

Original Research Article

RELATIONSHIP BETWEEN LATE-NIGHT MOBILE PHONE USE, SLEEP QUALITY, AND AFFECT AMONG CAREGIVERS OF PSYCHIATRY OUTPATIENTS: A HOSPITAL-BASED CROSS-SECTIONAL STUDY

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Received : 10/06/2026
Received in revised form : 19/07/2026
Accepted : 04/08/2026

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DOI: 10.70034/ijmedph.2026.3.496

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2026; 16 (3); 3181-3187

ABSTRACT

Background: Caregivers of individuals with psychiatric disorders frequently experience psychological stress, emotional burden, and lifestyle disruptions that adversely affect their sleep and emotional well-being. Excessive late-night mobile phone use has emerged as a potential behavioural factor contributing to poor sleep quality and altered affect. However, evidence regarding the interrelationship among late-night mobile phone use, sleep quality, and affect among caregivers of psychiatric patients remains limited, particularly in the Indian setting. The aim is to evaluate the relationship between late-night mobile phone use, sleep quality, and affect among caregivers accompanying patients attending a Psychiatry Outpatient Department.

Materials and Methods: A hospital-based cross-sectional observational study was conducted among 140 adult caregivers attending the Psychiatry Outpatient Department of a tertiary care teaching hospital over one year. Participants were recruited using convenience sampling after obtaining written informed consent. Sociodemographic and caregiving-related information was collected using a structured questionnaire. Late-night mobile phone use was assessed using the Cell Phone Use Before Sleep Questionnaire (CPU), sleep quality was evaluated using the Pittsburgh Sleep Quality Index (PSQI), and affect was measured using the Positive and Negative Affect Schedule (PANAS). Descriptive statistics were used to summarize participant characteristics. Associations between study variables and socio-demographic characteristics were assessed using the Chi-square test, Independent Student's t-test, or one-way ANOVA, as appropriate. Pearson's or Spearman's correlation coefficients were used to examine relationships among CPU, PSQI, and PANAS scores. Multiple linear regression analysis was performed to identify independent predictors of sleep quality and affect. A two-tailed p value of <0.05 was considered statistically significant.

Results: Female caregivers demonstrated significantly lower positive affect and higher negative affect and late-night mobile phone use than male caregivers (all $p < 0.05$). Caregivers with shorter sleep duration (<6 hours) and those without regular physical activity showed significantly poorer psychological outcomes (all $p < 0.001$). Sleep quality was positively correlated with negative affect ($r = 0.641$) and late-night mobile phone use ($r = 0.703$), while it was negatively correlated with positive affect ($r = -0.612$) (all $p < 0.001$). Multiple linear regression identified late-night mobile phone use ($\beta = 0.326$), negative affect ($\beta = 0.278$), female gender, shorter sleep duration, and chronic illness as significant independent predictors of poor sleep quality, whereas positive affect ($\beta = -0.214$) was a protective factor.

Conclusion: Caregivers of patients with psychiatric disorders are at increased risk of poor sleep quality and adverse emotional well-being. Targeted

interventions promoting healthy sleep habits, psychological support, regular physical activity, and responsible mobile phone use may improve caregiver health and quality of life.

Keywords: Caregivers; Psychiatric disorders; Sleep quality; Positive affect; Negative affect; Mobile phone use.

INTRODUCTION

Sleep is a fundamental biological process that is essential for maintaining physical health, cognitive performance, emotional regulation, and overall quality of life. Adequate sleep supports memory consolidation, immune function, decision-making, and psychological resilience, whereas poor sleep quality has been associated with fatigue, impaired concentration, reduced productivity, mood disturbances, and an increased risk of both physical and psychiatric disorders.^[1,2] In recent years, sleep disturbances have become increasingly prevalent because of modern lifestyle changes, psychosocial stress, and the widespread use of smartphones and other digital devices during late-night hours.^[1-3]

Smartphones have become indispensable tools for communication, education, entertainment, and access to health information. However, excessive use of mobile phones before bedtime has emerged as an important behavioural factor affecting sleep health. Exposure to blue light emitted from smartphone screens suppresses melatonin secretion, delays circadian rhythm, prolongs sleep latency, and reduces sleep duration and sleep quality. Furthermore, continuous engagement with social networking platforms, messaging applications, online videos, and gaming increases cognitive and emotional arousal, making it difficult to initiate restorative sleep.^[3-6]

Recent systematic reviews have consistently demonstrated that problematic smartphone use is significantly associated with poor sleep quality and adverse mental health outcomes across different populations.^[1,3]

Sleep quality is closely linked to affect, which represents an individual's emotional experiences and consists of positive and negative dimensions. Positive affect reflects enthusiasm, alertness, and active engagement, whereas negative affect is characterized by distress, anxiety, fear, irritability, and sadness. Disturbed sleep has been associated with reduced positive affect and increased negative affect, suggesting a bidirectional relationship between sleep and emotional well-being. Likewise, emotional distress may encourage prolonged nighttime smartphone use as a coping mechanism, creating a vicious cycle of excessive digital exposure, poor sleep, and worsening of psychological health.^[5-7]

Caregivers of patients with psychiatric disorders constitute a particularly vulnerable group. They frequently experience substantial caregiver burden due to continuous supervision, emotional involvement, financial responsibilities, social stigma, and uncertainty regarding the patient's illness. These

stressors may adversely affect their sleep quality and emotional well-being. Many caregivers also rely on smartphones during late-night hours for communication, information seeking, or emotional distraction after caregiving responsibilities, potentially aggravating sleep disturbances and affective symptoms.^[7-9]

Although previous studies have independently evaluated smartphone use, sleep quality, and emotional health, limited research has simultaneously examined the interrelationship among late-night mobile phone use, sleep quality, and affect in caregivers accompanying psychiatric outpatients, particularly in the Indian context.^[3,8-10] Understanding these relationships is important because caregiver well-being directly influences caregiving capacity, treatment adherence, family functioning, and patient recovery. Therefore, the present study was undertaken to evaluate the relationship between late-night mobile phone use, sleep quality, and affect among caregivers accompanying patients attending the Psychiatry Outpatient Department of a tertiary care teaching hospital. The study also aimed to examine the association of these variables with socio-demographic characteristics and to explore their correlations to identify potential behavioural factors that may be targeted through caregiver-focused interventions.

The present study aimed to evaluate the relationship between late-night mobile phone use, sleep quality, and affect among caregivers accompanying patients attending the Psychiatry Outpatient Department of a tertiary care teaching hospital. The specific objectives were to determine the prevalence of poor sleep quality and altered affect, assess the association of sleep quality, affect, and late-night mobile phone use with socio-demographic and clinical characteristics, examine the correlations among Cell Phone Use Before Sleep Questionnaire (CPU), Pittsburgh Sleep Quality Index (PSQI), and Positive and Negative Affect Schedule (PANAS) scores, and identify independent predictors of sleep quality and affect using multivariable regression analysis.

MATERIALS AND METHODS

Study Design: This hospital-based, cross-sectional, observational study was conducted to evaluate the relationship between late-night mobile phone use, sleep quality, and affect among caregivers accompanying patients attending the Psychiatry Outpatient Department (OPD). The study was designed in accordance with the Strengthening the

Reporting of Observational Studies in Epidemiology (STROBE) guidelines for cross-sectional studies.

Study Population: The study population comprised adult caregivers accompanying patients diagnosed with psychiatric disorders who attended the Psychiatry Outpatient Department during the study period. Eligible participants included parents, spouses, siblings, or adult children who were actively involved in the patient's care and had been regular smartphone users for at least the preceding six months.

Sample Size: A total of 140 participants were included in the study. The sample size was estimated based on the expected correlation between late-night mobile phone use and sleep quality with a 95% confidence level and 80% statistical power. An additional allowance was made for potential non-response and incomplete questionnaires.

Study Duration: The study was conducted over a period of one year.

Study Place: The study was carried out in the Psychiatry Outpatient Department of a tertiary care teaching hospital among caregivers accompanying patients receiving psychiatric consultation and follow-up care.

Sampling Technique: Participants were recruited using a convenience sampling technique. Consecutive eligible caregivers attending the Psychiatry OPD during the study period were invited to participate until the required sample size was achieved.

Study Instruments: Data were collected using a structured socio-demographic and clinical proforma together with three validated assessment tools:

- Cell Phone Use Before Sleep Questionnaire (CPU): Used to assess the duration and pattern of late-night mobile phone use before bedtime.
- Pittsburgh Sleep Quality Index (PSQI): Used to evaluate sleep quality over the preceding one month. A global PSQI score >5 was considered indicative of poor sleep quality.
- Positive and Negative Affect Schedule (PANAS): Used to assess positive and negative affect, with higher scores indicating greater levels of the respective affective dimension.

Data Collection Procedure: After obtaining written informed consent, eligible participants completed the study questionnaires through face-to-face interviews conducted in a quiet and private area of the Psychiatry OPD. Socio-demographic and caregiving-related information, including age, gender, occupation, relationship with the patient, and duration of caregiving, was recorded. Participants subsequently completed the CPU, PSQI, and PANAS questionnaires under the supervision of the investigators. All completed questionnaires were reviewed immediately to ensure completeness and accuracy before data entry.

Inclusion Criteria

- Adult caregivers aged 18–60 years.
- Parents, spouses, siblings, or adult children accompanying patients with a confirmed psychiatric disorder diagnosed according to ICD-11 or DSM-5 criteria.
- Active smartphone users for at least the previous six months.
- Individuals able to understand the study questionnaire and willing to provide written informed consent.

Exclusion Criteria

- Individuals with a previously diagnosed primary sleep disorder (e.g., chronic insomnia, obstructive sleep apnea, narcolepsy) before the onset of the patient's psychiatric illness.
- Individuals with a diagnosed psychiatric disorder or major neurological illness that could independently influence sleep quality or affect.
- Current use of sedative-hypnotic medications, history of substance use disorder, or alcohol dependence.
- Night-shift workers or individuals with irregular sleep–wake schedules.
- Caregivers with severe acute medical illness, cognitive impairment, or inability to complete the study questionnaires.
- Participants with incomplete or missing responses in any of the study instruments (CPU, PSQI, or PANAS).

Statistical Analysis: Data were entered into Microsoft Excel 2021 and analysed using SPSS version 27.0 (IBM Corp., Armonk, NY, USA). Continuous variables were expressed as mean $\pm$ standard deviation (SD) or median (interquartile range), while categorical variables were presented as frequencies and percentages. The normality of continuous data was assessed using the Shapiro–Wilk test. Comparisons of continuous variables between two groups were performed using the Independent Student's t-test or Mann–Whitney U test, whereas one-way ANOVA or the Kruskal–Wallis test was used for comparisons involving more than two groups. Associations between categorical variables were analysed using the Chi-square test or Fisher's exact test, as appropriate. Pearson's or Spearman's correlation coefficients were used to assess the relationships among Cell Phone Use Before Sleep Questionnaire (CPU), Pittsburgh Sleep Quality Index (PSQI), and Positive and Negative Affect Schedule (PANAS) scores. Multiple linear regression analysis was performed to identify independent predictors of sleep quality and affect after adjusting for relevant socio-demographic and clinical variables. All statistical tests were two-tailed, and a p value <0.05 was considered statistically significant.

RESULTS

Table 1: Socio-demographic and Clinical Characteristics of the Study Participants

Variable	Category	n (%)
Age (years)	18–20	48 (34.3)
	21–23	62 (44.3)
	≥24	30 (21.4)
Gender	Male	58 (41.4)
	Female	82 (58.6)
Residence	Urban	78 (55.7)
	Rural	62 (44.3)
Marital Status	Single	132 (94.3)
	Married	8 (5.7)
Average Sleep Duration	<6 hours	44 (31.4)
	6–8 hours	78 (55.7)
	>8 hours	18 (12.9)
Regular Physical Activity	Yes	56 (40.0)
	No	84 (60.0)
History of Chronic Illness	Yes	18 (12.9)
	No	122 (87.1)

Table 2: Comparison of Positive Affect, Negative Affect, and Late-night Mobile Phone Use Scores According to Socio-demographic Characteristics

Variable	Category	Positive Affect	Negative Affect	Late-night Mobile Phone Use
		Mean ± SD	Mean ± SD	Mean ± SD
Gender	Male	33.84 ± 6.08	18.41 ± 5.32	36.89 ± 8.71
	Female	31.42 ± 6.37	20.84 ± 5.94	40.15 ± 8.92
	t value	2.61	2.29	2.12
	p value	0.01	0.023	0.036
Residence	Urban	33.25 ± 6.01	18.52 ± 5.41	37.36 ± 8.22
	Rural	31.28 ± 6.56	21.09 ± 5.88	40.98 ± 9.11
	t value	2.08	2.67	2.87
	p value	0.039	0.009	0.005
Sleep Duration	<6 hours	28.76 ± 5.82	24.02 ± 5.69	45.84 ± 8.46
	6–8 hours	33.81 ± 5.97	18.92 ± 5.08	37.04 ± 7.52
	>8 hours	35.89 ± 5.12	15.78 ± 4.21	31.76 ± 6.13
	F value	16.53	29.71	31.18
	p value	<0.001	<0.001	<0.001
Physical Activity	Yes	34.38 ± 5.88	17.86 ± 5.01	35.67 ± 8.01
	No	30.94 ± 6.19	21.03 ± 5.69	40.94 ± 8.84
	t value	3.54	3.82	3.95
	p value	0.001	<0.001	<0.001

Table 3: Correlation among Sleep Quality, Affect and Late-night Mobile Phone Use

Variables	Sleep Quality	Positive Affect	Negative Affect	Mobile Phone Use	P-value
Sleep Quality	1	−0.612	0.641	0.703	p < 0.001
Positive Affect	−0.612	1	−0.587	−0.551	
Negative Affect	0.641	−0.587	1	0.618	
Mobile Phone Use	0.703	−0.551	0.618	1	

Table 4: Multiple Linear Regression Analysis Predicting Sleep Quality Score

Predictor	β	Standard Error	Standardized β	t	p value
Late-night Mobile Phone Use	0.326	0.047	0.382	6.98	<0.001
Positive Affect	−0.214	0.061	−0.236	−3.52	0.001
Negative Affect	0.278	0.058	0.301	4.79	<0.001
Female Gender	0.624	0.283	0.128	2.21	0.029
Sleep Duration	−0.581	0.142	−0.229	−4.09	<0.001
Chronic Illness	0.684	0.311	0.119	2.2	0.03

A total of 140 participants were included in the present study. The largest proportion of participants belonged to the 21–23 years age group (62, 44.3%), followed by those aged 18–20 years (48, 34.3%), while 30 participants (21.4%) were aged 24 years or above. Female participants predominated, accounting for 82 (58.6%) of the study population, whereas 58 (41.4%) were male. Regarding place of residence, 78 participants (55.7%) resided in urban areas and 62

(44.3%) came from rural areas. Most participants were single (132, 94.3%), while only 8 (5.7%) were married.

With respect to lifestyle characteristics, the majority of participants reported sleeping 6–8 hours per night (78, 55.7%), whereas 44 participants (31.4%) slept for less than 6 hours, and only 18 (12.9%) reported sleeping for more than 8 hours. Regular physical activity was reported by 56 participants (40.0%),

while 84 (60.0%) did not engage in regular exercise. A history of chronic illness was present in 18 participants (12.9%), whereas the remaining 122 (87.1%) reported no chronic medical conditions. The comparison of psychological well-being and late-night mobile phone use according to socio-demographic characteristics revealed several statistically significant differences.

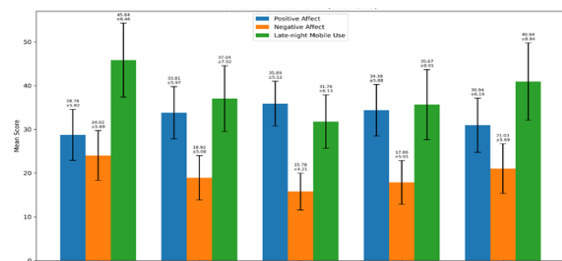


Figure 1: Psychological Scores Across Lifestyle Factors

Based on gender, male participants demonstrated significantly higher positive affect scores (33.84 ± 6.08) than females (31.42 ± 6.37) ($t = 2.61$, $p = 0.01$). Conversely, female participants had significantly higher negative affect scores (20.84 ± 5.94) compared with males (18.41 ± 5.32) ($t = 2.29$, $p = 0.023$). Females also reported significantly greater late-night mobile phone use (40.15 ± 8.92) than males (36.89 ± 8.71) ($t = 2.12$, $p = 0.036$).

When participants were compared according to residence, those living in urban areas exhibited significantly higher positive affect scores (33.25 ± 6.01) than participants residing in rural areas (31.28 ± 6.56) ($t = 2.08$, $p = 0.039$). In contrast, rural participants had significantly higher negative affect scores (21.09 ± 5.88) compared with urban participants (18.52 ± 5.41) ($t = 2.67$, $p = 0.009$). Similarly, late-night mobile phone use was significantly higher among rural participants (40.98 ± 9.11) than urban participants (37.36 ± 8.22) ($t = 2.87$, $p = 0.005$).

Sleep duration showed a highly significant association with all three outcome variables. Participants sleeping less than 6 hours demonstrated the lowest positive affect (28.76 ± 5.82), the highest negative affect (24.02 ± 5.69), and the highest late-night mobile phone use score (45.84 ± 8.46). Participants sleeping more than 8 hours had the highest positive affect (35.89 ± 5.12), the lowest negative affect (15.78 ± 4.21), and the lowest mobile phone use score (31.76 ± 6.13). These differences were statistically highly significant for positive affect ($F = 16.53$, $p < 0.001$), negative affect ($F = 29.71$, $p < 0.001$), and late-night mobile phone use ($F = 31.18$, $p < 0.001$).

Participants who engaged in regular physical activity demonstrated significantly better psychological outcomes than those who did not. Individuals performing regular physical activity had significantly higher positive affect scores (34.38 ± 5.88) than inactive participants (30.94 ± 6.19) ($t = 3.54$, $p = 0.001$). They also exhibited significantly lower

negative affect scores (17.86 ± 5.01 vs. 21.03 ± 5.69 , $t = 3.82$, $p < 0.001$) and lower late-night mobile phone use scores (35.67 ± 8.01 vs. 40.94 ± 8.84 , $t = 3.95$, $p < 0.001$).

Pearson's correlation analysis demonstrated significant relationships among sleep quality, affect, and late-night mobile phone use. Poor sleep quality showed a strong positive correlation with late-night mobile phone use ($r = 0.703$, $p < 0.001$), indicating that greater mobile phone use during late-night hours was associated with poorer sleep quality.

Sleep quality also exhibited a strong positive correlation with negative affect ($r = 0.641$, $p < 0.001$), suggesting that individuals with poorer sleep quality experienced higher levels of negative emotions. Conversely, sleep quality was negatively correlated with positive affect ($r = -0.612$, $p < 0.001$), indicating that poorer sleep quality was associated with lower levels of positive emotional well-being.

Furthermore, positive affect demonstrated significant negative correlations with both negative affect ($r = -0.587$) and late-night mobile phone use ($r = -0.551$), whereas negative affect was positively correlated with late-night mobile phone use ($r = 0.618$). Overall, these findings indicate that increased late-night mobile phone use is associated with poorer sleep quality, greater negative affect, and reduced positive affect.

Multiple linear regression analysis was performed to identify independent predictors of sleep quality after adjusting for potential confounding variables. The model demonstrated that late-night mobile phone use was the strongest independent predictor of poorer sleep quality ($\beta = 0.326$, Standardized $\beta = 0.382$, $t = 6.98$, $p < 0.001$). This finding indicates that increased late-night mobile phone use significantly contributes to worsening sleep quality.

Negative affect also emerged as a significant positive predictor of poor sleep quality ($\beta = 0.278$, Standardized $\beta = 0.301$, $t = 4.79$, $p < 0.001$), whereas positive affect showed a significant negative association ($\beta = -0.214$, Standardized $\beta = -0.236$, $t = -3.52$, $p = 0.001$), suggesting that higher positive affect independently predicts better sleep quality.

In addition, sleep duration remained a significant independent predictor ($\beta = -0.581$, Standardized $\beta = -0.229$, $t = -4.09$, $p < 0.001$), indicating that longer sleep duration was associated with improved sleep quality. Female gender was independently associated with poorer sleep quality ($\beta = 0.624$, Standardized $\beta = 0.128$, $t = 2.21$, $p = 0.029$). Similarly, participants with a history of chronic illness demonstrated significantly poorer sleep quality than those without chronic illness ($\beta = 0.684$, Standardized $\beta = 0.119$, $t = 2.20$, $p = 0.030$).

Overall, the regression analysis suggests that late-night mobile phone use, negative affect, female gender, shorter sleep duration, and the presence of chronic illness independently predict poorer sleep quality, whereas higher positive affect serves as a protective factor for better sleep quality.

DISCUSSION

The present study evaluated the relationship between sleep quality, emotional well-being, and late-night mobile phone use among caregivers of patients with psychiatric disorders. The socio-demographic profile showed that most caregivers were female, belonged to the young to middle-adult age group, and did not engage in regular physical activity. This pattern is consistent with previous caregiver studies reporting that women frequently assume the primary caregiving role because of traditional family responsibilities and therefore experience greater physical and psychological demands than male caregivers.^[11,12]

The majority of caregivers in the present study belonged to the 21–23 years age group (44.3%), followed by 18–20 years (34.3%), while caregivers aged 24 years or above constituted 21.4% of the study population. This finding indicates that caregiving responsibilities were predominantly undertaken by young adults, who may experience considerable physical, emotional, and social demands while caring for patients with psychiatric disorders. Younger caregivers often have to balance caregiving with education, employment, or other family responsibilities, which may increase psychological stress and adversely affect their overall well-being. In the present study, age was included as a socio-demographic characteristic; however, age-wise statistical comparisons with sleep quality, positive affect, negative affect, and late-night mobile phone use were not performed. Therefore, it cannot be concluded that age independently influenced the study outcomes. Further studies with larger sample sizes and age-stratified analyses are recommended to determine the impact of age on caregivers' sleep quality, emotional well-being, caregiver burden, coping strategies, and quality of life.

Female caregivers in the present study demonstrated significantly lower positive affect, higher negative affect, and greater late-night mobile phone use than male caregivers. These findings are comparable with those reported by Gupta et al., who observed that female caregivers of patients with psychiatric illness experienced greater caregiver burden and poorer quality of life than males because of prolonged caregiving responsibilities and emotional involvement.^[11] Similar observations have also been reported among caregivers of dementia patients, where female caregivers exhibited higher levels of depression, anxiety, and sleep disturbances than their male counterparts.^[12,13]

Residence also influenced psychological outcomes in the present study. Rural caregivers reported lower positive affect together with higher negative affect and greater late-night mobile phone use than urban caregivers. Similar findings have been described by studies suggesting that limited access to mental health services, reduced social support, and increased caregiving burden in rural settings contribute to

poorer psychological well-being among caregivers.^[12,14]

Sleep duration demonstrated a strong association with emotional health and mobile phone use. Caregivers sleeping for less than six hours showed the poorest psychological profile, including lower positive affect, higher negative affect, and greater late-night mobile phone use. These findings are consistent with Sameera et al., who reported that poor sleep quality among caregivers of patients with mental illness was significantly associated with impaired psychological well-being.^[15] Likewise, Ravyts and Dzierzewski demonstrated that sleep disturbance adversely affected caregivers' mental health and ultimately reduced their quality of life, particularly among those with greater caregiving demands.^[16]

Regular physical activity was associated with better emotional well-being in the present study. Caregivers who exercised regularly reported significantly higher positive affect and lower negative affect and late-night mobile phone use. These findings support previous evidence suggesting that physical activity serves as an effective coping strategy by reducing psychological stress, anxiety, and depressive symptoms while improving resilience and quality of life among caregivers.^[17,18]

Correlation analysis demonstrated that poor sleep quality was strongly associated with greater late-night mobile phone use and higher negative affect, whereas positive affect showed an inverse relationship with poor sleep quality. These observations agree with previous caregiver studies demonstrating that sleep disturbance contributes to anxiety, depression, emotional distress, and reduced quality of life among family caregivers of individuals with mental illness.^[15,16] Furthermore, increased psychological distress has consistently been associated with poorer caregiver functioning and lower life satisfaction.^[15,16]

The regression analysis identified late-night mobile phone use as the strongest independent predictor of poor sleep quality, followed by negative affect, shorter sleep duration, female gender, and chronic illness, whereas positive affect acted as a protective factor. These findings are consistent with previous reports indicating that psychological distress, prolonged caregiving responsibilities, sleep disturbances, and pre-existing health problems independently contribute to poorer health outcomes among caregivers.^[16,18,19] Collectively, these findings emphasize that interventions targeting sleep hygiene, emotional regulation, stress management, and healthy lifestyle practices may substantially improve caregivers' overall psychological well-being and quality of life.

CONCLUSION

The present study demonstrates that caregivers of patients with psychiatric disorders are vulnerable to

poor sleep quality, adverse emotional well-being, and excessive late-night mobile phone use. Female caregivers, those with shorter sleep duration, lack of regular physical activity, and a history of chronic illness were more likely to experience poorer psychological outcomes. Sleep quality was significantly associated with positive affect, negative affect, and late-night mobile phone use, while regression analysis identified late-night mobile phone use, negative affect, shorter sleep duration, female gender, and chronic illness as independent predictors of poor sleep quality. These findings highlight the multidimensional challenges faced by caregivers and emphasize the need for routine psychological assessment as part of comprehensive psychiatric care. Interventions focusing on sleep hygiene, emotional support, stress management, healthy lifestyle practices, and appropriate mobile phone use may improve caregivers' mental health and overall quality of life. Future longitudinal and multicenter studies with larger sample sizes are recommended to confirm these findings and evaluate the effectiveness of caregiver-centered psychosocial interventions.

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