

Research Paper

Impact of Smartphone Addiction on Sleep Quality and Psychological Distress: A Study of Gen Z and Millennials

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ABSTRACT

Today's world is significantly impacted by smartphone addiction, a phenomenon that has intertwined with our daily lives. This study investigates the relationship between smartphone addiction, sleep quality, and psychological distress among Generation Z (Gen Z) and Millennials. A total of 115 participants (63 female and 52 male) representing two generational cohorts (64 Gen Z and 51 Millennials) were included in the study. Three standardized assessment tools were utilized: the Smartphone Addiction Scale (SAS) by Kwon et al. (2013), the Sleep Quality Scale (SQS) by Yi et al. (2006), and the Kessler Psychological Distress Scale (K10) developed by Professor Ronald C. Kessler (1992). Results indicate a significant relationship between smartphone addiction, sleep quality, and psychological distress across both generational cohorts. Furthermore, significant differences were observed between Gen Z and Millennials in smartphone addiction, sleep quality, and psychological distress. Additionally, gender differences were noted, with significant disparities between male and female participants in smartphone addiction and sleep quality. However, no significant differences were found between genders in psychological distress. These findings underscore the importance of addressing smartphone addiction as it relates to sleep quality and psychological well-being, particularly among younger generations. Tailored interventions targeting smartphone usage habits and promoting healthy sleep hygiene practices may be essential in mitigating adverse effects on mental health and overall well-being.

Keywords: *Smartphone Addiction, Sleep Quality, Psychological Distress, Generation Z, Millennials*

In the contemporary digital age, smartphones have become an integral part of daily life, particularly among Generation Z and Millennials, who engage extensively with digital technologies for communication, entertainment, and social interaction. This extensive use has raised worries about smartphone addiction, which is characterized by excessive, obsessive, and difficult-to-control smartphone use. Such behaviors have been linked to major disturbances in critical elements of well-being, including sleep quality and

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psychological health. Sleep is a critical physiological process that involves both length and subjective restfulness, and it is extremely vulnerable to lifestyle influences such as screen exposure. Prolonged smartphone usage, particularly at night, can cause sleep start delays, reduced sleep efficiency, and disruption of circadian rhythms, all of which contribute to poor sleep quality.

At the same time, excessive smartphone use has been related to increased psychological discomfort, which includes symptoms like anxiety, melancholy, impatience, and emotional instability. Constant connectedness, exposure to social media, and feelings like social comparison and fear of missing out all lead to higher emotional stress. The interaction between smartphone addiction, sleep quality, and psychological discomfort is complicated and bidirectional, with bad sleep exacerbating emotional problems and psychological anguish reinforcing excessive smartphone usage as a coping technique. These connections are especially important for Generation Z, who are digital natives with high levels of screen engagement, and Millennials, who use smartphones for both personal and professional purposes.

These interactions are particularly relevant for Generation Z, who are digital natives with high levels of screen engagement, and Millennials, who integrate smartphone use into both personal and professional domains. Differences in technological exposure, lifestyle demands, and coping behaviors across these cohorts further influence how these variables interact, highlighting a dynamic interplay between digital behavior, sleep patterns, and mental well-being.

Smartphone Addiction

Smartphone addiction is the term used to describe an obsessive and difficult-to-control smartphone user base. While a computer, tablet, or smartphone may be highly helpful tools, using them excessively can have a bad effect on relationships, work, and education. The compulsive needs to check and scroll through on a smartphone can develop smartphone addiction, a behavioral addiction that impairs other significant facets of life.

Griffiths (1995) was one of the first academics to introduce the idea of addictions to technology. Technology-related addictions are defined by him as "non-chemical (behavioral) addictions which involve human-machine interaction." Internet addiction disorders or online usage problems sometimes aggravate smartphone addiction, also referred to as "nomophobia" (the fear of being without a mobile phone).

The constant, habitual use of smartphones driven by environmental signals and situational indications—such as an overwhelming temptation to check their phones unintentionally—is known as habitual smartphone usage. In reality, operant conditioning can cause the brain to produce dopamine when someone uses a smartphone for quick-gratification activities like gaming or social media browsing. This reinforces the behaviour and encourages the user to use the device more often (Flayelle et al., 2023).

The components model of addiction (Griffiths, 2005) suggests that addictions that are behavioural in nature as well as substance-related may share a developmental pathway through biopsychosocial processes and comparable criteria for addiction. Tolerance, withdrawal, salience, mood modification, relapses, and conflict are characteristic elements of CMA.

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The pathways model (PM) of problematic mobile phone use proposed by Billieux (2012) explains different routes leading to dysfunctional smartphone use. It identifies four pathways: impulsivity, relationships, extraversion, and cyberaddiction. The impulsive pathway involves poor self-control and maladaptive emotion regulation. The relationship pathway reflects individuals who use smartphones for emotional comfort and tend to have higher neuroticism and lower self-esteem. The extraversion pathway includes socially active individuals with a strong need for communication, while the cyberaddiction pathway refers to excessive engagement with various digital activities beyond just smartphones.

As per the compensatory Internet usage theory (CIUT; Kardefelt-Winther, 2014), negative effects may have a major role in the increased use of digital technologies. More specifically, some people could utilize these tools—like the Internet—to help them deal with their bad feelings (Kardefelt-Winther, 2014). It's crucial to remember, though, that CIUT sees problematic Internet usage (PIU) as a normal, if maladaptive, way for people to cope with distress rather than as an illness. Additionally, CIUT has been utilized in a number of research to conceptualise the relationships between PSU and symptoms of psychopathology (Wang et al., 2015). Similarly, according to the compensatory Internet usage theory (CIUT; Kardefelt-Winther, 2014), individuals may use digital technologies to cope with negative emotions. Such use is viewed as a maladaptive but normal coping mechanism rather than a disorder. CIUT has also been applied to explain the relationship between problematic smartphone use and symptoms of psychopathology (Wang et al., 2015).

Smartphone addiction is associated with various impulse control problems, including virtual relationships, information overload, and online compulsions. It often reflects underlying issues such as loneliness, stress, anxiety, or depression, while simultaneously exacerbating them. Individuals may use smartphones as a “security blanket,” leading to social withdrawal and increased emotional distress. Excessive use can impair concentration, disrupt sleep, and negatively affect overall well-being. There is no fixed measure of problematic use; however, it becomes concerning when it interferes with daily activities, relationships, and responsibilities, such as neglecting work, studies, or in-person interactions.

Sleep quality

The assessment of one's ability to sleep is known as sleep quality. Sleep quality refers to an individual's satisfaction with their overall sleep experience and is determined by factors such as sleep latency, duration, efficiency, and wakefulness after sleep onset. It is influenced by psychological (stress, anxiety, depression), physiological (age, circadian rhythm), and environmental factors (device use, room conditions). Good sleep promotes restoration and well-being, whereas poor sleep leads to fatigue, irritability, impaired functioning, and reduced concentration. Studies show that sleep quality, duration, and timing are closely linked to students' cognitive performance and academic achievement, with many experiencing chronic sleep deprivation (Curcio et al., 2006). Additionally, over 60% of college students report poor sleep quality, increasing the risk of physical and mental health issues (Lund et al., 2010).

Studies indicate a decline in sleep quality among young adults in recent years. Sleep quality, though not uniformly defined, generally refers to an individual's overall satisfaction with their sleep, including duration, continuity, and sense of refreshment upon waking. Lifestyle changes, increased technology use, and greater work and social demands have contributed to reduced sleep quality (Chokroverty, 1998). Adequate sleep is essential for physical,

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cognitive, and psychological well-being, whereas poor or disturbed sleep can impair health and functioning. Indicators of poor sleep quality include persistent fatigue, frequent awakenings, and symptoms of sleep disturbances.

Psychological Distress

Psychological distress is a state of emotional suffering characterized by symptoms such as anxiety, depression, insomnia, and hopelessness (Decker, 1997). It arises when individuals are unable to cope with stressful or adverse situations (Lerutla, 2000) and includes feelings of restlessness, irritability, and fear (Mirowsky & Ross, 1989). It reflects maladaptive coping and may involve somatic symptoms like fatigue and sleep disturbances. Psychological distress can significantly impair cognitive functioning, social relationships, and daily activities, and may increase the risk of developing serious mental health conditions if left untreated (Carson, Butcher & Mineka, 1996).

Various factors contribute to psychological distress, including loneliness, job dissatisfaction, and work-family conflict (Viertiö et al., 2021). The biopsychosocial model explains distress through the interaction of biological, psychological, and social factors, while the diathesis-stress model highlights the role of vulnerability combined with stressful life events. Cognitive behavioural theory links distress to maladaptive thought patterns, whereas psychoanalytic theory attributes it to unresolved unconscious conflicts.

Generation Z & Millennials

Generation Z and Millennials exhibit high levels of smartphone use, which is closely associated with sleep disturbances and psychological distress. Gen Z, as digital natives, frequently use smartphones for social interaction and coping with stress (Ameen & Anand, 2020), while Millennials rely on them for communication and social comparison (Darrat et al., 2023; Festinger, 1954). Excessive smartphone use has been linked to poor sleep quality, as screen exposure before bedtime disrupts circadian rhythms (Exelmans & Van den Bulek, 2016). Studies show that problematic smartphone use is associated with sleep disturbances and reduced sleep quality (Demirci et al., 2015) and also contributes to psychological distress such as anxiety and depression (Elhai et al., 2017; Samaha & Hawi, 2016). Poor sleep further intensifies psychological distress and emotional instability (Baglioni et al., 2011). Additionally, a bidirectional relationship exists between smartphone addiction, sleep quality, and depressive symptoms (Levenson et al., 2017). Both generations are particularly vulnerable due to academic pressure, economic stress, and constant social media exposure, which increases comparison and fear of missing out (Twenge et al., 2018). Consequently, smartphone addiction both serves as a coping mechanism and exacerbates psychological distress by impairing sleep and reinforcing maladaptive behaviours.

Alzhrani et al. (2023) investigated the relationship between smartphone use and sleep quality, psychological discomfort, and loneliness among healthcare students and staff. The study found a positive and significant association between smartphone addiction, psychological suffering, and emotional loneliness. Furthermore, a substantial unfavorable link between smartphone addiction and sleep quality was discovered. However, there was no clear link between smartphone addiction and social loneliness. These findings conclude that smartphone addiction has a negative impact on psychological discomfort, sleep quality, and emotional loneliness among health-care students and staff.

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Chatterjee and Kar (2021) conducted a study to assess the relationship between smartphone addiction and sleep quality among medical students from all semesters, as well as other background characteristics. According to study results, 46.15% of men and 33.33% of women are addicted to smartphones. According to their PQSI scores, 63.39% of study participants had poor sleep quality, and 62.05% had poor health status based on their GHQ ratings. The total PQSI scores showed a favorable correlation with the GHQ, SAS-SV, and length of time spent using smartphones each day. It is concerning that a large percentage of medical students use smartphones excessively because it is bad for their health and sleep patterns.

Susmitha et al. (2024) investigated the effects of smartphone addiction on sleep and mental health among undergraduate dental students. The study's findings revealed that 42% of the pupils were addicted to their smartphones. In this group, smartphone addiction was found to be negatively associated with mental health and positively correlated with poor sleep quality.

Nicolli et al. (2023) investigated the relationship between smartphone use, sleep disorders, and mental health among medical students in Central Serbia. International Physical Activity Questionnaire-Short Form (IPAQ-SF), Smartphone Addiction Scale-Short Form (SAS-SV), Pittsburgh Sleep Quality Index (PSQI), and Depression, Anxiety, and Stress Scale-21 items (DASS-21). Statistical approaches such as the Chi-square test, student's t-test, and logistic regression were used to explore the relationship between smartphone addiction, physical activity, and mental health outcomes. The study found a 21.7% prevalence of smartphone addiction, with men having a slightly greater rate than women. Females performed considerably better on the SAS-SV. Excessive smartphone use, poor sleep quality, and elevated levels of stress, anxiety, and depression were all linked to smartphone addiction. Notably, it was discovered that anxiety and excessive smartphone use were separate predictors of addiction.

Stanković et al. (2021) found a link between problematic smartphone use and psychopathological behaviors, including internet addiction, depression, anxiety, stress, and sleep quality. The results showed that using a smartphone negatively correlated with stress, anxiety, and sleep quality. Extensive smartphone use is linked to depression via stress mediation; greater smartphone use has been shown to lessen stress. Furthermore, depression leads to increased smartphone use, indicating a bidirectional relationship. Taken together, the data give strong support for a bidirectional hybrid perspective of the relationship between excessive smartphone use and depression mediated by stress.

Objectives

- To examine the relationship between smartphone addiction, sleep quality and psychological distress across the Gen Z and Millennial age groups.
- To compare the levels of smartphone addiction, sleep quality and psychological distress between Generation Z and Millennials.
- To assess whether there is any gender-specific trends in smartphone addiction, sleep quality and psychological distress.
- To investigate the predictive role of smartphone addiction on sleep quality and psychological distress.

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Hypothesis

- Ho1: There will be significant relationship between smartphone addiction, sleep quality and psychological distress.
- Ho2: There will be significant difference in the levels of smartphone addiction, sleep quality and psychological distress among Generation Z and Millennials.
- H03: There will be significant gender-specific trends in smartphone addiction, sleep quality and psychological distress.
- H04: Smartphone addiction will significantly predict sleep quality and psychological distress.

Rationale

The 21st century has seen an exponential increase in technological advancements that have impacted every aspect of life. One such advancement is the smartphone and its plethora of applications, which provide instant access to the Internet and social media through apps like Facebook, Instagram, Twitter, and Skype. Considering how common smartphones are, there is growing concern regarding smartphone addiction and its link to poor sleep, mental, and physical health issues. Users have grown so dependent on their smartphones that they feel they would be unable to function without them, and their use and obsession with them causes them to ignore other assignments and tasks. This is what psychologists refer to as irrational overuse of smartphones, and it is what is known as smartphone addiction. Among all addictions, this one is probably the most common in every generation. People who are addicted to smartphones are supposed to live alone. Addiction can also have psychological and financial effects on a person. The aim of this research is to examine how excessive smartphone use affects people's sleep patterns and psychological well-being. Additionally, the study aims to ascertain the percentage of Gen Z and millennials who use smartphones excessively. This study enables us to examine the impacts of smartphone addiction in an Indian context, while most of the previous research has been conducted in Western contexts.

METHOD

Design

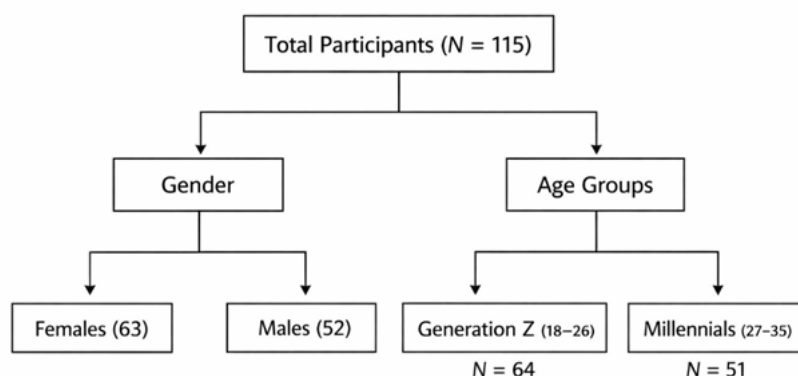
The present study adopted a descriptive cross-sectional design using the survey method. Data was collected through a structured questionnaire assessing smartphone addiction, sleep quality, and psychological distress. Both descriptive and inferential statistics were used for analysis. Independent t-tests were conducted to examine gender and generational differences, while correlation analysis was used to study the relationships among variables. Additionally, regression analysis was performed to assess the predictive relationships between smartphone addiction, sleep quality, and psychological distress.

- *Independent variable:* Smartphone addiction
- *Dependent variables:* Sleep quality and Psychological distress

Sample

The study consisted of a total of 115 participants out of which 63 were females and 52 were males. Participants were grouped into two age groups: 18–26 (Generation Z) and 27–35 (Millennial). The sample comprised of 64 Generation Z participants and 51 Millennials. For the present study, a non-probability sampling technique was employed. Under non-probability, purposive sampling was employed. In purposive sampling the participants are selected based on the objectives of the study.

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Measures

The participants' smartphone addiction was assessed using the 'Smartphone addiction scale' created by Kwon et al. (2013). The Smartphone Addiction Scale (SAS) is a self-reported assessment for smartphone addiction that includes six criteria and 33 items on a six-point Likert scale (1: "strongly disagree" and 6: "strongly agree"). The six variables are: everyday life disruption, pleasant anticipation, withdrawal, cyberspace-oriented connection, overuse, and tolerance. During the development phases, the internal consistency test result (Cronbach's alpha) was 0.967.

Sleep quality was assessed using the Sleep Quality Scale (SQS) developed by Yi et al. (2006). The scale consists of 28 items measuring six aspects of sleep quality, rated on a 4-point Likert scale (0 = few to 3 = almost always). Items related to restoration after sleep and satisfaction with sleep are reverse scored. Total scores range from 0 to 84, with higher scores indicating poorer sleep quality. The scale has demonstrated good reliability, with an internal consistency of .92 and test-retest reliability of .81 and shows strong correlation with the Pittsburgh Sleep Quality Index.

To assess the psychological distress among the participants, Kessler Psychological Distress Scale (K10)', designed by Professor Ronald C. Kessler (1992) from Harvard University, was used. It is a 10-item questionnaire intended to yield a global measure of distress based on questions about anxiety and depressive symptoms that a person has experienced in the most recent 4-week period. K-10 has showed good construct validity and reliability, with a Cronbach's alpha of 0.84.

Procedure

The objective of the present study was to assess the impact of smartphone addiction on sleep quality and psychological distress among Generation Z and Millennials. The sample consisted of 115 participants, including 63 females and 52 males, with 61 belonging to Generation Z (18–26 years) and 54 to Millennials (27–35 years).

Data was collected online through Google Forms, which comprised four sections. Section A included the introduction, informed consent, and socio-demographic details such as age and gender. Section B assessed smartphone addiction, Section C measured sleep quality, and Section D assessed psychological distress. The informed consent ensured participants' rights, including anonymity, confidentiality, and the option to withdraw at any time.

Participants were selected purposively in accordance with the study objectives and were requested to complete the questionnaire within one week, responding honestly. After data

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collection, scoring was carried out as per the respective scales. The data were analysed using descriptive statistics (mean, standard deviation, and frequency) and inferential statistics, including independent t-test, correlation, and regression analysis.

RESULTS

Table 1 Correlation between Smartphone Addiction, Sleep Quality and Psychological distress (sample size = 115 and $df = 113$)

Measures	Smartphone addiction	Sleep quality	Psychological distress
Smartphone addiction	-----	-----	-----
Sleep quality	-0.549***	-----	-----
Psychological distress	0.431**	-0.518***	-----

Note: ** $p < .01$, *** $p < .001$

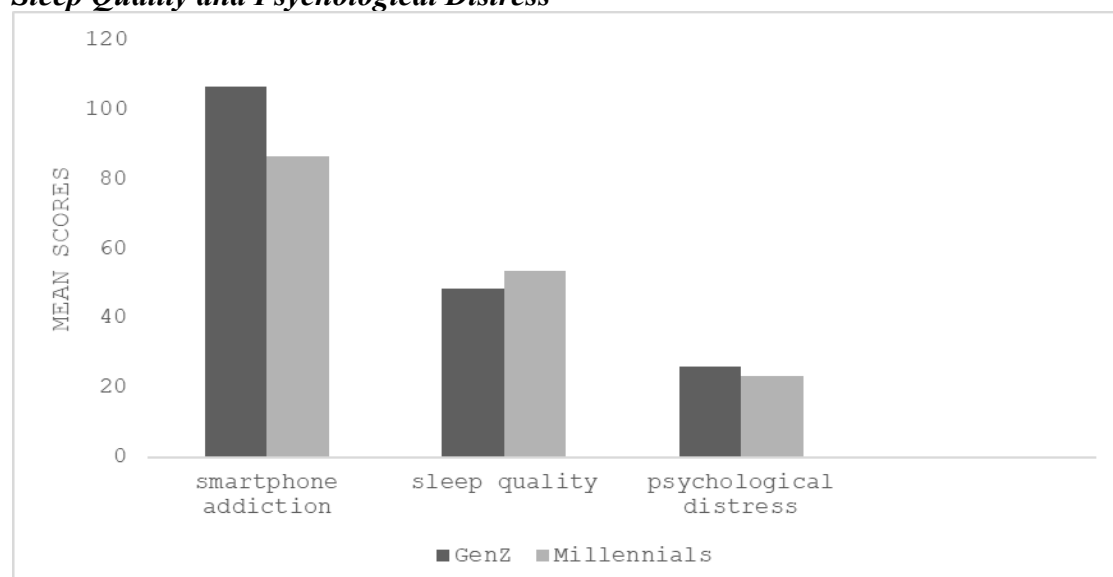
Table 2 M, SD and t-value of GenZ and Millennial participants in smartphone addiction, sleep quality and psychological distress (sample = 115, $df = 113$)

	Generation Z (18-26)		Millennial (27-35)		
	M	SD	M	SD	T
Smartphone Addiction	106.4	31.95	86.3	25.40	3.67*
Sleep quality	48.5	12.15	53.3	10.16	-2.25**
Psychological Distress	26.0	8.12	23.2	5.68	2.09**

Note: * $p < .001$, ** $p < .05$

Table 2 compares Generation Z and Millennials on smartphone addiction, sleep quality, and psychological distress. Generation Z showed significantly higher smartphone addiction ($M=106.4$, $SD=31.95$) than Millennials ($M=86.3$, $SD=25.40$; $t=3.67$, $p < .001$). Millennials reported better sleep quality ($M=53.3$, $SD=10.16$) compared to Generation Z ($M=48.5$, $SD=12.15$; $t=-2.25$, $p < .05$). Additionally, Generation Z had slightly higher psychological distress ($M=26.0$, $SD=8.12$) than Millennials ($M=23.2$, $SD=5.68$; $t=2.09$, $p < .05$), indicating significant differences.

Figure 1 Mean Differences Between Gen Z and Millennials on Smartphone Addiction, Sleep Quality and Psychological Distress



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Table 3 *M, SD and t-value of Male and Female participants in smartphone addiction, sleep quality and psychological distress (sample = 115, df = 113)*

	Male		Female		t
	M	SD	M	SD	
Smartphone Addiction	90.2	26.95	103.4	32.64	2.335**
Sleep quality	52.9	9.70	48.7	12.58	-1.989**
Psychological Distress	24.6	7.33	25.0	7.23	0.289**

Note: * $p < .001$, ** $p < .05$

Table 3 examines gender differences in smartphone addiction, sleep quality, and psychological distress ($df = 113$). Females reported significantly higher smartphone addiction ($M = 103.4$, $SD = 32.64$) than males ($M = 90.2$, $SD = 26.95$; $t = 2.335$, $p < .05$). Males showed better sleep quality ($M = 52.9$, $SD = 9.70$) compared to females ($M = 48.7$, $SD = 12.58$; $t = -1.989$, $p < .05$). However, no significant gender difference was found in psychological distress (males: $M = 24.6$, $SD = 7.33$; females: $M = 25.0$, $SD = 7.23$; $t = 0.289$).

Figure 2 *Mean differences between Male and Female on Smartphone Addiction, Sleep Quality and Psychological Distress*

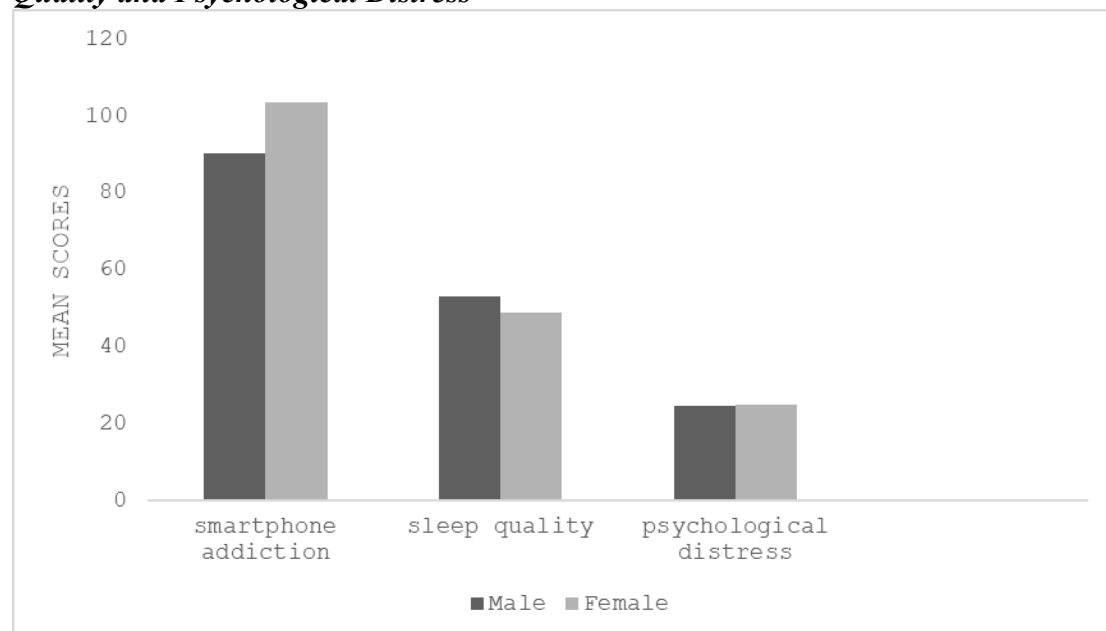


Table 4 *Linear regression predicting Sleep Quality from Smartphone Addiction*

Predictor	B	SE B	β	t	P
Constant	70.61	3.01	-	23.50	<.001
Smartphone Addiction	-0.21	0.03	-0.55	-6.98	<.001

Note. $R^2 = .30$, $R = .55$, $N = 115$

Table 4 shows that smartphone addiction significantly predicts sleep quality among 115 participants. The regression model explained 30% of the variance in sleep quality ($R^2 = .30$). Smartphone addiction was found to be a significant negative predictor of sleep quality ($B = -0.21$, $\beta = -0.55$, $t = -6.98$, $p < .001$), indicating that higher levels of smartphone addiction are associated with poorer sleep quality.

Table 5 Linear regression predicting Psychological Distress from Smartphone Addiction

Predictor	B	SE B	β	t	P
Constant	14.88	2.04	-	7.29	<.001
Smartphone Addiction	0.10	0.02	0.43	5.08	<.001

Note. $R = .43$, $R^2 = .19$, $N = 115$.

Table 5 shows that smartphone addiction significantly predicts psychological distress among 115 participants. The model accounted for 19% of the variance in psychological distress ($R^2 = .19$). Smartphone addiction emerged as a significant positive predictor ($B = 0.10$, $\beta = 0.43$, $t = 5.08$, $p < .001$), suggesting that higher smartphone addiction is associated with higher levels of psychological distress.

DISCUSSION

The present study aimed to examine the impact of smartphone addiction on sleep quality and psychological distress among Generation Z and Millennials. A total of 115 participants were included in the study. Based on the objectives, it was hypothesized that smartphone addiction would be significantly related to sleep quality and psychological distress, that there would be significant differences between Generation Z and Millennials on these variables, and that gender differences would exist. Additionally, it was hypothesized that smartphone addiction would significantly predict sleep quality and psychological distress. The findings supported these hypotheses, revealing significant relationships among smartphone addiction, sleep quality, and psychological distress. Significant differences were also observed between generational groups. Gender differences were partially supported, with males and females differing significantly in smartphone addiction and sleep quality, but not in psychological distress. Furthermore, regression analysis indicated that smartphone addiction significantly predicted both sleep quality and psychological distress.

Table 1 indicates a significant relationship among smartphone addiction, sleep quality, and psychological distress. A moderate negative correlation was found between smartphone addiction and sleep quality, suggesting that higher levels of smartphone addiction are associated with poorer sleep quality. This finding is consistent with previous research showing that excessive smartphone use disrupts sleep patterns, reduces sleep duration, and impairs overall sleep quality (Haripriya et al., 2019; Canan et al., 2013; Godwin & Sharp, 2023). One possible explanation is that smartphone use, particularly before bedtime, exposes individuals to blue light that suppresses melatonin production and disrupts circadian rhythms (Randjelović et al., 2023). Additionally, behaviors such as prolonged screen time, “doom-scrolling,” and frequent notifications increase cognitive arousal and delay sleep onset, ultimately reducing sleep efficiency (Peters & Peters, 2024; Wu et al., 2015). Psychological factors such as fear of missing out (FOMO) further contribute to nighttime smartphone use and poorer sleep quality (Almeida et al., 2022).

A moderate positive correlation was also observed between smartphone addiction and psychological distress, indicating that higher smartphone addiction is associated with increased distress. This aligns with prior studies linking excessive smartphone use with anxiety, depression, and low self-esteem (Kim et al., 2021; Alhassan et al., 2018; Hwang & Cho, 2012). Constant connectivity, social comparison, and dependence on smartphones as a coping mechanism may intensify negative emotional states. Supporting the compensatory internet use theory, individuals may rely on smartphones to alleviate distress, which can reinforce addictive behaviors over time (Peterka-Bonetta et al., 2019; Toseeb & Inkster,

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2015; Chen et al., 2017; Zsila & Reyes, 2023). Longitudinal evidence also suggests that excessive smartphone use predicts later emotional problems and sleep disturbances (Thomé et al., 2011).

Furthermore, a significant negative correlation between sleep quality and psychological distress indicates a bidirectional relationship, where poor sleep contributes to higher distress and vice versa. Previous research supports this association, showing that sleep disturbances are linked to anxiety and depression, while inadequate sleep impairs emotional regulation and cognitive functioning (Jiang et al., 2020; Zhang et al., 2022; Palmer & Alfano, 2017). Sleep deprivation also affects stress regulation by increasing cortisol levels, thereby heightening vulnerability to psychological distress (Hirokawa et al., 2022). Neurobiological mechanisms involving serotonin and dopamine further explain this link (Ursin, 2002; Dzirasa et al., 2006). Overall, these findings highlight a cyclical relationship in which smartphone addiction, poor sleep quality, and psychological distress reinforce one another, negatively impacting overall well-being.

Table 2 indicates significant differences between Generation Z (18–26 years) and Millennials (27–32 years) in smartphone addiction, sleep quality, and psychological distress. The findings show that Generation Z reported significantly higher levels of smartphone addiction compared to Millennials. This supports existing literature suggesting that younger individuals, often referred to as “digital natives,” are more prone to problematic smartphone use due to early and continuous exposure to technology, social media engagement, and peer influence (Hidayati, 2019; Busch & McCarthy, 2021; Shensa et al., 2018). Factors such as fear of missing out (FOMO), instant gratification, and reliance on smartphones for communication and entertainment further contribute to higher addiction levels among Generation Z (Lian et al., 2021; Kuss et al., 2018). Additionally, peer pressure and social norms play a significant role in reinforcing frequent smartphone use in this group (Xu et al., 2023; Wang et al., 2022).

The results also reveal that Generation Z experiences significantly poorer sleep quality than Millennials. This may be attributed to higher screen time, increased nighttime social media use, and greater exposure to blue light, which disrupts circadian rhythms and sleep patterns (Twenge & Campbell, 2018; Levenson et al., 2016; Fischer et al., 2023). Moreover, academic stress, irregular sleep schedules, and heightened mental health concerns among Generation Z further contribute to sleep disturbances (Robbins, 2018; Bei et al., 2018; Wong et al., 2015). In contrast, Millennials may demonstrate relatively better sleep habits due to lower dependence on technology and greater awareness of work–life balance.

Furthermore, a significant difference was found in psychological distress, with Generation Z reporting higher levels compared to Millennials. This aligns with previous research linking increased social media use and digital exposure to higher levels of anxiety and depression (Twenge & Campbell, 2018). Additional stressors such as academic pressure, economic uncertainty, and challenges associated with transitioning into adulthood may further elevate distress levels in this group (Galfy et al., 2020). Differences in mental health awareness and help-seeking behavior may also contribute, as Millennials have been more actively involved in mental health advocacy and may be better equipped to manage psychological challenges (Reavley & Jorm, 2014). Overall, the findings highlight generational differences, with Generation Z being more vulnerable to smartphone addiction, poorer sleep quality, and higher psychological distress.

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Table 3 examines gender differences in smartphone addiction, sleep quality, and psychological distress. The findings indicate significant differences between males and females in smartphone addiction and sleep quality, while no significant difference was observed in psychological distress. Specifically, females reported higher levels of smartphone addiction compared to males. This finding is consistent with prior research suggesting that females tend to engage more in social networking, messaging, and emotionally driven smartphone use, which may increase the risk of addictive behaviors (Ching & Looi, 2019; Jiang et al., 2017). Additionally, females are more likely to use smartphones as a coping mechanism for stress and emotional regulation, further contributing to higher dependency (Gervasi et al., 2017). Socio-cultural expectations related to communication and social connectedness may also play a role in reinforcing greater smartphone use among females (Lachmann et al., 2016).

The results also revealed that females reported significantly poorer sleep quality than males. This may be attributed to higher stress levels, greater emotional involvement in social interactions, and increased nighttime smartphone usage among females (Grandner et al., 2010). Biological factors, such as hormonal fluctuations, have also been found to influence sleep patterns and contribute to sleep disturbances among females (Baker & Driver, 2007). Furthermore, socio-cultural responsibilities and role expectations, including caregiving and work-life balance, may negatively impact sleep quality (Basner et al., 2014; Ohayon et al., 2013).

In contrast, no significant gender difference was found in psychological distress, suggesting that both males and females experience similar levels of distress in the present study. This aligns with research indicating that gender differences in psychological distress are often complex and influenced by multiple interacting factors, including cultural norms and coping styles (Piccinelli & Wilkinson, 2000; Addis & Mahalik, 2003). Although some studies report higher rates of depression among females, these differences are not always consistent and may vary depending on context and sample characteristics (Kessler et al., 2005). Overall, the findings suggest that while gender plays a role in smartphone addiction and sleep quality, its influence.

Tables 4 and 5 present the results of regression analyses examining the predictive role of smartphone addiction on sleep quality and psychological distress. The findings indicate that smartphone addiction significantly predicts both sleep quality and psychological distress. Specifically, higher levels of smartphone addiction are associated with poorer sleep quality and increased psychological distress, supporting the hypothesis that smartphone addiction is a significant predictor of both behavioral and mental health outcomes.

These findings are consistent with previous research. Studies have shown that excessive smartphone use negatively impacts sleep quality due to increased screen exposure, nighttime usage, and disruption of circadian rhythms (Demirci et al., 2015; Randjelović et al., 2023). Similarly, Elhai et al. (2017) found that problematic smartphone use significantly predicts anxiety and depression, while Thomée et al. (2011) reported that frequent mobile phone use is associated with sleep disturbances and mental health issues over time. Additionally, Kim et al. (2021) and Alhassan et al. (2018) highlighted that higher smartphone addiction is linked to greater psychological distress.

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The predictive relationship may be explained by mechanisms such as cognitive arousal, emotional dependency, and maladaptive coping strategies. Constant connectivity, social comparison, and the use of smartphones as a means of escaping negative emotions can further reinforce addiction and increase distress levels (Hawi & Samaha, 2017; Toseeb & Inkster, 2015). Overall, these findings emphasize that smartphone addiction is a significant risk factor affecting both sleep quality and psychological well-being, highlighting the importance of promoting healthier smartphone usage habits.

CONCLUSION

The study's findings show strong correlations between smartphone addiction, sleep quality, and psychological discomfort, with higher smartphone addiction being related with poorer sleep and more distress. Regression results show that smartphone addiction significantly predicts both sleep quality and psychological suffering. Compared to Millennials, Generation Z individuals were more likely to develop smartphone addiction, have lower sleep quality, and experience greater psychological distress. Furthermore, females had stronger smartphone addiction and lower sleep quality than males, although there were no significant gender differences in psychological discomfort.

Implications

The results show that smartphone addiction is a behavioural risk factor that can be changed, highlighting the necessity of focused interventions that emphasise self-control and digital cleanliness. Additionally, they emphasise the significance of sleep-focused psychoeducation, especially for younger populations who are more susceptible to the negative consequences of excessive smartphone use. According to the study, which has clinical significance, mental health practitioners should regularly evaluate technology use patterns while treating psychological discomfort. More broadly, the findings encourage the inclusion of digital well-being policies in educational institutions and highlight early preventive measures, like raising knowledge about responsible smartphone use in schools and colleges to lower related psychological risks.

Limitations

The study's small sample size of 115 people might not offer a complete picture of the larger community. Furthermore, the study only looked at Gen Z and Millennials, leaving out comparisons with prior generations that might provide a more comprehensive generational viewpoint. Because purposive sampling method do not ensure a representative sample of the target population, they may introduce selection bias. The use of self-report measures for data collection may result in response bias, especially the social desirability bias, where participants may give answers, they believe to be favourable rather than ones that are genuine.

Future Suggestions

- To determine the causal links between factors, future research should employ experimental and longitudinal approaches.
- Given their early exposure to cellphones, research should take into account younger generations like Gen Alpha and Gen Beta.
- It is necessary to look at mediating and moderating factors such as screen time habits, personality traits, and coping strategies.
- Intervention-based research should be carried out with the goal of lowering smartphone addiction and enhancing sleep hygiene.

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- To increase generalizability, studies should be expanded to include a variety of demographic and cultural groups.

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Conflict of Interest

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