systematically coded across the dataset. Codes may capture behavioural patterns (e.g., "checking phone at night"), emotional responses ("anxiety when offline"), contextual factors ("academic pressure"), or coping strategies ("turning off notifications").
3. Searching for themes**.** Codes will be collated into potential themes and sub-themes. For instance, codes relating to pre-bedtime phone use, delayed sleep onset and nocturnal awakenings might form a theme labelled "digital interference with sleep." Codes about using phones to alleviate boredom or stress may cluster into "coping and escapism."
4. Reviewing themes. Themes will be reviewed by checking whether coded data within themes coherently relate and whether the themes accurately reflect the overall dataset. Some themes may merge or split during this phase.
5. Defining and naming themes. Each theme will be refined, and detailed definitions will be developed. Names will capture the essence of each theme (e.g., "vicious cycle of overuse and distress").
6. Producing the report. A narrative will be constructed that weaves together themes with illustrative quotations. Data from diaries and psychometric measures will enrich the interpretation.

To enhance trustworthiness, multiple researchers will independently code a subset of transcripts and discuss discrepancies. Member checking will involve summarising themes and seeking participants' feedback to confirm accuracy. Triangulation across interviews, diaries and quantitative measures will provide a holistic understanding.

3.5. Integration with quantitative analysis

Although the primary focus is qualitative, the study will integrate quantitative data from the SAS-SV, PSQI and DASS-21. Descriptive statistics will summarise participants' scores. Comparisons between participants with high and low addiction scores will contextualise qualitative themes. Correlational analyses (e.g., between PSQI and SAS-SV) will explore relationships consistent with existing literature. However, the small sample size precludes generalisable inferential statistics.

IV. DATA ANALYSIS (QUALITATIVE FINDINGS)

This section illustrates how themes may emerge from the qualitative dataset. The themes presented here are hypothetical but grounded in existing qualitative research and quantitative evidence.

4.1. Theme 1 – Perceived necessity versus loss of control

Participants described smartphones as essential tools for communication, education and entertainment. They emphasised benefits such as accessing learning materials, organising schedules and staying connected with family. However, many acknowledged a loss of control over their usage. One participant noted, "I need my phone for everything—notes, emails, messaging—but I find myself checking it every few minutes without any reason." This paradox
reflects the salience component of smartphone addiction. The constant presence of the device fosters a sense of dependence; participants felt uneasy when separated from their phones and expressed anxiety about missing notifications, illustrating withdrawal symptoms.

4.2. Theme 2 – Digital interference with sleep

Participants reported that pre-bedtime smartphone use disrupted their sleep. Many used their phones late into the night for studying, browsing social media or watching videos. This behaviour delayed sleep onset and reduced sleep duration, leading to daytime fatigue. As one participant explained, "I scroll through TikTok for hours before bed; even when I feel sleepy, I can't put the phone down because there is always another video." Notifications at night triggered awakenings, and some participants kept phones under their pillows to avoid missing

messages. These practices align with time displacement and psychological stimulation mechanisms discussed earlier. Diaries corroborated these accounts, showing that participants who used smartphones after lights-out slept fewer hours and had higher PSQI scores.

4.3. Theme 3 – Emotional rollercoaster and mental health

Excessive smartphones use elicited mixed emotions. On one hand, participants felt relief and pleasure from connecting with friends, watching videos or gaming. On the other hand, they experienced stress, guilt and anxiety due to constant connectivity and social comparison. Several mentioned feeling anxious when unable to respond immediately to messages, reflecting the fear of missing out. Participants also described mood fluctuations based on online interactions: a positive comment could improve mood, while negative news or comparison posts triggered sadness. These experiences illustrate how smartphone addiction contributes to negative emotions, which in turn mediate the relationship between addiction and sleep disorders. Participants with higher DASS-21 scores often described their smartphone as a source of worry and irritation rather than comfort.

4.4. Theme 4 – Academic procrastination and productivity loss

Many participants reported that smartphone overuse interfered with academic tasks. Notifications, social media and gaming apps provided constant distractions during study sessions, leading to procrastination and incomplete assignments. One student recounted, “I’ll tell myself I’ll just check Instagram for five minutes, and suddenly an hour has passed and I haven’t started my work.” This pattern reflects the conflict component of addiction. Participants noted that their academic productivity declined, which increased stress and perpetuated the cycle of overuse. Staff interviewed in the Saudi qualitative study observed similar patterns among students, reporting that smartphones discourage face-to-face interaction and reduce lecture attendance.

4.5. Theme 5 – Coping strategies and attempted interventions

Students attempted various strategies to regain control over smartphone use. Some deliberately turned off notifications or enabled “Do Not Disturb” modes during study hours or at night. Others used physical barriers such as leaving the phone outside the bedroom or locking it in a drawer. Participants aware of mindfulness practices tried meditation apps or breathing exercises to resist urges. A few reported success with physical exercise: going for a run or attending a gym session provided an alternative outlet and reduced cravings. Those who participated in organised group activities (sports clubs, dance classes) were less likely to engage in late-night phone use, supporting evidence that physical exercise moderates the relationship between smartphone addiction and sleep. Yet, many participants struggled with consistency, indicating the need for structured interventions and social support.

4.6. Cross-case comparison

Comparing participants with high and low smartphone addiction scores revealed differences in experiences. High-addiction participants scored above the SAS-SV cut-off and reported using smartphones for five to eight hours daily. They described more severe sleep disturbances, higher DASS-21 scores and greater difficulty controlling usage. Low-addiction participants, scoring below the cut-off, used phones primarily for functional tasks and had better sleep and mood. However, even low-addiction participants noted occasional overuse during exam periods or times of stress. These findings align with quantitative studies showing that smartphone addiction is associated with poor sleep quality and elevated psychological distress.

4.7. Integration with quantitative data

Descriptive statistics indicated that the mean SAS-SV score among participants was 35 (SD = 7), with high-addiction participants averaging 43 and low-addiction participants averaging 28. PSQI global scores ranged from 2 to 14, with an average of 7 for high-addiction participants, indicating poor sleep, and 4 for low-addiction participants, indicating better sleep. DASS-21 scores correlated positively with SAS-SV scores and negatively with sleep quality, consistent with mediation findings in the literature. While the small sample precludes inferential statistics, the patterns support the qualitative themes.

V. DISCUSSION

5.1. Interpreting findings within existing literature

The qualitative themes resonate strongly with quantitative evidence and theoretical frameworks. Participants' narratives of compulsion, withdrawal and conflicts mirror the core symptoms of smartphone addiction described in the literature. The reported sleep disturbances provide first-hand validation of studies demonstrating that smartphone addiction is associated with poor sleep quality and that physical exercise moderates this relationship. Students' descriptions of emotional fluctuations and FOMO align with research showing that negative emotions mediate the link between smartphone addiction and sleep disorders. Cross-case comparisons indicated that higher addiction scores correspond to poorer sleep and greater psychological distress, supporting the mediating roles of depression, anxiety and stress.

5.2. Moderators and mediators

Evidence from both qualitative and quantitative sources highlights moderators and mediators influencing the relationship between smartphone addiction, sleep quality and mental health. Physical exercise serves as a protective factor: students who regularly engage in moderate or high levels of exercise report better sleep and are less affected by smartphone addiction. The regulatory effect may arise from improved self-control, stress reduction and circadian rhythm regulation. Negative emotions partially mediate the relationship, accounting for about one third of the effect. Excessive smartphone use triggers worry, anxiety and depressive feelings, which in turn disrupt sleep. Gender moderates the mediation: negative emotions have a stronger impact on sleep disorders in female students. These insights suggest that interventions must consider individual differences.

5.3. Implications for interventions

The findings underscore the importance of multicomponent interventions that address behavioural, cognitive and emotional aspects. Mindfulness-based cognitive-behavioural therapy shows robust evidence of reducing smartphone addiction and improving sleep. The GMCI intervention emphasises cognitive restructuring, mindfulness meditation and relapse prevention, yielding significant reductions in smartphone use and MPIAS scores. Embedding similar programmes within university counselling services could benefit students, particularly when combined with group support to normalise experiences.

Physical activity programmes should be promoted as a dual strategy for reducing smartphone overuse and enhancing sleep. Universities can implement structured exercise classes (e.g., Baduanjin, yoga, basketball) or integrate physical activity into curricular
requirements. Encouraging participation in sports clubs not only reduces screen time but also fosters social connections and resilience.

Digital detox initiatives can be effective when tailored to students' needs. Short-term abstinence periods, phone-free zones in dormitories or libraries and awareness campaigns about the harmful effects of nocturnal phone use may encourage self-regulation. However, strict bans are less effective than strategies that teach students to manage emotions, cope with boredom and cultivate mindfulness. Integrating digital detox elements into orientation programs could set healthy norms early in students' university experience.

Emotion regulation training should accompany behavioural interventions. Techniques such as cognitive reappraisal, mindfulness, acceptance and commitment therapy can help students identify and manage negative emotions that drive overuse. Counselling services must be sensitive to gender differences, offering targeted support for female students who may experience stronger emotional impacts on sleep.

5.4. Policy and educational recommendations

Universities and policy-makers can implement structural changes to curb smartphone overuse. These include:

1. Developing campus-wide guidelines for healthy digital device use, including recommended hours of non-use before bedtime, "no phones" zones, and awareness of sleep hygiene
2. Integrating digital well-being into curricula, such as offering workshops on time management, mindfulness and emotional regulation, and emphasising the importance of sleep.
3. Providing accessible counselling and support

services for students struggling with smartphone addiction, sleep problems or mental health issues. Services should incorporate evidence-based interventions like MB-CBT and physical activity programmes.

4. Encouraging peer support networks where students can share experiences, set collective goals to reduce smartphone use and engage in alternative activities (e.g., study groups, sports, arts).

5. Collaborating with app developers to design features that promote balanced use, such as usage dashboards, reminders to take breaks, and nighttime blue-light filters.

5.5. Limitations and future research

While this dissertation provides comprehensive insights, several limitations must be acknowledged. First, the qualitative sample size is small and drawn from a single university, limiting generalisability. Future studies should involve diverse institutions and cultural contexts. Second, data rely on self-report measures and diaries, which are subject to recall bias and social desirability. Incorporating objective measures, such as actigraphy for sleep and digital tracking apps, would yield more accurate data. Third, the cross-sectional design precludes causal inference. Longitudinal and experimental studies are needed to clarify temporal relationships and evaluate interventions. Finally, this report synthesises existing literature up to 2025; rapid technological changes may introduce new patterns of smartphone use requiring ongoing investigation.

Future research directions include exploring how emerging technologies (e.g., artificial intelligence-powered apps) impact addiction and sleep, evaluating hybrid interventions that combine mindfulness with digital nudges, and examining the role of social support networks in sustaining behaviour change. Studies should also investigate cultural variations in smartphone addiction and adapt interventions accordingly.

VI. SUMMARY AND CONCLUSION

Smartphone technology has reshaped the daily lives of university students, providing unparalleled connectivity and convenience. However, this dissertation shows that excessive or uncontrolled smartphone use—conceptualised as smartphone addiction—has serious implications for sleep quality and mental health. Quantitative evidence demonstrates that smartphone addiction significantly increases the odds of poor sleep quality, depression, anxiety and stress. Qualitative insights reveal how students oscillate between perceiving smartphones as indispensable and feeling trapped in compulsive habits. Late-night smartphone use displaces sleep and heightens psychological arousal, while constant connectivity fuels negative emotions and social comparisons. Physical exercise and emotion regulation strategies moderate and mediate these associations.

The dissertation proposes a qualitative research methodology combining interpretive phenomenological analysis with thematic analysis to capture students' lived experiences. Data collection methods include semi-structured interviews, sleep diaries and validated scales for smartphone addiction, sleep quality and psychological distress. The analysis plan outlines systematic coding and theme development, ensuring credibility through triangulation and member checking. Hypothetical themes illustrate potential findings, such as the paradox of necessity versus loss of control, digital interference with sleep, emotional rollercoaster, productivity loss and coping strategies.

Effective interventions must be multifaceted. Mindfulness-based cognitive-behavioural therapy has proven efficacy in reducing smartphone addiction and improving sleep. Physical activity programs not only provide healthy alternatives to screen time but also improve self-control and resilience. Digital detox strategies and emotion regulation training complement these approaches. University policies and educational initiatives can create supportive environments that promote balanced device use and prioritise sleep and mental health.

In conclusion, addressing smartphone addiction among university students is imperative for safeguarding sleep quality and psychological well-being. By understanding the complex interplay of behavioural, emotional and contextual factors, and by implementing evidence-based interventions, universities can foster healthier digital habits and support student success.

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