The Relationship between Problematic Mobile Use and Sleep Quality among Nursing Students: The Mediating Role of Perceived Stress

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Abstract

Introduction: Excessive and problematic use of mobile phones could have several negative effects on different aspects of students’ lives. The current study aimed to explore the relationship between excessive mobile uses and sleep quality among nursing students considering the mediating role of perceived stress.

Methods: In this descriptive study with a correlational design, 138 nursing students (103 females, 35 males) were selected using the random sampling method. To collect the data, cell-phone over-use scale (COS), Pittsburgh sleep quality index (PSQI), and Cohen’s perceived stress scale were used. The data were analyzed using Pearson product moment correlation, Independent Samples t test, and hierarchical regression analysis by the SPSS 22 software.

Results: The mean scores of students’ mobile use, sleep quality, and perceived stress were 52.17 ± 14.70, 11.8 ± 2.69, and 22.60 ± 6.45, respectively. There was no statistically significant difference in the aforementioned variables among male and female nursing students. The results of hierarchical regression analysis showed that mobile use in the first model could predict students’ sleep quality (β = 0.38). By entering the perceived stress to the equation, β of mobile use decreased, which showed the incomplete mediating role of perceived stress.

Conclusions: Problematic mobile use has not only direct adverse health consequences but also indirect negative effects on students’ sleep quality through perceived stress. The findings yield significant insights for parents, education practitioners, health specialists, and policy makers in making interventions regarding the excessive, and problematic mobile use among nursing students.


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INTRODUCTION

Mobile phones were first meant to serve communication purposes; however, nowadays they are increasingly used in our daily lives to fulfill a wide range of functions such as listening to music, playing games, browsing the Internet, taking videos/photos, etc. This is due to the fact that they are easily accessible, provide their users with security, and have a key role in social communication [1], thus attracting the attention of different social groups including students [2]. In the context of Iran, a recent study by Mohammadbeigi [3] found 85% of the Iranians use this device, and 58% of teenagers connect to the Internet via their smart phones. Apart from the positive effects of mobile phones on productivity as well as convenience in academic and professional settings, they might cause Internet and mobile phone addiction if used excessively [4]. Recent research has indicated several negative consequences of excessive mobile use including poor sleep quality [5, 6] and decreased levels of academic performance [7], mental health [8, 9], and life satisfaction [7]. In addition, the EMF radiations of mobile phones might cause several serious health problems such as headache, sleep disturbance, short-term memory impairment, lack of concentration, dizziness, and high blood pressure [10, 11]. More specifically, mobile phone use after lights out has a relationship with sleep disturbances such as short sleep duration, subjective poor sleep quality, excessive daytime sleepiness, and insomnia symptoms [12]. Furthermore, exposure to mobile phone emissions at night could affect melatonin-onset time [13]. Insomnia is common across all developmental stages. In fact, recent research shows university students are very susceptible to sleep disturbances, frequently experiencing significant shifts in their sleep-wake cycle and becoming prone to serious health problems [14]. In addition, students perceiving accessibility via mobile phones as stressful reported the highest risk of mental health symptoms in the follow-up studies [5]. Also, since smartphones are more likely to be used for multitasking, they can possibly cause much stress for their users by limiting their relief [15]. Several studies
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have reported the prevalence of sleep problems and poor sleep quality among students all over the world [16, 17]. Moreover, poor sleep quality has a relationship with mal-adaptive behaviors [18, 19]. Medical students are a group who face high risks of sleep deprivation because of demanding clinical duties and academic expectations [20]. Several studies have shown that nursing students display high levels of stress [21, 22], which might affect their quality of sleep [4]. For example, Lund et al. found 68% of nursing students reported that stress negatively affected their sleep initiation [18]. In addition, multiple regression analyses showed that tension and stress predicted 24% of the variance in the Pittsburgh sleep quality index (PSQI) score, while exercise, alcohol and caffeine consumption, and sleep schedule consistency could not account for sleep quality [18]. Similarly, in another study on Chinese adolescents, perceived stress was found to be the most important risk factor for poor sleep quality [23] and can predispose individuals and increase their sleep difficulties [24].

Overall, high levels of perceived stress associate with poor sleep quality, anxiety, depressive symptoms, irritability, attention and concentration difficulties, poor academic performance, and eating disorder [25, 26]. Also, the perceived stress on the night before clinical experiences reduces students’ sleep quality and decreases their sleep duration [27]. Also, the results obtained by Benavente [28] showed that high levels of stress cause low sleep quality. Perceived stress might induce more sleep problems among students [29]. Moreover, nursing students’ low sleep quality can result in their fatigue, which can seriously affect their consciousness, concentration, temperament, efficiency, awareness, and argument [30]. It seems excessive mobile use can cause stress for students, and in turn, decrease their sleep quality. However, considering the utmost importance of sleep quality among nursing students for their profession, unfortunately not much is known about this issue in the context of Iran. In fact, research should address how excessive mobile use can lead to low sleep quality. In this vein, exploring mediatory factors can shed more light on this relationship. Therefore, the present study aimed to explore the relationship between excessive mobile use and sleep quality by considering the mediating role of perceived stress among Iranian nursing students.

METHODS

The present study was descriptive with a correlational design. The statistical population consisted of 566 nursing students in Kashan University of Medical Sciences in the 2015-2016 academic year. One hundred and fifty nursing students were randomly selected via stratified sampling (according to gender) based on the Cochran’s Sample Size Formula. After excluding 12 incomplete questionnaires (a return rate of 92%), 138 ones (103 for females, 35 for males) were analyzed. The data collection instruments included cell-phone over-use scale (COS), Pittsburgh sleep quality index (PSQI), and Cohen’s perceived stress scale (CPSS). The Cronbach’s alpha of 0.903 and test-retest reliability coefficient of 0.714 (P<0.005). As for scoring, scores above 75 and below 25 are considered as ‘excessive user’ and ‘rare user’, respectively. To determine the mediating role of stress in the relationship between excessive mobile use and sleep quality, hierarchical linear regression analysis was used to analyze the data using the SPSS software (version 22).

RESULTS

The mean ages of female and male students were 20.72 ± 2.01 and 21.08 ± 1.46 years, respectively. The mean values of mobile use were 51.15 ± 14.8 and 55.17 ± 14.20 among female and male students, respectively. Regarding the sleep quality, 11.38 ± 2.54 and 10.57 ± 3.03 were the mean values of sleep among male and female students, respectively. The results of Independent Samples t test indicated no significant difference in terms of the research variables among male and female students (excessive mobile use: t = 1.40, P = 0.16; sleep quality: t = -1.59, P = 0.12; perceived stress: t = 1.16, P = 0.24). Table 1 shows descriptive statistics and correlation coefficients for excessive mobile use, sleep quality, and perceived stress.
Table 1: Descriptive Indices and Matrix of Pearson’s Correlation Coefficients for Nursing Students

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Mobile use</th>
<th>Sleep Quality</th>
<th>Perceived stress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile use</td>
<td>52.17</td>
<td>14.7</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sleep Quality</td>
<td>11.18</td>
<td>2.69</td>
<td>0.38**</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Perceived stress</td>
<td>22.6</td>
<td>6.45</td>
<td>0.33**</td>
<td>0.35**</td>
<td>-</td>
</tr>
</tbody>
</table>

**P < 0.01

Table 2: Regression Coefficients of Mediating Role of Perceived Stress in Relationship between Mobile Use and Sleep Quality

<table>
<thead>
<tr>
<th>Predictable variable</th>
<th>B</th>
<th>SE</th>
<th>β</th>
<th>t</th>
<th>sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>7.52</td>
<td>0.78</td>
<td>-</td>
<td>9.57</td>
<td>0.00</td>
</tr>
<tr>
<td>Mobile use</td>
<td>0.07</td>
<td>0.014</td>
<td>0.38</td>
<td>4.83</td>
<td>0.00</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>5.94</td>
<td>0.917</td>
<td>-</td>
<td>6.48</td>
<td>0.00</td>
</tr>
<tr>
<td>Mobile use</td>
<td>0.55</td>
<td>0.015</td>
<td>0.30</td>
<td>3.67</td>
<td>0.00</td>
</tr>
<tr>
<td>Perceived stress</td>
<td>0.10</td>
<td>0.034</td>
<td>0.25</td>
<td>3.09</td>
<td>0.002</td>
</tr>
</tbody>
</table>

Table 3: Direct and Indirect Effects of the Variables

<table>
<thead>
<tr>
<th>Path</th>
<th>Regression standardized coefficients(β)</th>
<th>sig</th>
<th>Bootstrapping P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct effect of excessive mobile use on sleep quality</td>
<td>0.30</td>
<td>0.001</td>
<td>0.007</td>
</tr>
<tr>
<td>Direct effect of excessive mobile use on perceived stress</td>
<td>0.33</td>
<td>0.001</td>
<td>0.004</td>
</tr>
<tr>
<td>Direct effect of perceived stress on sleep quality</td>
<td>0.25</td>
<td>0.002</td>
<td>0.005</td>
</tr>
<tr>
<td>Indirect effect of excessive mobile use on sleep quality</td>
<td>0.08</td>
<td>0.001</td>
<td>0.003</td>
</tr>
<tr>
<td>Total effect of excessive mobile use on sleep quality</td>
<td>0.38</td>
<td>0.001</td>
<td>0.007</td>
</tr>
</tbody>
</table>

Figure 1: Regression Model of the Mediating Role of Perceived Stress

Table 1 shows the correlations among excessive mobile use, perceived stress, and sleep quality. As expected, excessive mobile use was positively associated with PSQS’s scores. It is noteworthy that higher scores in this perceived sleep quality scale (PSQS) are indicative of sleep disturbances and poorer sleep quality. There was a positive correlation between excessive mobile use and perceived stress ($r = 0.33$, $P < 0.01$) and negative correlation between perceived stress and sleep quality ($r = 0.35$, $P < 0.01$). Since we were interested in the potential mediating role of perceived stress on the relationship between excessive mobile use and sleep quality, and because initial correlational analyses provided basic evidence for the importance of excessive mobile use, subsequent hierarchical regression analyses were performed. In the first step, excessive mobile use was entered. Next, perceived stress was entered. Table 2 demonstrates the results of these analyses.

Regression coefficients ($β$) from the final as well as the penultimate step of the model are shown in Table 2. According to this table, a potential mediation effect is suggested based on which the effect by excessive mobile use is mediated through perceived stress. It is noteworthy that we followed recommendations by Baron and Kenny [38] to complete the statistical test for mediation. More specifically, by addition of the perceived stress to the equation in step 2, stress decreased the relationship between excessive mobile use ($β = 0.38$ to $β = 0.30$) and sleep quality. To assess whether these changes were statistically significant, the Sobel test was used. Findings from the Sobel Test indicated that perceived stress partially mediated the effect of excessive mobile use on sleep quality. Table 3 shows the direct and indirect effects of variables in the regression model.

As it can be seen from Table 3, excessive mobile use had not...
The findings of the present study showed that students’ excessive mobile use has a statistically significant relationship with their sleep quality and can predict it (β = .38), which is in line with Sahin [6], Thomée [4], Ahn and Kim [4], Mohammadbeigi [3]. In a study conducted by Jin-jian [39], it was found that 8.1% and 37.8% of the students suffered serious and mild mobile phone independence, respectively. This could be justified by the fact that students’ sleep quality has deteriorated due to their excessive mobile use. In fact, mobile use at night has a significant relationship with medical students’ sleep quality, and students who use their mobile phones more than 2 hours a day experienced sleep deprivation and daily somnolence [40]. Excessive mobile use at night can disturb sleep and wake cycle by affecting melatonin spatter and increase the risk of mental health problems such as depression, stress, anxiety, and social dysfunction [6, 41]. Mobile use more than 5 hours a day negatively influences sleep quality of the students [6]. The results of another study undertaken by Silvaet al. [42] revealed that decreased sleep quality and more daytime somnolence reduce alertness and cause higher levels of anxiety among female nursing students. Thomee et al. [5] found that, after a one-year follow-up, excessive mobile use has a relationship with sleep disturbances and mental health symptoms among men and with depression symptoms among women. With respect to stress, a statistically significant correlation was found between perceived stress and excessive mobile use, i.e., students who used mobile phones excessively developed more stress, which is in line with Be- ranuy [9], Thomée [41], and Samaha [43]. Reinecke et al. [44] found that failure in self-control and lack of resistance against tendency to use media leads to guilty, which could justify the relationship between excessive mobile use and increased stress. Also, the obtained results could be justified by considering the fact that smartphones are so accessible and prevalent nowadays because they provide access to not only a telephone but also the Internet simultaneously. However, excessive mobile usage can cause much stress for their users [45]. As Reinecke [46] found, communication load caused by social media messages and Internet multitasking has a direct relationship with perceived stress. This is mainly due to poor time management, social dysfunction, and some side effects such as exchanging messages late at night, losing social contact with people in real world, and serious emotional dependence on mobile [45]. In addition, stress could have negative effects on a person’s health status and health behaviors, e.g., sleep-wake cycle and sleep quantity and quality [47]. As Ahn and Kim [4] found, there is a significant correlation between nursing students’ smartphone use and their perceived stress, both of which can explain decreased sleep quality. Therefore, tension and stress are evidently two influential factors in predicting sleep quality. For example, in a study conducted by Lund et al. [18], most respondents considered stress, mainly academic and emotional, as a key factor negatively influencing their sleep initiation. Overall, mobile use after lights off causes much difficulty for students to sleep. On the other hand, it seems that there is a circular causality between sleep quality and perceived stress, and they mutually influence each other. Thus, in addition to the aforementioned research on the effect of stress on sleep quality, stress is also affected by sleep quality. For example, Myers et al. [48] found healthy sleep practices, as a protective factor, significantly reduce perceived stress among college students. Also, sleep hygiene has a direct relationship with daytime sleepiness and fatigue, and in turn with stress [49, 50]. Although mobile phones have several beneficial usages in our daily lives, they can negatively influence students’ psychological health, sleep, and academic performance [51]. As research indicates, mobile phone use after lights out, even for a moderate amount of time, is harmful in that it can cause long-term tiredness [52]. Due to attractiveness and various applications of mobile phones, many students neglect their negative aspects such as time waste, occupation of psychological and cognitive capacities, loss of efficient study time, mobile phone dependence, and anxiety while attending to academic affairs. In addition to direct negative influences, excessive mobile use has negative and indirect (via stress) influences on students’ sleep quality. Hence, students’ awareness about direct and indirect negative consequences of excessive mobile use should be raised by offering essential education to nursing students in order to prevent further problems. Moreover, it is essential to perform behavioral and cognitive interventions to change mobile use pattern and improve students’ sleep quality. Furthermore, effective measures could be taken; for example, various useful sports and entertainment programs are highly recommended to prevent mobile phone addiction among students. Since a considerable amount of mobile usage is devoted to cyber space, it is suggested that key factors in modern media such as the Internet and social networks in cyber space and their effects on students’ sleep quality and perceived stress be extensively studied. Suitable interventions could play a key role to improve the quality of mobile use, decrease the perceived stress and enhance sleep quality.

ACKNOWLEDGMENTS

We like to show our gratitude to students in Kashan University of Medical Sciences and Health Services for their corporation.

CONFLICTS OF INTEREST

There is no conflict of interest of financial disclosure with this study.

FUNDING

This study did not have any funds.

ETHICAL CONSIDERATION

This research was approved by ethics committee of the facul-
ty of Humanities, University of Kashan. All participants were informed of the purpose of the study, and their oral consent was obtained.

AUTHOR CONTRIBUTIONS
Sadoughi M: Supervisor, Statistical Analysis, manuscript preparation, Critical revision of the manuscript. Mohammad-Salehi Z: Study design, Data collection, Drafting of the manuscript.

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