Association of smartphone addiction with pain, sleep, anxiety, and depression in university students

Análise da dependência do uso de smartphone em comparação à dor, sono, ansiedade e depressão em universitários

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Abstract

Introduction: Smartphone use has become a popular social communication phenomenon worldwide. Its excessive use can compromise daily routines and habits, which is associated with sleep disorders, stress, anxiety and pain. Therefore, the university student stands out, as they has a lifestyle in which it is necessary to reconcile daily activities with curriculum activities, aggravating psychosocial factors. **Objective:** To investigate whether smartphone addiction influences sleep quality, anxiety, depression and pain in university students. **Methods:** We carried out an analytical cross-sectional study. For data collection, the following self-administered questionnaires were used: Smartphone Addiction Inventory (SPAI-BR), to assess smartphone dependence; Pittsburgh Sleep Quality Index (PSQI), to evaluate sleep quality; Hospital Anxiety and Depression Scale, to assess anxiety and depression (HADS), where it was subdivided into HADS-A for anxiety and HADS-D for depression; and Numeric Rating Scale (NRS) to determine physical pain intensity. The sample consisted of 301 university students studying physiotherapy and physical education at the State University of Northern Paraná (UENP). They were divided according to the score obtained in the SPAI-BR between the "regular" group (up to 6 points) and "predisposed" to smartphone dependence (7 or more points). **Results:** The comparisons were statistically significant in favor of the regular group: the predisposed group obtained a higher score for the questionnaires used with an average NRS of 2.37 points, average HADS-D of 9.05 points and average HADS-A of 6.01 points. Differences between groups were statistically significant: NRS, p = 0.018; HADS-A, p = 0.001; HADS-D p = 0.001; and PSQI, p = 0.001. **Conclusion:** The university students analyzed in this study classified as predisposed were more prone to being addicted to their smartphone, and they were more likely to have anxiety, with a worse quality of sleep and with a greater intensity of pain.

Keywords: Anxiety disorders. Depression. Pain. Smartphone.

Resumo

Introdaçãao: *O uso de smartphones se tornou um fenômeno social mundialmente popular de comunicação. Seu uso excessivo pode comprometer as rotinas e hábitos diários, que estão associados aos distúrbios do sono, estresse, ansiedade, algias; logo, destaca-se o universitário, que apresenta um estilo de vida em que é preciso conciliar as atividades diárias com as curriculares, agravando fatores psicossociais.* ***Objetivo:*** *Investigar se a dependência do uso de smartphone influencia a qualidade de sono e os níveis de ansiedade, depressão e dor em universitários.* ***Métodos:*** *Trata-se de um estudo transversal analítico. Para a coleta dos dados foram utilizados os questionários autoaplicáveis Inventário de Dependências do Smartphone (SPAI-BR), Escala de Pittsburgh (PSQI), Escala Hospitalar de Ansiedade e Depressão (HADS), sendo este subdividido em HADS-A (ansiedade) e HADS-D (depressão), e Escala Numérica da Dor (END). A amostra foi composta por 301 universitários da Universidade Estadual do Norte do Paraná, dos cursos de fisioterapia e educação física. Os estudantes foram divididos de acordo com o escore obtido no SPAI-BR entre grupo regular (até 6 pontos) e pré-disposto à dependência do uso de smartphone (7 ou mais pontos).* ***Resultados:*** *As comparações foram estatisticamente significativas a favor do grupo regular; sendo assim, o grupo pré-disposto obteve uma pontuação pior nos questionários utilizados, sendo a média END de 2,37 pontos, a média HADS-D de 9,05 e a média HADS-A de 6,01. Os valores de intensidade de dor entre os grupos foram de p = 0,018; HADS-A: p = 0,001; HADS-D: p = 0,001; PSQI: p= 0,001.* ***Conclusão:*** *Os universitários classificados como pré-dispostos apresentaram uma maior propensão à dependência do smartphone, além de maior chance de terem ansiedade com uma pior qualidade de sono e maior intensidade de dor.*

Palavras-chave: *Transtornos de ansiedade. Depressão. Dor. Smartphone.*

Introduction

Smartphones are considered a very popular form of communication worldwide. Its expanding use has become a social phenomenon mainly because it includes many features. In view of its popularity, questions about its excessive use are progressively increasing, which compromises users' daily routines, habits, behaviors and social interactions. It is undeniable that the constant use and examining the present contents are associated with sleep disorders, stress, anxiety, antisocial technological behavior, pain conditions and decreased academic performance.[1-3]

Accordingly, preoccupation with smartphones can become something negative, especially from the moment when dependence on use arises, a situation that can affect the quality of life of users. Thus, it is necessary to point out that there is a connection between this dependence and the individual's psychological well-being; that is, dependence on the use of these devices can predict psychological problems, as well as induce disorders related to physical health, such as pain in the wrist or neck, a situation that is becoming increasingly frequent in the academic environment, associated with both lifestyle habits and the activities carried out in this environment.[4]

With that, university students stand out, as they have a lifestyle which makes it necessary to reconcile daily activities with curricular activities and which often result in changes in postural biomechanics, which triggers painful symptoms and can be associated with psychosocial factors such as stress, monotony of activities, anxiety and depression, which significantly contributes to the occurrence of pain.[5]

This population is more prone to stressful situations because of the intense study load, which leads many students to develop psychiatric disorders during college, the most common being anxiety and depression disorders.[6] Along with this heavy study load and possible psychiatric disorders, there is also a high incidence of sleep-related problems, since the time that should be destined to body and mental restoration is often being substituted to fulfill commitments related to studies, resulting in irregular sleep patterns and often insufficient rest time.[7]

NIn this context, there is a need to investigate the quality of life generated by the overuse of the smartphone, in light of the observation of a society that is almost completely adept at its use. The existence of few current studies that refer to the university population in this scenario described above ends up generating a gap in the area of scientific knowledge. Thus, the present study aimed to investigate whether smartphone dependence influences sleep quality and levels of anxiety, depression and pain in university students.

Methods

An analytical cross-sectional study, approved by the Ethics Committee for Research with Human Beings of the State University of Northern Paraná (UENP), under Approval No. 4422354, was conducted respecting recommended ethical standards. The sample consisted of 301 university students at UENP, Campus de Jacarezinho, Paraná, Brazil, who were in undergraduate courses in physiotherapy (bachelor's degree) and physical education (associate's and bachelor's degree).

The eligibility criteria were: full-time student at UENP, in the physiotherapy or physical education courses; age between 18 and 30 years; and cognitive capacity to answer the questionnaires. Excluded from the study were those: who had neurological and/or cognitive alterations; who used medication for anxiety and/or depression; who were undergoing psychological follow-up; and who had a previously diagnosed sleep disorder. The recruited participants signed an informed consent form and agreed to participate voluntarily and without any charge.

Instruments

Data collection took place through self-administered questionnaires, distributed to a group of people at the same time, so that there was no selection bias that could harm the research results. Initially, the volunteers' identification form was filled out, used to characterize the sample, and the sequence of questionnaires then began.

The assessment of smartphone dependency was carried out based on the Smartphone Addiction Inventory (SPAI-BR), consisting of 26 questions, which could be answered with "yes" or "no", with "yes" corresponding to a point and "no", to zero. The predisposition to smartphone dependence is detected when the individual marks seven times or more "yes" in the questions.[8] The score of this questionnaire was then used to divide the sample into a regular group (individuals who obtained 6 points (pts) on the SPAI-BR) and predisposed group (individuals who scored ≥7 pts).

The Numeric Rating Scale (NRS) was used to assess the level of pain felt, consisting of a ruler divided into eleven equal parts, numbered from zero to ten, in which the participant marked the score according to their physical pain at the time of the procedure. application through numerical classification, with zero being the least pain and ten, maximum pain.[9]

Next, the Pittsburgh Sleep Quality Index (PSQI) was used to assess sleep quality, which includes ten questions referring to sleep habits during the previous month, four open questions and six objective ones. The PSQI is analyzed through seven components, where each has a score from 0-3 pts, and when the scores are added up, a total score of zero to 21 pts is obtained. It is considered that the higher the total score, the lower the quality of sleep. The first component assesses the subjective quality of sleep and refers to question 6 of the PSQI, with a score from 0-3 pts. The second component determines sleep latency and is composed of the answers to questions 2 and 5, and to calculate the score, the sum of the answers to both questions is necessary, which can vary 0-3 pts. The third component assesses the duration of sleep, taking into account question 4, referring to the number of hours slept per night, and the greater the number of hours slept, the lower the score is: 7 h of sleep = 0 pts; 6-7 h = 1 pt; 5-6 h = 2 pts; and <5 h = 3 pts.

In the fourth component, it is possible to determine sleep efficiency, as the number of hours slept divided by the time the individual spends in bed is analyzed, multiplied by 100 for the result in percentage, being: >85% = 0 pts; 75-84% = 1 pt; 74% = 2 pts; <65% = 3 pts. The fifth component analyzes the answers to questions 5b to 5k (ten items evaluated), referring to sleep disorders, each item being scored 0-3 and the final score being the sum of the scores of the ten items: a sum of 0 indicates zero score; 1-9, score of 1; 10-18, score of 2; and19-27, score of 3. The sixth component analyzes question 7, which refers to the use of sleeping pills in the last month, with a score of 0-3 pts. Finally, the seventh component analyzes questions 8 and 9, which correspond to drowsiness and enthusiasm, with the final score being the sum of the two questions.

The scores of the seven components are summed to give a global PSQI score, which varies between 0 and 21, with a score of 0-4 considered good, 5-10 considered bad, and >10 indicating the presence of a sleep disorder.[10]

Finally, the Hospital Anxiety and Depression Scale (HADS) was used to assess anxiety and depression. The scale has 14 items, of which seven are aimed at assessing anxiety (HADS-A) and seven for depression (HADS-D). Each of the items can be scored 0-3, composing a maximum score of 21 pts for each factor. It is recommended for both subscales that values of 0-8 indicate the absence of depression/anxiety and values ≥9 indicate the presence of anxiety/depression.[11]

Statistical analysis was performed using the IBM SPSS® Statistics software, version 22. After analyzing the normality of the data, the Student t-test was used for independent samples, presenting the data with means and standard deviations; $p \leq 0.05$ was considered significant.

Results

A total of 301 volunteers participated in the study, 144 males and 157 females. The sample analyzed belonged to two undergraduate courses with different curriculum loads: the physiotherapy course was available full-time, with 105 students, and courses for the associate's and bachelor's degrees in physical education, were in the evening and had 196 students.

The sample was divided into regular and predisposed groups, classification performed according to the score obtained in the SPAI-BR: the regular group had students who obtained a score of <7 pts, and the predisposed group was composed of students with a score of ≥7 pts, taking into account smartphone dependence. The description of the sample groups is present in Table 1.

Table 1 - Description of the sample group by mean and standard deviation

	Groups	
	Regular	Predisposed
Amostra (n)	105	196
Sex (%)		
Female	47.61	54.59
Male	52.39	45.41
Idade (anos)	21.68 ± 2.92	20.96 ± 2.71
Course (%)		
Physiotherapy	25.71	39.79
Physical education (bachelor's)	29.53	22.96
Physical education (associate's)	44.76	37.25

Table 2 presents the mean and standard deviation obtained by the scores of the NRA, HADS-A and HADS-D scales. The results were compared between the regular and predisposed groups, with statistical differences pointing in favor of the regular group, with values close to the cutoff point considered normal. As the cutoff point used to classify individuals with anxiety or depression is ≥9, it is possible to observe that individuals predisposed to smartphone addiction are students with anxiety (mean of 9.05 ± 4.21), but who are not classified as depressed students (mean of 6.01 ± 3/30).

Table 3 displays PSQI scores, which assessed sleep quality. It presents a statistically significant total ($p = 0.001$), in which the scale components were divided for a better understanding of which factors really had the capacity to influence the quality of sleep of university students. It is observed that component 2, which evaluated sleep latency and proved to be significant ($p = 0.014$), suggests that predisposed individuals take longer to fall asleep after lying in bed.

Component 5, which is also considerably significant ($p = 0.000$), suggests that the predisposed group is more likely to have a sleep disorder, while component 7, which is also significant ($p = 0.001$), allows us to infer that predisposed individuals have less enthusiasm to perform activities of daily living.

Table 2 - Comparison between regular and predisposed groups in mean and standard deviation of pain intensity, anxiety and depression

	Regular	Pré-disposto	p-value*
NRS (points)	1.72 ± 2.22	2.37 ± 2.24	0.018
HADS-A (points)	6.41 ± 3.46	9.05 ± 4.21	0.001
HADS-D (points)	4.33 ± 3.05	6.01 ± 3.30	0.001

Note: NRS = Numeric Rating Scale; HADS-A = Hospital Anxiety and Depression Scale - Anxiety; HADS-D = Hospital Anxiety and Depression Scale - Depression. *p < 0.05. Student t-test.

Table 3 - Comparison between regular and predisposed groups in mean and standard deviation of the components of the Pittsburgh Sleep Quality Index (PSQI)

Component (points)	Regular	Predisposed	p-value
Subjective sleep quality	1.14 ± 0.76	1.25 ± 0.72	0.208
Sleep latency	0.94 ± 0.96	1.23 ± 0.96	0.014*
Sleep duration	0.88 ± 0.90	0.83 ± 0.96	0.603
Sleep efficacy	0.00 ± 0.00	0.03 ± 0.23	0.120
Sleep disorders	1.20 ± 0.54	1.49 ± 0.58	0.000*
Use of sleep medications	0.26 ± 0.75	0.36 ± 0.82	0.276
Drowsiness and enthusiasm	1.30 ± 0.87	1.66 ± 0.92	0.001*
Total PSQI	5.66 ± 2.42	7.04 ± 2.96	0.001*

Note: *p < 0.05. Student t-test.

Discussion

In the search for data that would allow a consistent analysis of the influence of smartphone addiction on sleep quality, level of pain, symptoms of depression and anxiety, we found that university students predisposed to smartphone dependence showed a significant degree of anxiety and less enthusiasm for carrying out their activities of daily living, in addition to staying awake longer in bed than actually sleeping and having a greater chance of developing sleep-related disorders.

Corroborating findings that showed that using a smartphone before going to sleep considerably influences the quality of sleep and promotes daytime sleepiness,[12,13] this disorder can either be the cause, symptom or comorbidity of stress or psychiatric disorder, or stress itself can worsen the quality of sleep.[14] The greater the impairment of sleep, the higher the levels of anxiety and depression are, and the rates of depression and anxiety are higher in cases of moderate/high internet addiction.[15] In addition, sleep disorders can affect learning and the quality of activities.[16]

A possible dependence on the smartphone in which the first thought when waking up every morning is to use the smartphone,[13] is in line with the university students evaluated in the present study, in which 65.12% obtained a score on the SPAI-BR indicating possible smartphone addiction, and this same group had poor sleep quality according to the PSQI. Accordingly, it has also been observed that the earlier an individual begins using a smartphone, the more likely they will show dependence or excessive use.[17]

Another outcome analyzed in this study showed that individuals predisposed to smartphone addiction have greater pain intensity. Among the main causes are bad posture, weight gain, muscle imbalances, and maintenance of bad postures, in addition to psychosocial factors, such as intense occupational stress, monotony of activities, anxiety and depression, corroborating evidence that indicates a high prevalence. of pain, as well as its chronic nature, in university students whose main complaints of pain were in the lower back and arms.[18] Thus, professionals involved in prevention and health promotion will need more information and access to more publications for a greater understanding of the influences that sleep disturbance, lack of energy, learning

deficit and pain, associated with smartphone addiction, can have on the health of these students. Investigations become relevant for future contributions in terms of prevention and health promotion for university students in health area courses, bearing in mind that they will be future health professionals.

The greatest limitation of the study was not being able to distinguish whether individuals use the smartphone because they have a sleep disorder or whether the sleep disorder causes them to use the smartphone more. Therefore, there is a need for a new study to evaluate this condition. This study was also unable to diagnose individuals as "smartphone addicts", as this would require a proper psychological assessment.[7]

It is important to state that the undergraduate courses analyzed have differences in their curricular structure, where the physiotherapy course is full-time and the physical education course at night, which may be a bias for this study as well as a call for new data analysis. The undergraduate course in physical education offers students the opportunity to engage in physical exercise, possible in their curriculum, a fact that can also change the data analysis, considering that exercising reduces pain levels considerably.[19]

Conclusion

The university students included in this study were more likely to be smartphone-dependent (predisposed group) and tended to be anxious, have worse sleep quality, and have more pain. The study demonstrated that smartphone addiction influences the quality of sleep and the levels of anxiety, depression and pain in the university students studied. Thus, more studies are needed to further investigate the future repercussions of this influence.

Authors' contribution

VCGP and FJJ prepared and approved the study and project. VCGP, ACN, GAO, ACFTDA, and TTDA collected the data and, together with FJJ, analyzed and interpreted it. TTDA was responsible for the statistical analysis, while VCGP and FJJ prepared and revised the manuscript. All authors approved the final version.

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