Smartphone addiction in COVID-19 pandemic times: a longitudinal study with Brazilian dental students

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ABSTRACT

This study aimed to evaluate smartphone addiction, sleep quality, quality of life and depression among dental students before and during the first wave COVID-19 pandemic lockdown and explore how smartphone addiction influences the other variables. 57 dental students answered the smartphone addiction inventory, Pittsburg sleep quality index, WHOQOL-bref and research diagnosis criteria for temporomandibular disorders axis II questionnaires before and during lockdown. Statistical analysis was conducted using Wilcoxon test, Mann-Whitney U test, Spearman tests and linear regression models considering the smartphone addiction inventory total score as the independent variable. The high mean scores on smartphone addiction on both times are remarkable. The smartphone addiction prevalence was also high on both times (68.66% and 71.92% respectively). Overall sleep quality improved. However, there was no significant change on overall smartphone addiction, quality of life and depression grade during lockdown. Tolerance using smartphones increased during lockdown, especially for women. Smartphone addiction showed negative correlation to quality of life and positive correlation to depression, subjective sleep quality and sleep medication use. Smartphone addiction was a predictor to total WHOQOL-bref score, all WHOQOL-bref domains, sleep medication use and to depression on both times, before and during lockdown. Smartphone addiction was directly affecting quality of life. Despite the growing smartphone use among university students due to the pandemic restrictions, this study showed that the overall smartphone addiction, quality of life and depression grade were not influenced by the lockdown restrictions. However, it was observed an improvement on sleep quality during this period among dental students.

Descriptors: Addictive Behavior. Smartphone. Quarantine. Sleep. Quality of Life.

1 INTRODUCTION

COVID-19 has been a big challenge all around the world. Since World Health Organization (WHO) declared it a pandemic on

March 11, 2020[1], many countries have adopted social distancing and/or lockdown, a drastic but effective measure to contain the virus fast spread. In Brazil, each state decided which health measure would be adopted. Where this research was conducted, it was declared strict a lockdown from March 17, 2020 until May 30, 2020. From June/2020 on, the isolation recommendations have been progressively alleviated[2]. Despite the WHO incentive lockdown, they demonstrated concerns about their economic and mental health burden[3]. On this regard, some researches have been published and most of them evaluated anxiety, depression, sleep quality and quality of life[4-10].

Stuck at home, most of the work, academic and leisure activities turned to be internet based as well as interpersonal connection. Concerns about longer screen time and electronic addiction, especially smartphone addiction (SPA), also come up. Smartphone addiction is an overuse of the device associated to functional problems such as social, work or academic impairment with symptoms resembling those in substance addiction (tolerance, withdrawal, compulsion)[11]. A recent paper observed correlation between problematic smartphone use and depression during lockdown in China[12]. A survey showed that Brazil had almost 134 million internet users in 2019 (79% of the population). Almost 60% of them access the internet exclusively by smartphones[13] which makes the research about SPA even more relevant in this country. Several studies had investigated the associations of SPA to depression[14-19], poor sleep quality (SQ)[17,19-24] and low quality of life (QoL)[25,26].

Students used to be the most studied population regarding screen time and electronic addiction. A study compared students from different areas regarding their SPA and found that health students rated greater scores. There was no statistical difference though[14].

A systematic review showed SQ and depression as significant negative predictors to medical students' quality of life[26]. University student's QoL seemed not to be consistently affected by home isolation. A Chinese study on which 75% of the sample were college students found that 65,3% of the participants were satisfied with their QoL[4]. Another Brazilian research found that 55,2 % of the dental students evaluated were satisfied with their QoL during lockdown[27].

Researches have shown that SQ worsen during lockdown[5,6,8,10] while others found that most part of the volunteers reported good or very good SQ[4]. Although previous studies had related an association of poor SQ to SPA[17,19-23,28] to the best of our knowledge, there is still no published studies analysing this association during lockdown.

The aim of this study was to evaluate the addiction to smartphone, sleep quality, quality of life and depression among dental students before and during lockdown and explore how smartphone addiction influences the other variables.

2 METHODS

Study protocol was approved by the ethical committee of the University. Written and digital consent was obtained from all volunteers.

This longitudinal study was conducted in two moments. 61 dental students coursing the second semester answered self-administered questionnaires in May and August 2019 during their class time (time 1). Throughout 2020 April (time 2), during the lockdown due to COVID-19 controlling measures, the same sample was invited to answer an online version of the same questionnaires. The eligibility criteria for time 1 was: to be a student regularly registered to the dentistry course, to use regularly the smartphone

and the exclusion criteria was: pregnancy. For time 2, the eligibility criteria were the participation on time 1 and the exclusion criteria was: pregnancy. 4 individuals were excluded since they didn't agree in participating on the second moment. The final sample was composed of 57 students. Despite the small sample size, post-hoc power analysis demonstrated a satisfactory level ($\alpha = 0.05$, $\beta = 0.97$).

The data collected comprises demographic information (age, gender, smartphone use/week) and data on SPA, SQ, QoL and depression grade through validated instruments to Brazilian Portuguese detailed below. Gender comparison was conducted for all variables.

A valid and reliable tool to evaluate SPA in Brazilian university students was used: the Smartphone Addiction Inventory (SPAI-BR). It comprises 26 dichotomic (yes or no) items dealing with four addiction characteristics: compulsive behaviour, functional impairment, withdrawal syndrome and tolerance syndrome. Each item is rated on 0= no and 1=yes. The final score ranges from 0 to 26, scores rated above 7 indicate smartphone addiction. Therefore, the desirable mean score is 0.27. The greater the score, the higher the severity of the addiction[11].

The Brazilian validated version of the abbreviated World Health Organization quality of life (WHOQOL-bref) was chosen to evaluate the QoL. It is composed of 26 items on a 5-point Likert scale. The first 2 questions determine the self-rated QoL and the other 24 comprise the 4 domains of the original WHOQOL: (D1) physical domain, (D2) psychological domain, (D3) social relationships domain and (D4) environmental domain. Total scores range from 23 to 130. Higher scores indicate better quality of life[29]. Considering previous studies conducted with university samples in Brazil[27], for the propose of this study scores above 70 were classified as satisfactory QoL.

SQ was assessed using the Pittsburg Sleep Quality Index (PSQI-BR) an already validated and largely used instrument on Brazilian population. It consists of 19 self-rated questions categorized into 7 components: (C1) subjective sleep quality, (C2) sleep latency, (C3) sleep duration, (C4) habitual sleep efficiency, (C5) sleep disturbances, (C6) sleep medication use and (C7) daytime disfunction. Each component score ranges from 0 to 3 and the global score ranges from 0 to 21, higher scores indicate worse SQ. A global score greater than 5 indicates moderate difficulties in more than 3 components or major difficulties in at least 2 components and was classified as sleep disorder presence for the purpose of this study[30].

The depression grade was assessed by the validated Portuguese version of the Research diagnosis Criteria for Temporomandibular Disorders axis II (RDC/TMD axis II) which comprises a likert depression scale derived from the Symptom Checklist 90-R. The depression grade score is calculated summing up items b, e, f, g, h, k, l, m, n, q, v, y, z, aa, bb, cc, dd, ee, and ff from question 20 of the RDC/TMD axis II (each item ranges from 0 to 4) and dividing by the number of answered items. Scores below 0.535 are considered normal, between 0.535 and 1.105 indicate moderate depression and above 1.105 indicate severe depression[31,32].

We planned to use the whole RDC/TMD tool to investigate the prevalence of temporomandibular disorder on this sample but RDC/TMD axis I requires a clinal examination which was impossible during lockdown. Therefore, this data was excluded of this study.

Descriptive statistics were made for both times. To compare variables, we first conducted a normality test. Considering all variables were abnormal, we used Wilcoxon test to compare the scores. The Mann-Whitney U test was used to compare the scores according to gender in both

times. Spearman tests were conducted to correlate the variables and linear regression models were applied considering the SPAI total score as the independent variable and the others (PSQI total score and components, WHOQOL-bref total score and domains and depression grade score) as dependent variables. Data were analysed using Statistical Package for Social Sciences (SPSS) version 20.0. P<0.05 were considered significant.

3 RESULTS

The final sample was composed of 57 volunteers, 63.20% female. The mean age was 20.16±2.3 years. All of them declared regular smartphone use for 7 days/week.

Table 1 depicts the total score and subscores of the variables analysed in mean values and confidence intervals according to Wilcoxon test comparing times, before and during lockdown. Considering the total SPAI-BR score, there was no statistic significant increase in SPA during lockdown (p=0.05). The SPA prevalence increased from 68.66% on time 1 to 71.92% on time 2. Furthermore, the mean score on time 1 (0.41) and on time 2 (0.45) was higher than the desirable (0.27). Within the addiction components there was an increase in tolerance (p=0.02).

The self-rated QoL improved (p=0.04). Although the WHOQOL-bref social relationship domain decreased during lockdown (p=0.01). Overall SQ improved during lockdown as shown on the total PSQI score (p=0.01), daytime disfunction decreased (p<0.01) and sleep duration improved (p<0.01). The prevalence of poor SQ on time 1 was 71.9% and decreased to 52.6% on time 2.

Table 1. Variables distribution and comparison on time 1 and time 2

Variables	Time 1 Mean (CI)	Time 2 Mean (CI)	*P-value*
SPAI-BR			
Compulsive behavior	0.40 (0.16 - 0.65)	0.42 (0.14 - 0.71)	0.440
Functional impairment	0.33 (0.07 - 0.58)	0.38 (0.09 - 0.66)	0.110
Withdrawal	0.47 (0.15 - 0.79)	0.47 (0.12 - 0.82)	0.940
Tolerance	0.53 (0.23 - 0.83)	0.69 (0.33 - 1.05)	0.002
SPAI score	0.41 (0.20 - 0.63)	0.45 (0.19 - 0.7)	0.050
WHOQOL-bref			
Physical	13.87 (11.6 - 16.13)	14.52 (12.04 - 17)	0.081
Psychological	13.41 (1.97 - 15.85)	13.02 (1.54 - 15.5)	0.319
Social relationships	14.84 (12.22 - 17.47)	14.06 (11.36 - 16.76)	0.016
Enviromental	13.41 (11.2 - 15.62)	13.82 (11.58 - 16.05)	0.058
Self-rated quality of life	13.93 (1.98 - 16.88)	14.67 (11.76 - 17.58)	0.047
WHOQOL score	13.74 (11.93 - 15.54)	13.91 (12.11 - 15.72)	0.265
PSQI			
Subjective sleep quality	1.72 (0.82 - 2.62)	1.42 (0.34 - 2.51)	0.067
Latency	1.29 (0.38 - 2.19)	1.35 (0.42 - 2.29)	0.599
Duration	0.96 (0.03 - 1.9)	0.18 (-0.4 - 0.75)	**0.000**
Eficiency	0.13 (-0.34 - 0.59)	0.05 (-0.17 - 0.28)	0.260
Disturbances	1.18 (0.6 - 1.75)	1.26 (0.74 - 1.78)	0.336
Medication use	1.3 (0.65 - 1.96)	1.19 (0.47 - 1.91)	0.175
Daytime dysfunction	1.07 (0.25 - 1.89)	0.44 (-0.19 - 1.07)	**0.000**
PSQI score	7.51 (4.36 - 1.65)	5.93 (3.33 - 8.53)	**0.001**
RDC-TMD Axis II			
Depression grade	1.08 (0.37 - 1.78)	1.04 (.39 - 1.68)	0.520

On time 1, the depression prevalence was 70.40%, while on time 2 it was 52.60%. There was no statistic significant difference in depression grade before and after lockdown considering the total sample scores (p=0.52).

Considering just the female sample on the comparison between times (table 2) there were statistical differences on the following variables: increased tolerance using smartphone (p=0.01) and more unsatisfaction regarding the social relationship domain of WHOQOL-bref (p=0.01). The improvement in sleep quality during lockdown was demonstrated by lower scores for total PSQI (p=0.02), sleep duration (p<0.01) and daytime dysfunction (p<0.01). Considering only the male sample (table 2) there was an improvement on the same sleep quality scores: Total PSQI (p=0.05), sleep duration (p<0.01) and daytime dysfunction (p<0.01) but there was no difference on SPA, QoL nor depression.

There were statistical differences between gender on both times regarding SQ (table 2). Before lockdown, the only difference was the less sleep duration (p=0.04) among women, however this difference disappeared during lockdown. Women showed lower scores than men during lockdown for WHOQOL-bref physical domain (p=0.04), which means that women were more unsatisfied regarding this domain. There was no difference on depression grade between sexes before lockdown. Nevertheless, women rated worse depression grade (p=0.03) during lockdown.

According to Spearman correlation matrixes results before lockdown, SPA showed statistical significant negative correlation to physical (ρ = -0.33, p<0.05), social relationship (ρ = -0.28, p<0.05), environmental (ρ = -0.32, p<0.05), self-rated quality of life (ρ = -0.47; p <0.01), total WHOQOL-bref score (ρ = -0.37; p<0.05) and positive correlation to sleep latency(ρ = 0.29; p < 0.05) subjective sleep quality (ρ = 0.30; p < 0.05), sleep medication use (ρ =0.31; p<0.05), total PSQI score (ρ = 0.33; p<0 .01) and depression grade (ρ = 0.34; p< 0.05). During lockdown, SPA showed statistical significant negative correlation to all WHOQOL-bref domains: physical (ρ = -0.48; p<0.01), psychological (ρ = -0.33; p=0.01), social relationships (ρ = -0.32; p<0.05), environmental (ρ = -0.32; p<0.05), self-rated quality of life (ρ = -0.41; p<0.01), total WHOQOL-bref score (ρ = -0.51; p<0.01) and positive correlation to subjective sleep quality (ρ = 0.28; p<0.05), sleep medication use (ρ =0.35; p<0.01), sleep disturbs (ρ =0.32; p<0.05) and depression grade (ρ = 0.34; p<0.05). Unlike time 1, total PSQI score didn´t show statistical correlation (ρ = 0.22; p>0.05) to smartphone addiction on time 2.

According to linear regression analysis results, SPA showed predictive power to all WHOQOL-bref domains on both times. Although during lockdown the variability proportion explained by the SPAI total score was greater for physical, psychological, social relationships domains and total WHOQOL-bref scores (table 3).

Considering sleep quality parameters before lockdown, SPA was a statistic significant predictive factor to subjective sleep quality [F(1.54)= 6.31; p=0.01; R^2=0 .10], sleep latency [F(1.54)= 4.56; p=0.037; R^2=0.07], sleep medication use [F(1.54)= 4.76; p=0.034; R^2=0.08] and to total PSQI score [F(1.54)= 6.95; p=0.01; R^2=0.11]. During lockdown the SPA was a statistic significant predictor to sleep disturbances [F(1.54)= 4.32; p<0.05; R^2=0.07] and sleep medication use [F(1.54)=4,37; p<0.05; R^2=0.07], however, the predictive power is lower than the observed before lockdown. Smartphone addiction was a statistic significant predictor to depression grade both before [F (1.54) =9.04; p<0.01; R^2 = 0.14] and during lockdown [F (1.54) = 8.85; p<0.01; R^2 =0.14].

Table 2. Variable comparison according to time and gender

Factors	Male		Female		Gender comparison	
	Time 1 Mean (CI)	Time 2 Mean (CI)	Time 1 Mean (CI)	Time 2 Mean (CI)	Time 1 P-value	Time 2 P-value
SPAI-BR						
Compulsive behavior	0.40 (0.12 - 0.67)	0.42 (0.12 - 0.72)	0.40 (0.18 - 0.63)	0.43 (0.15 - 0.71)	0.814	0.751
Functional impairment	0.35 (0.07 - 0.63)	0.41 (0.15 - 0.67)	0.32 (0.07 - 0.56)	0.35 (0.06 - 0.65)	0.682	0.384
Withdrawal	0.48 (0.17 - 0.80)	0.48 (0.13 - 0.82)	0.46 (0.14 - 0.79)	0.46 (0.10 - 0.82)	0.784	0.887
Tolerance	0.57 (0.27 - 0.87)	0.63 (0.24 - 1.03)	0.51 (0.21 - 0.81)	0.72 (0.39 - 1.06)*	0.498	0.419
SPAI score	0.42 (0.21 - 0.64)	0.45 (0.20 - 0.71)	0.41 (0.19 - 0.63)	0.44 (0.18 - 0.70)	0.852	0.852
WHOQOL-bref						
Physical	14.48 (12.24 - 16.72)	15.37 (13.12 - 17.63)	13.53 (11.29 - 15.77)	14.02 (11.52 - 16.51)	0.109	**0.043**
Psychological	13.62 (1.90 - 16.34)	13.81 (12.24 - 15.38)	13.29 (11.00 - 15.58)	12.56 (9.75 - 15.36)	0.360	0.054
Social relationship	14.51 (11.50 - 17.52)	13.84 (1.88 - 16.81)	15.04 (12.65 - 17.43)	14.19 (11.61 - 16.76)*	0.473	0.581
Enviromental	13.27 (11.00 - 15.54)	13.62 (11.84 - 15.39)	13.50 (11.30 - 15.70)	13.93 (11.45 - 16.41)	0.696	0.672
Sef-rated QoL	14.19 (11.75 - 16.63)	14.76 (11.63 - 17.89)	13.78 (1.55 - 17.01)	14.61 (11.79 - 17.43)	0.945	0.764
WHOQOL score	13.87 (11.89 - 15.86)	14.25 (12.90 - 15.60)	13.66 (11.95 - 15.37)	13.72 (11.70 - 15.73)	0.417	0.417
PSQI						
Subjective sleep quality	1.62 (0.6 - 2.64)	1.19 (0.21 - 2.17)	1.78 (0.95 - 2.61)	1.56 (0.42 - 2.69)	0.477	0.267
Latence	1.35 (0.47 - 2.23)	1.29 (0.33 - 2.24)	1.25 (0.31 - 2.19)	1.39 (0.45 - 2.32)	0.589	0.643
Duration	1.3 (0.32 - 2.28)	0.10 (-0.21 - 0.40)*	0.78 (-0.09 - 1.64)	0.22 (-0.46 - 0.90)*	**0.043**	0.780
Eficiency	0.20 (-0.42 - 0.82)	0.05 (-0.17 - 0.27)	0.08 (-0.29 - 0.45)	0.06 (-0.18 - 0.29)	0.515	0.898
Disturbances	1.10 (0.47 - 1.72)	1.24 (0.70 - 1.78)	1.22 (0.68 - 1.76)	1.28 (0.76 - 1.79)	0.455	0.949
Sleep medication use	1.35 (0.68 - 2.02)	1.33 (0.48 - 2.19)	1.28 (0.62 - 1.94)	1.11 (0.49 - 1.73)	0.878	0.287
Daytime dysfunction	1.10 (0.39 - 1.80)	0.33 (-0.32 - 0.99)*	1.06 (0.16 - 1.95)	0.50 (-0.11 - 1.11)*	0.649	0.192
PSQI score	7.81 (4.37 - 11.25)	5.52 (2.67 - 8.38)*	7.33 (4.34 - 1.33)	6.17 (3.71 - 8.62)*	0.684	0.196
RDC-TMD Axis II						
Depression grade	1.06 (0.34 - 1.78)	0.83 (0.33 - 1.33)	1.09 (0.38 - 1.80)	1.16 (0.46 - 1.86)	0.901	**0.034**

* $p < 0.05$ comparing time 1 and time 2 for the same gender

Table 3. Linear regression models considering smartphone addiction as the independent variable

Variables	Time 1			Time 2		
	R^2	Beta	*P-value*	R^2	Beta	*P-value*
WHOQOL-bref						
Physical	0.12	-0.34	**0.009**	0.24	-0.49	**<0 .00001**
Psychological	0.08	-0.29	**0.029**	0.12	-0.35	**0.007**
Social relationships	0.09	-0.3	**0.023**	0.10	-0.33	**0.013**
Enviromental	0.13	-0.36	**0.006**	0.08	-0.28	**0.033**
Self-rated QoL	0.23	-0.48	**< 0.00001**	0.14	-0.37	**0.004**
WHOQOL score	0.2	-0.45	**< 0.00001**	0.26	-0.51	**< 0.00001**
PSQI						
Subjective sleep quality	0.1	0.32	**0.015**	0.05	0.22	0.091
Latency	0.07	0.28	**0.037**	0.00	-0.06	0.661
Duration	0.001	0.03	0.810	0.00	0.03	0.825
Eficiency	0.03	0.17	0.207	0.01	-0.12	0.378
Disturbances	0.02	0.15	0.258	0.07	0.27	**0.042**
Medication use	0.08	0.28	**0.034**	0.07	0.27	**0.041**
Daytime dysfunction	0.04	0.21	0.104	0.00	0.01	0.931
PSQI score	0.11	0.33	**0.011**	0.03	0.19	0.142
RDC-TMD Axis II						
Depression grade	0.14	0.37	**0.004**	0.14	0.37	**0.004**

4 DISCUSSION

These study findings showed that overall SQ improved. However, there was no significant change on overall SPA, QoL and depression grade during lockdown. The high SPA means scores on both times are remarkable. Tolerance using smartphones increased during lockdown which means that the participants spent more time using the smartphone without being aware of how long they were actually using it.

It is important to highlight the high SPA prevalence before and during lockdown for the sample evaluated. Other Brazilian studies have also shown high SPA and internet addiction prevalence[33-35]. Although there are comparison limitations regarding inclusion and exclusion criteria and differences on SPA assessment scales, this finding reinforces the importance of preventive and harm reduction health policies.

The SPA was a predictor to depression, total WHOQOL-bref score, all WHOQOL-bref domains, sleep medication use on both times, before and during lockdown. All these variables may affect the academic performance[20,36].

There is not a consensus regarding SPA gender difference. In a longitudinal prospective study, women were considered a risk factor[15] however, many other studies have not found gender difference[14,17,22,23]. Chen et al. (2017)[17] had evaluated factors that influence the SPA in medical students according to gender and found that SQ influenced SPA to both gender but depression influenced SPA just to women. In our study, there was no gender difference on SPA.

Comparing both times, men rated better scores on WHOQOL-bref physical domain during pandemic, while before lockdown, a similar difference was on sleep duration. There was gender statistic difference on depression grade during lockdown. However, women rated higher depression grades on both times. On the contrary, an Italian study didn't find gender difference on depression during lockdown5. Sociocultural and political circumstances may

have influenced this finding.

This study found improvement on overall SQ (PSQI total score) and on sleep duration and less daytime dysfunction during lockdown. Other researches also found an increase in sleep duration during quarantine[8,9,37] however Blume et al. (2020)[8] and Cellini et al. (2020)[37] found a decrease in SQ. We also found positive correlation of SPA to poor SQ before COVID-19 outbreak specially to total PSQI score, subjective sleep quality, sleep disturbances and sleeping medication use. During lockdown, the correlation of SPA to subjective SQ, sleep disturbances and sleeping medication remained but the correlation to total PSQI score did not. This may be explained by the longer sleep time observed.

Considering bivariate correlation analysis, before pandemic SPA showed negative correlation to total WHOQOL-bref score, self-rated QoL, physical, social relationship and environmental domains while during lockdown SPA showed negative correlation to all WHOQOL-bref domains and total score, among them the most significative correlations were to physical, self-rated quality of life and total score. Based on previous studies[10,15-17,25], we suppose that, although the increase in SPA during lockdown was not statistically significant, it was sufficient to influence the psychological domain.

Depression grade was positive correlated to SPA on both times. Previous studies[15,25] had shown similar findings, including a systematic review that found a greater effect size for depression than for anxiety correlation to SPA[12].

Considering the linear regression analysis, we found SPA as a statistic significant predictor to subjective sleep quality, sleep latency, sleeping medication use and total PSQI score on pre-pandemic time and to sleep disturbances during lockdown as well as to sleeping medication use on both times. Previous studies had observed associations between SPA and poor SQ[17-20,22,23,28] but our findings just partially support this observation since the PSQI components that remain influenced by the SPA during lockdown were sleep disturbances and sleeping medication use. The interruption in academic activities during lockdown allowed the students to sleep longer and may have influenced this finding. Further studies should investigate if the curricular activities affect the dental students' sleep quality.

There was no difference on depression grade during lockdown compared to baseline, however the regression analysis demonstrated that SPA was a predictor to depression on both times which agrees to several pre-pandemic studies that found association between SPA and depression[16,17,19]. On the other hand, a Korean longitudinal study related depression as a protective factor to SPA[15]. Future studies may use statistic mediator models and/or other designs to clarify this finding.

Comparing both times, we didn't observe difference on the overall QoL. Interestingly, self-perception QoL improved while the social relationship domain decreased during lockdown. This improvement in self-perception QoL may be due to the increase in SQ. Pagnin and Queiroz (2015)[38] showed a direct association between SQ and QoL in medical students, especially over the physical and psychological domains.

This study has some limitations. The small sample size does not allow a generalization of the findings. The questionnaires use implies in some memory bias. The observational feature of this study precludes us to stablish from establishing relationships of cause and effect. The short exposure time of the sample to the lockdown may have resulted in fewer changes in the outcomes.

The students identified with depression in our sample were referred to the University

psychological support program. A systematic review with metanalysis showed that exercise interventions are effective to treat SPA and that longer interventions demonstrated greater effects(24). Besides, another study observed that engagement on physical activities was associated to better QoL and better SQ during quarantine[4]. Therefore, Universities may incentive exercise programs to deal with the SPA among students and its consequences.

Considering the growing smartphone use among university students especially during pandemic and the increased distance educational activities, their awareness of smartphone addiction and its implications is quite important. Universities should stimulate programs to identify and deal properly with this behavioral addiction in order to contribute to the students' academic performance, better quality of life and mental health.

5 CONCLUSION

This study showed that the overall smartphone addiction, quality of life and depression grade were not influenced by the lockdown restrictions. However, it was observed an improvement on sleep quality during this period. It's noteworthy that the smartphone addiction was directly correlated to depression grade as well as inversely correlated to quality of life, both before and during pandemic restrictions.

RESUMO

Vício em *smartphone* em tempos de pandemia por COVID-19: estudo longitudinal com estudantes de Odontologia

O objetivo deste estudo foi avaliar o vício em *smartphones*, qualidade de vida, qualidade de sono e depressão em estudantes de odontologia antes e durante a quarentena da primeira onda da pandemia por COVID-19. 57 estudantes de odontologia responderam nos dois tempos os questionários validados: *smartphone addiction inventory*, índice de qualidade de sono de Pittsburg, WHOQOL-bref e critérios para diagnóstico em pesquisa das disfunções temporomandibulares eixo II. Foram realizados os testes estatísticos: Wilcoxon, Mann-Whitney U, Spearman e regressões lineares considerando o total do *smartphone addiction inventory* como variável independente. A prevalência de vício em *smartphones* foi elevada nos dois tempos (68.66% e 71.92% respectivamente). Durante a quarentena a qualidade de sono melhorou e não houve diferença estatisticamente significativa no vício em *smartphones*, qualidade de vida nem depressão. A tolerância no uso dos *smartphones* aumentou, especialmente entre as mulheres. O vício em *smartphones* apresentou correlação negativa com qualidade de vida e positiva com a depressão, qualidade subjetiva do sono e necessidade de medicação hipnótica. O vício em *smartphones* foi preditor para todos os domínios do WHOQOL-bref e seu escore total, para o uso de medicação e depressão em ambos os tempos. O vício em *smartphones* foi muito elevado nos dois tempos afetando a qualidade de vida dos estudantes. Apesar do aumento do uso de *smartphones* em virtude das restrições impostas pela pandemia, esse estudo mostrou que o vício em smartphones, qualidade de vida e depressão não foram influenciados pela quarentena. Entretanto, foi observada melhora na qualidade de sono durante esse período.

Descritores: Comportamento Aditivo. Smartphone. Quarentena. Sono. Qualidade de Vida.

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