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Review On-Gadget Addiction A Growing Risk Factor for Depression

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Abstract: *Gadget addiction has emerged as a growing public health concern, particularly among young adults who increasingly rely on smartphones and other digital devices in their daily lives.*
This study investigates the prevalence of gadget dependency and its relationship with mental health outcomes, especially sleep disturbances and depressive symptoms. A review of multiple cross-sectional and longitudinal studies reveals that excessive mobile phone use is consistently associated with negative physical, psychological, and social consequences. High gadget dependency was observed in 45% of undergraduate students—substantially higher than rates reported in comparable studies from Delhi (22%) and China (21.3%).
Frequent mobile phone use was linked to vision and hearing problems, reduced physical activity, difficulty performing routine tasks, and impaired sleep. Longitudinal evidence further demonstrates that high mobile phone use at baseline increases the risk of developing sleep disturbances and depressive symptoms, particularly among men, while perceived pressure to be constantly available significantly elevates stress and mental health risks in both genders.
These findings highlight the urgent need for awareness programs and behavioural interventions that promote healthy digital habits and help young adults establish boundaries around mobile phone availability. Addressing gadget dependency is essential for safeguarding mental well-being in an increasingly technology-driven society.

Keywords*:* Gadget addiction, Excessive screen time, Depression risk, Sleep disturbances, Young adults, Mobile phone dependency

I. INTRODUCTION

People have always been concerned about issues like “drug addiction” among young people, but in today’s world, “gadget addiction” has become an even more serious problem. Nowadays, it’s common to see young people deeply attached to modern devices like smartphones, tablets, and laptops. This growing dependence on e A gadget is a modern device designed to make our daily tasks easier and more convenient than older technologies.[1]

Addiction means having a hard time staying away from something, even when you want to.

It often leads to losing control over your behaviour, constantly craving the activity or substance, and not fully realizing how it’s affecting your life and relationships. It can also cause emotional struggles and unhealthy reactions.[2] In simple terms, addiction is a

powerful urge that people find difficult to resist, even when it starts to harm them. When it comes to Internet addiction, research on how it affects young adults is still fairly new and developing.[3]

The word “gadget” refers to portable electronic devices like smartphones, tablets, and laptops. Using gadgets has both advantages and disadvantages. However, spending too much time on them can lead to several health issues, such as eye strain, finger pain, back and neck problems, and trouble sleeping. The longer and more often someone uses gadgets, the more likely they are to experience negative effects on their body, mind, emotions, and social life.[4]

People have become so dependent on modern gadgets and the services they offer that it’s hard for many to imagine moving forward or progressing without them. This heavy reliance is turning into a kind of addiction to technology. Young people, especially those between the ages of 15 and 24, are the most at risk of developing this addiction.[5] In

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India, there are about 231 million young people, which makes the country a huge market for gadget and technology companies.[6]

Many parents complain that their children have become increasingly addicted to their mobile phones, spending hours playing video games or watching TV all day. As human intelligence has advanced, so have our gadgets and the internet. Unfortunately, this progress has also changed how we connect with one another. Genuine, face-to-face conversations that once built strong relationships are now often replaced by quick messages and emojis on social media. It's fair to say that people have become slaves to modern technology. As Michael Condry, the Chief Operating and Development Officer at Sledgehammer Games, once said, "All these gadgets — the phone and the computer — expose the inside of your brain in a way that's bad." Nowadays, instead of going out or spending time with loved ones, many people prefer to spend their weekends and free time in front of their screens.[7]

Advances in smartphone technology have captured the attention of people from all age groups, including college and university students. However, excessive smartphone use can easily turn into a habit or even an addiction, which may negatively impact a person's mental health and overall well-being (Hadi et al., 2019). [8]

The word "smartphone" was first used in 1997 when Ericsson described its GS 88 "Penelope" model as a smartphone. The term was meant to set apart these advanced devices from the basic feature phones that existed earlier. Smartphones introduced a new generation of mobile phones that combined various communication and digital services — including voice calls, text messaging, online gaming, shopping, web browsing, and social networking. They also offered personal information management tools and wireless connectivity, making them powerful, all-in-one communication devices (Kalyani et al., 2019).[9]

Depression is one of the most common mental health issues among college students, with its prevalence estimated to range between 1.5% and 19% (10,11). It is recognized as the second leading cause of disability-adjusted life years (DALYs), often leading to physical, emotional, and psychosocial difficulties (12-14). Depression can negatively impact various aspects of a student's life, including academic performance, cognitive functioning, and sleep quality (15– 17). Studies have also shown that depression in adolescents is linked to certain problematic behaviours, such as substance use, excessive internet use, and problematic mobile phone use (PMPU) (18–21). As a result, there has been growing interest in exploring the relationship between depression, sleep quality, and PMPU.

Mobile phones have become an essential part of everyday life, largely due to their ability to provide instant access to the internet (22). However, mobile phone use, particularly among adolescents, has become a growing concern. Studies have reported that 6.3% of high school students in Italy (23), 16% of middle school students in Korea (24), 20% of high school students in Spain (25), and 26% of young people in Tunisia (26) show signs of problematic mobile phone use (PMPU). This issue is becoming increasingly widespread and is associated with various physical, psychological, and social difficulties (27–30). Research has also revealed significant correlations between PMPU and depression, as well as with factors such as age, impulsiveness, and excessive reassurance seeking (31). Visnjic et al. (20) suggested that the intensity and manner of mobile phone use could influence the mental health of university students. Furthermore, a longitudinal study found that higher levels of mobile phone use at baseline were linked to increased depression scores after one year, providing new insight into the relationship between mobile phone use and the development of depressive symptoms (32).

We hypothesized that problematic mobile phone use (PMPU) is associated with both sleep quality and depressive symptoms among young adults. Therefore, the present study aimed to investigate the relationship between PMPU and depression among college students. Additionally, this study examined the mediating role of sleep quality in the relationship between PMPU and depressive symptoms. Sleep quality is widely recognized as an important factor associated with depression among young adults. Previous research has shown that sleeping less than six hours per day increases the likelihood of developing depression during adolescence (33). Another study reported that shorter sleep onset latency and resistance to sleep are significant independent predictors of major depressive disorder (34). Moreover, several studies have identified an inverse relationship between sleep quality and depression. A meta-analysis revealed that adolescents with major depressive disorder tend to experience poor sleep quality, including frequent sleep disturbances, insomnia, and hypersomnia (35). Compared to healthy controls, adolescents with depression also reported longer sleep onset latencies, more frequent awakenings during the night, and lower overall sleep efficiency.

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Depression is among the most common mental disorders worldwide, contributing substantially to disability, dependence, and healthcare costs [36–39]. Previous studies have highlighted adolescence as a particularly sensitive period for the development of depressive disorders [40–45]. During this stage, depressive symptoms often present in more diverse forms than in adulthood, including irritability, aggression, social withdrawal, and other behavioural changes in addition to the typical symptoms of depression [46]. Moreover, adolescents are especially susceptible to socio contextual influences, such as the increasing use of mobile technologies and social media (MTSM). However, the impact of exposure to these technologies on the development of depressive disorders in this age group remains unclear.

Method:

We carried out a systematic review of studies published between 2008 and September 21, 2015. Since the iPhone was introduced in 2007 and marked a major shift in mobile technology, we focused only on research published after that year. This helped ensure that the participants in these studies were using modern smartphones rather than older basic phones. Throughout the process of collecting and analysing data, we followed the PRISMA review guidelines (Moher et al., 2015) to maintain accuracy and transparency.[47]

This study used data from the Project for Health of Adolescents in Southern Taiwan, a large research program focused on understanding the mental health of teenagers living in that region. Southern Taiwan includes three big cities and four counties.

In 2004, the region had a very large number of students—about 258,000 in junior high schools and 202,000 in senior high or vocational schools. To make sure the sample represented all types of students, researchers used a stratified random sampling method. They first divided districts into urban and non-urban areas based on the Taiwan Demographic Fact Book.

From these areas, they randomly chose:

• 12 junior highs and 19 senior high/vocational schools from urban districts

• 11 junior highs and 10 senior high/vocational schools from non-urban districts

Next, classes in these schools were grouped according to grade levels. Using another round of random selection, the researchers chose 207 classes, which together included 12,210 students. These students formed the final sample for the study.[48]

Study Design and Participants:

This study was carried out with pharmacy students at a university in northern Thailand. Students were invited to take part if they were:

• In their 1st to 5th year of pharmacy school

• At least 18 years old

• Using a smartphone or tablet

• Able to access the internet

• Willing to participate

Students in their final (6th) year were not included because they spend the entire year in clinical clerkship rotations, which gives them a very different daily schedule compared to students in years 1–5. Students who did not provide complete or reliable answers were also excluded.

To decide how many students were needed for the study, the researchers used Taro Yamane's sample size formula. With a total population of about 600 pharmacy students (around 120 students in each of the first five years), and allowing a 5% margin of error at a 0.05 significance level, the calculated sample size came out to 240 students.[49]

Questionnaire Development and Data Collection:

A self-administered questionnaire was created to address all the study objectives, which included assessing smartphone addiction, smartphone-use behaviours, factors linked to addiction, and the duration of smartphone use. To develop the questionnaire, the research team reviewed existing literature on smartphone behaviour and addiction and also interviewed pharmacy students to ensure the questions were relevant to their experiences.

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To check content validity, three experts evaluated each item using the Item–Objective Congruence (IOC) index, which ranges from –1 to +1. A score of +1 means the item is fully appropriate, 0 means uncertainty, and –1 means it is inappropriate. Items scoring at least 0.5 were kept, while those scoring below 0.5 were revised or removed after discussion with the experts.

Next, the questionnaire was tested for clarity with 30 pharmacy students. Its reliability was then evaluated using Cronbach's alpha, and the value of 0.89 indicated that the tool was highly reliable.

The final questionnaire consisted of three parts, along with a cover page. The cover page explained the study's purpose and included an option for students to give voluntary consent by selecting "I consent to participate in the study voluntarily." Participants were assured that all responses would remain anonymous.

Section 1 gathered general information such as sex, age, academic year, GPA, place of residence, monthly parental income (THB), and monthly smartphone bill (THB).

Section 2 focused on smartphone and tablet usage behaviours, including:

1. Type of device used (smartphone only or smartphone with tablet)
2. Duration of smartphone use on weekdays (⩽5 hours or >5 hours per day)
3. Duration of smartphone use on weekends (⩽5 hours or >5 hours per day)
4. Purpose of use, such as social networking (Facebook, Instagram), education (online learning, reading), entertainment (YouTube), gaming, or non-academic reading
5. Health symptoms related to device use, where students could select from headaches, insomnia, depression, anxiety, and stress if they had experienced any of them.

Section 3 of the questionnaire focused on assessing smartphone addiction, with the specific variables described in the "Measured Variables" section. Data collection was carried out among pharmacy students using an online questionnaire designed in Google Forms. A link to the final questionnaire was shared with the student representative from each academic year, who then distributed it to their peers. Participation was entirely voluntary, and students could withdraw at any time if they felt uncomfortable or preferred not to answer certain questions. The questionnaire remained accessible for two months, from January to February 2021. After the data collection period ended, the researcher carefully screened all responses to ensure data quality and removed any duplicate entries.[50]

Statistical Analysis:

All collected data were first entered into Microsoft Excel spreadsheets (Microsoft Office 2003, Microsoft, Redmond, DC, USA). To ensure accuracy, each questionnaire was entered by two data entry personnel working in pairs, and every entry was cross-checked before finalization. Statistical analyses were performed using SPSS version 17.0 (SPSS Inc., Chicago, IL, USA) on a Windows 7 Ultimate operating system. The findings were summarized and presented in tabular form.

The analysis included both descriptive and inferential statistical procedures. Descriptive statistics were used to summarize the characteristics of the dataset, with continuous variables expressed as mean and standard deviation, and categorical variables presented as frequencies and percentages. An independent t-test was applied to compare parametric variables between male and female participants.

Pearson's and Spearman's correlation tests were used to examine the strength and direction of relationships between the study variables, depending on the distribution of the data. Binary logistic regression analysis was conducted to calculate odds ratios (ORs) and 95% confidence intervals (CIs), assessing both independent and interactive effects of selected predictor variables on depression, anxiety, and stress outcomes. A p-value of less than 0.05 was considered statistically significant for all analyses.[51]

Study Population and Data Collection:

The study population consisted of young adults aged 20–24 years, following the United Nations' definition of this age group. A total of 20,000 individuals—10,000 men and 10,000 women—were randomly selected from the general population. All participants were born between 1983 and 1987. Figure 1 presents an overview of the sampling process

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and the structure of the study population The study population consisted of 20,000 young adults (10,000 men and 10,000 women) aged 20–24 years, selected at random from the national population registry maintained by the Swedish Tax Agency. Half of the individuals lived in Västra Götaland County, Sweden, and the other half in the remaining regions of the country.

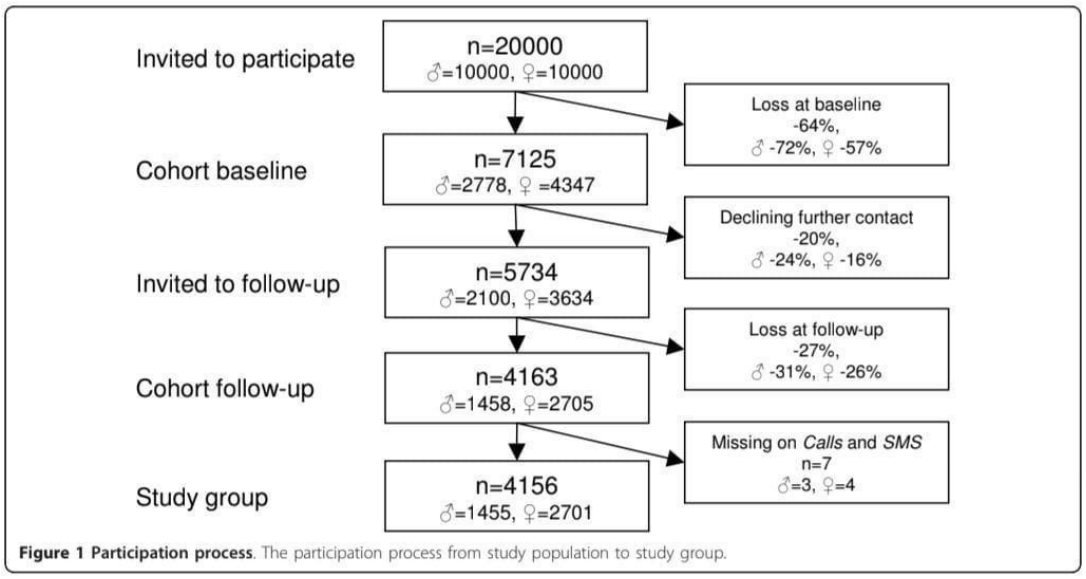

Figure No:1 Participation process. The participation process from study population to study group.

In October 2007, a questionnaire covering health, work and leisure exposures, background characteristics, and psychosocial factors was mailed to all selected individuals. Participants could return the questionnaire by post or complete it online if preferred. A lottery ticket (valued at approximately 1 Euro) was included with the invitation and could be redeemed regardless of participation. Two postal reminders were sent, and the baseline response rate was 36% (n = 7125).

One year later, respondents who had indicated willingness to participate in follow-up studies (n = 5734) were invited to complete the same questionnaire, administered online. The data collection procedures were similar to those at baseline, with the addition of a third reminder that included the option of a paper questionnaire and two cinema tickets as incentives. The follow-up response rate was 73% (n = 4163). After excluding individuals who did not respond to both mobile phone use and SMS frequency questions at baseline, 4156 participants remained in the analytical sample.

Overall, non-participation and dropout across the study period amounted to 79%.[52]

Mobile phone exposure variables:

Information about how participants used their mobile phones was collected using a baseline questionnaire. The questionnaire asked about the average number of phone calls they made and received each day, as well as the number of text messages (SMS) they sent and received.

In addition to these numbers, the survey also included qualitative questions—that is, questions about how people felt about their mobile phone use. These included:

- How often their mobile phone woke them up at night
- Whether they felt pressure to always be available
- Whether being reachable all the time felt stressful
- Whether they felt they were overusing their mobile phone

The responses were grouped into high, medium, and low levels based on how frequently people reported these behaviours. Overuse was classified separately, based on how many overuse-related statements the person agreed with.

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To simplify the analysis, researchers created a combined mobile phone use variable by merging the number of calls and text messages. These two measures were moderately related (Spearman correlation $r = 0.35$, $p < 0.0001$). The combined score also showed strong correlations with the original call frequency ($r = 0.73$, $p < 0.0001$) and SMS frequency ($r = 0.84$, $p < 0.0001$), showing that it was a good overall indicator of mobile phone use.[53]

*Mental health outcome variables:

Information on mental health symptoms was gathered through the cohort study questionnaire at both baseline and follow-up.

Current Stress:

Current stress was measured using a simple, validated question. Stress was explained as feeling tense, restless, nervous, anxious, or having trouble sleeping because your mind is constantly worried. Participants were then asked:

"Are you currently experiencing this kind of stress?"

The response options were:

• a: not at all

Table 1 Mobile phone variables at baseline

Category	Mobile phone variables	Men n = 1455		Women n = 2701	
		Freq	%	Freq	%
	Frequency of calls				
Low	0 per day	69	5	51	2
Low	1-5 per day	952	65	1946	72
Med	6-10 per day	301	21	543	20
High	11-20 per day	97	7	108	4
High	More than 20 per day	36	2	47	2
	Frequency of SMS messages				
Low	0 per day	126	9	58	2
Low	1-5 per day	906	62	1609	60
Med	6-10 per day	262	18	634	23
High	11-20 per day	98	7	259	10
High	More than 20 per day	60	4	140	5
	Mobile phone use				
Low	Low Calls + Low SMS	804	55	1433	53
Med	Low Calls + Med SMS or vice versa	326	22	616	23
High	High Calls and/or High SMS, or Med Calls + Med SMS	323	22	645	24
	Awakened at night				
Low	Never	600	41	989	37
Med	Only occasionally	657	45	1248	46
High	A few times per month	164	11	386	14
High	A few times per week	27	2	68	3
High	Almost every day	6	0	9	0
	Availability demands				
Low	Never	23	2	12	0
Low	Now and then, but not daily	82	6	86	3
Low	Daily, but not all day	278	19	828	31
Med	All day	680	47	1127	42
High	Around the clock	388	27	642	24
	Accessibility stress				
Low	Not at all stressful	892	61	1229	46
Med	A little bit stressful	418	29	1083	40
High	Rather stressful	115	8	311	12
High	Very stressful	28	2	75	3
	Overuse				
	Item 1: Use too much	184	13	587	22
	Item 2: Tried to cut down unsuccessfully	87	6	371	14
Low	No item	1199	84	1898	71
Med	One item	183	13	579	22
High	Both items	41	3	187	7

Table No:1 Mobile Phone variables at baseline

• b: just a little

• c: to some extent

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• d: rather much
• e: very much
For the analysis, answers d and e were grouped as "Yes" (experiencing stress), while a, b, and c were grouped as "No", based on how the responses were distributed and what the categories represent.

Sleep Disturbances:
Sleep disturbances were measured using a single question that combined common sleep problems such as insomnia, waking up repeatedly during the night, and waking up too early. The question, adapted from the Karolinska Sleep Questionnaire, was:
"How often have you had problems with your sleep in the past 30 days (e.g., trouble falling asleep, waking up several times, or waking up too early)?"
The response options were:
• a: never
• b: a few times per month
• c: several times per week
• d: every day
For the analysis, responses c and d were classified as "Yes" (indicating sleep problems), while a and b were classified as "No", based on clinical relevance.[54]

Result:
Study Group Characteristics:
At the start of the study, just over half of the men (52%) and about one-third of the women (34%) were single. Most participants had completed upper secondary school. A smaller portion had gone on to higher education, with 13% of the men and 16% of the women having finished college or university. Only a few—5% of men and 6% of women—had completed only elementary school.
When asked about their main occupation, 51% of the men and 41% of the women said they were working. Another large share were students: 40% of men and 48% of women. A small group—8% of men and 12% of women—fell into an "other" category.
Participants were also asked about their level of social support. High social support was reported by 43% of men and 56% of women. Medium support was reported by 41% of men and 32% of women, while low support was reported by 16% of men and 13% of women.[55]

Study Group Characteristics:
• Marital status:
o 52% of men and 34% of women were single at the start of the study.
• Education:
o Most participants had completed upper secondary school.
o College or university graduates: 13% of men and 16% of women.
o Only elementary schooling: 5% of men and 6% of women.
• Main occupation:
o Working: 51% of men and 41% of women.
o Studying: 40% of men and 48% of women.
o Other categories (e.g., unemployed, homemakers): 8% of men and 12% of women.
• Social support levels:
o High social support: 43% of men and 56% of women.
o Medium social support: 41% of men and 32% of women.

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Low social support: 16% of men and 13% of women. A little over half of the participants were classified as low mobile phone users, meaning they made or received five or fewer calls and SMS messages per day. High mobile phone use—defined as eleven or more calls or messages daily—was reported by 22% of men and 24% of women.

Most participants said they were expected to be reachable every day, and about one in four were expected to be available at all times. Only a small percentage found this constant accessibility very stressful, whereas about half did not find it stressful at all.

For most people, their mobile phone rarely disturbed their sleep, and only a few reported being woken up by their phone on a weekly basis. Thirteen percent of men and 22% of women felt that either they or people close to them believed they used their phone too much. Additionally, 6% of men and 14% of women had tried—but were unable—to reduce their mobile phone use.[56]

Prospective associations between mobile phone variables at baseline and mental health outcomes at 1-year follow-up:

When participants who already had symptoms at baseline were excluded, men with high mobile phone use at baseline were more likely than low-use men to report sleep problems and depressive symptoms (based on one question) after one year (PR 1.8, CI 1.21–2.69 for sleep problems; and PR 1.7, CI 1.14–2.46 for depressive symptoms). Among women, high mobile phone use was linked to depressive symptoms measured by two items (PR 1.5, CI 1.02–2.24) at the 1-year follow-up.

There were no strong associations between expectations of being available or being woken at night and mental health outcomes. However, among women, moderate levels of mobile phone overuse were linked to current stress, and both high and moderate overuse were linked to sleep disturbances. High accessibility-related stress was associated with current stress, sleep disturbances, and depressive symptoms (two items) in both men and women.

Overall, in most analyses (32 out of 40), the "high" exposure group showed higher
prevalence ratios (PRs) than the "medium" exposure group.[57]

Correlations between the mobile phone exposure variables at baseline

	Awakened at night Men/Women	Availability demands Men/Women	Accessibility stress Men/Women	Overuse Men/Women
Mobile phone use	0.31[a]/0.32[a]	0.24[a]/0.23[a]	0.09[b]/0.10[a]	0.24[a]/0.30[a]
Awakened at night		0.28[a]/0.28[a]	0.07[c]/0.09[a]	0.14[a]/0.21[a]
Availability demands			-0.002 ns/0.03 ns	0.10[a]/0.11[a]
Accessibility stress				0.20[a]/0.22[a]

Spearman correlation coefficients for the men (n = 1455) and women (n = 2701). All correlations are statistically significant ([a]p < 0.001, [b]p < 0.01, [c]p < 0.05) unless indicated as non-significant (ns).

Table No:2 Correlation between the mobile phone exposure variables at baseline

Discussion:

The present study set out to understand how common gadget dependency is among undergraduate students. We found that 45% of the participants had a high level of dependency. This percentage is noticeably higher than what was reported in earlier studies— 22% in Delhi and 21.3% in Changsha, China. These differences might be due to variations in the study settings. The earlier studies were conducted among students from different academic backgrounds and universities, while the Delhi study was based in an urban community setting, which may have provided a more realistic picture of gadget addiction.

In our study, most participants (90.5%) used smartphones. Among them, 57.5% reported vision-related problems, 39% had hearing issues, and 20% experienced reduced physical activity. These findings are similar to those from a study in Karachi, where 88.5% of students owned smartphones and reported issues such as difficulty concentrating on daily tasks (71%), hearing problems (36.5%), and vision problems (7%). This suggests that gadget use tends to have similar health effects across different regions.

We also found that 61% of the students in our study struggled with performing day-to-day tasks, 12% had disturbed sleep, and 10.5% experienced difficulty concentrating or thinking clearly. These results are consistent with a study from Sweden, which showed that frequent smartphone use was linked to sleep disturbances and symptoms of depression in both men and women. This highlights how inadequate rest can lead to exhaustion and reduced ability to carry out routine activities.[58]

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II. CONCLUSIONS

The study found both cross-sectional and long-term links between mobile phone use and mental health among young adults. Using a mobile phone very frequently at the start of the study increased the risk of sleep problems and depressive symptoms in men, and depressive symptoms in women, one year later.[59,60,61] The highest risk of mental health issues at follow-up was seen in participants who felt stressed by always needing to be reachable on their phones. These findings suggest that public health efforts could focus on shaping healthier attitudes toward mobile phone use—for example, by offering guidance that helps young adults set boundaries on how available they need to be to others via their phones.

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