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ORIGINAL ARTICLE

Adolescents and sleep in COVID-19 pandemic era: what to expect?

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Abstract

Objectives: To assess COVID-19 pandemic's impact on adolescents' sleep quality. **Methods:** An anonymous online survey was conducted. Sociodemographic data and information about daily routine during and after lockdown were assessed. A descriptive statistical analysis was performed. **Results:** In total, 258 participants, most female (71.7%) with median 15.7 years, were included. The quality of sleep during confinement was considered to be the same (58.1%) for those who normally classify their sleep as good or very good, but it was considered worse (83.3%) for those with usual bad or very bad sleep. Students delayed bedtime and wake up time during lockdown. Sleep habits before bedtime were equivalent during and after lockdown; however, in the latter, an increase in the use of videogames was reported. During lockdown, adolescents woke up less times during the night and got up easier in the morning. Once lockdown ceased and a normal routine restarted, 44.2% of the adolescents felt more productive during the day and 55.4% less anxious. **Discussion:** School closure and home confinement during the COVID-19 pandemic impacted adolescents sleep. During lockdown adolescents delayed bedtime and wake-up time, sleep quality was worse in those who reported previous poor sleep quality, there was an increase in screen time use before bed. Nonetheless, it was easier for most of those inquired to wake up in the morning and they reported feeling less tired throughout the day. This result shows that the confinement allowed young people to adjust to the physiological phase delay of adolescence, decreasing daytime sleepiness.

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INTRODUCTION

The new coronavirus disease-19 (COVID-19) caused by severe acute respiratory syndrome coronavirus-2 (SARS--CoV-2) was first reported in Wuhan, China in December 2019[1]. Since then, it has spread worldwide, with the World Health Organization (WHO) classifying it as a pandemic on March 11th 2020[2]. Social distancing measures to prevent disease spread were taken and home confinement was imposed throughout the world leading to abrupt lifestyle and behaviour changes.

Although SARS-CoV-2 infection is associated with milder or asymptomatic disease in children[3], they are not immune to the related non-infectious adverse effects. The COVID-19 pandemic has had impact on the health-related quality of life of adolescents[4,5], including mental health with substantial increase in the prevalence of mental diseases[5,6]. The imposed social distancing measures also redefined every family's daily routine[7], with impact in sleep quality[8].

Poor quality sleep has been linked to impaired physical and mental health[3], contributing to psychopathology in the long-term[7].

Adolescents have special biological characteristics that could theoretically and partially protect them from this disturbance of sleep quality. Characteristically, they prefer to sleep late due to a biologically delayed sleep phase. Later school start time has been mentioned as a measure to improve sleep duration and quality in adolescents[9]. Home-schooling during home confinement allowed students to have a more flexible schedule as online classes begun later and there was no time spent to commute to school. This benefited a better sleep pattern aligned with adolescent's biologic sleep phase.

However, we have witnessed other factors that overwhelmed this apparent biological protection. One of them was an exponential growth of screen-based electronic devices utilization in the current pandemic. With home-office working parents, online classes and restricted social interaction, the use of electronic devices became almost inevitable. It is known that excessive utilization of screen-based electronic devices is associated with bad sleep quality, since blue light exposure suppresses melatonin production, and decreases the practice of health beneficial activities, such as physical activity[10]. Therefore, the pandemic brought more available sleep hours but with potential quality loss.

Witnessing repeated lockdowns, followed by a gradual and slow return to normal daily routine we designed this study to access this sleep quality impact, if it persisted and how the teenagers were able or not to readjust.

METHODS

Participants completed an anonymous online survey, after reading the written consent form and explicitly agreeing to participate. The survey regarded information about daily routine during and after lockdown and was shared via social media for a limited time window (from June 16th to 25th, 2021), targeting late elementary and high school students from 13 to 18 years old. There was no monetary or credit compensation for participating in the study. The study protocol was approved by the Ethics Committee our tertiary care centre - Centro Hospitalar Universitário Lisboa Central.

A total of 328 participants completed the survey. From this sample, we excluded 70 participants: age >18 or <13 years; who were already followed by a psychologist/ psychiatrist; with known neurologic/psychiatric disorder and/or who were on sleep medication therapy. The final sample consisted of 258 participants.

Data reported in this study were used to evaluate the impact of lockdown in sleep quality and quality of life of student adolescents and how they were able to adapt once lockdown ceased.

Descriptive statistical analysis were performed using *IBM*® Statistical Package for Social Sciences® (*SPSS)*®, version 27. We were not able to use Pearson's chi-squared test as the Cochrane criteria are not valid.

RESULTS

Of the 258 participants (median age 15,7 years, SD 0,107), most were female [71.7% (n=185)], in high school [67.8% (n=175)], in public school [62.8% (n=162)] and on regular teaching [97.7% (n=252)].

The quality of sleep during confinement was considered to be the same (58.1%) for those who normally classify their sleep as good or very good, but it was considered worse (83.3%) for those with usual bad or very bad sleep.

Students delayed bedtime and wake up time during lockdown. There was an increase of 17% in the time "00-2h" and 266% in the time ">2h" (Graph 1). This was also the case for the wake up time: most of the adolescents woke up between "7-8h" time [47.7% (n=123)] during lockdown, whereas they woke 1h earlier after lockdown, with "<7h" being the most frequent time reported [82.9% (n=214)] (Graph 2).

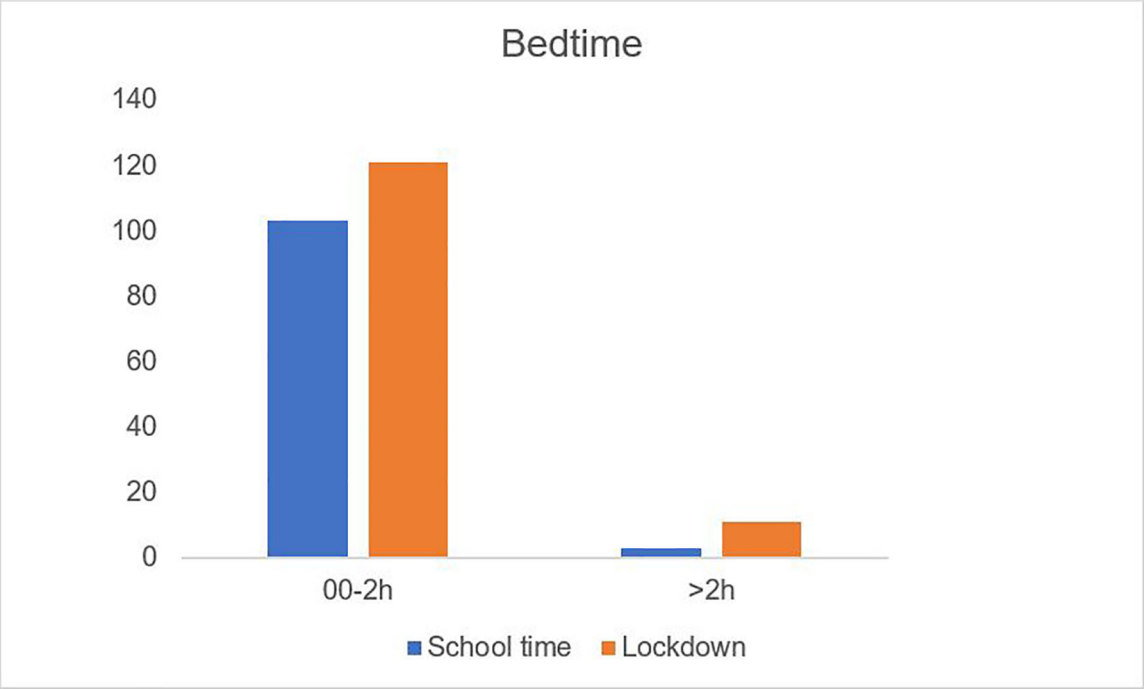
Looking at the number of hours of sleep per night, during lockdown, most of the adolescents slept 6-8h/night (60.1%) and it took them <30 min to fall asleep (62%); these numbers were similar after lockdown: 68,6% slept 6-8h/night and 67,1% took <30 min to fall asleep.

Sleep habits before bedtime regarding cell phone's use, watching television and reading books were equivalent during and after lockdown: cell phone use (60.9% vs 59.7%), watching television (16.7% vs 15.9%), reading a book (9.7% vs 10.5%), respectively; however, playing videogames had a reported increase of 116.7% during lockdown (Graph 3).

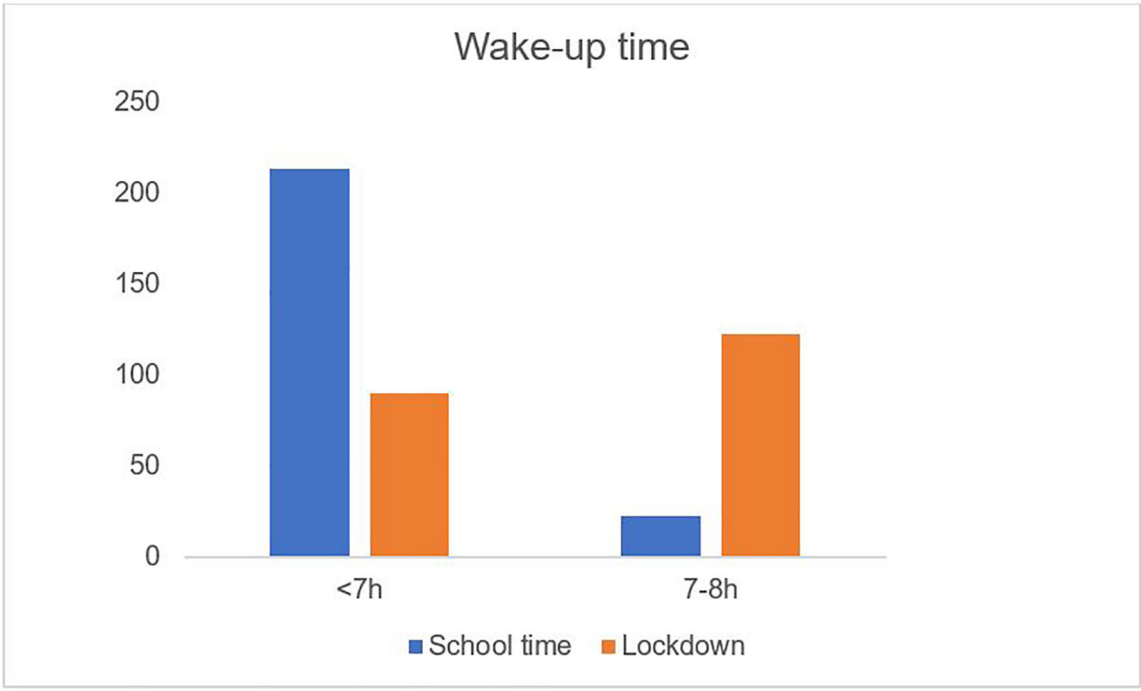
During lockdown, adolescents woke up less times during the night (12% reduction) and got up easier in the morning (increased by 10%). Yet, they were less physically active, reporting a 9.6% reduction.

Four adolescents begun sleep medication during lockdown.

Once lockdown ceased and a normal routine restarted, 56.6% (n=146) of the adolescents felt more tired but, conversely, felt more productive during the day (44.2%, n=114). 53.9% (n=139) found it hard to return to the previous schedules but 86% (n=222) felt happier and 55.4% (n=143) less anxious.



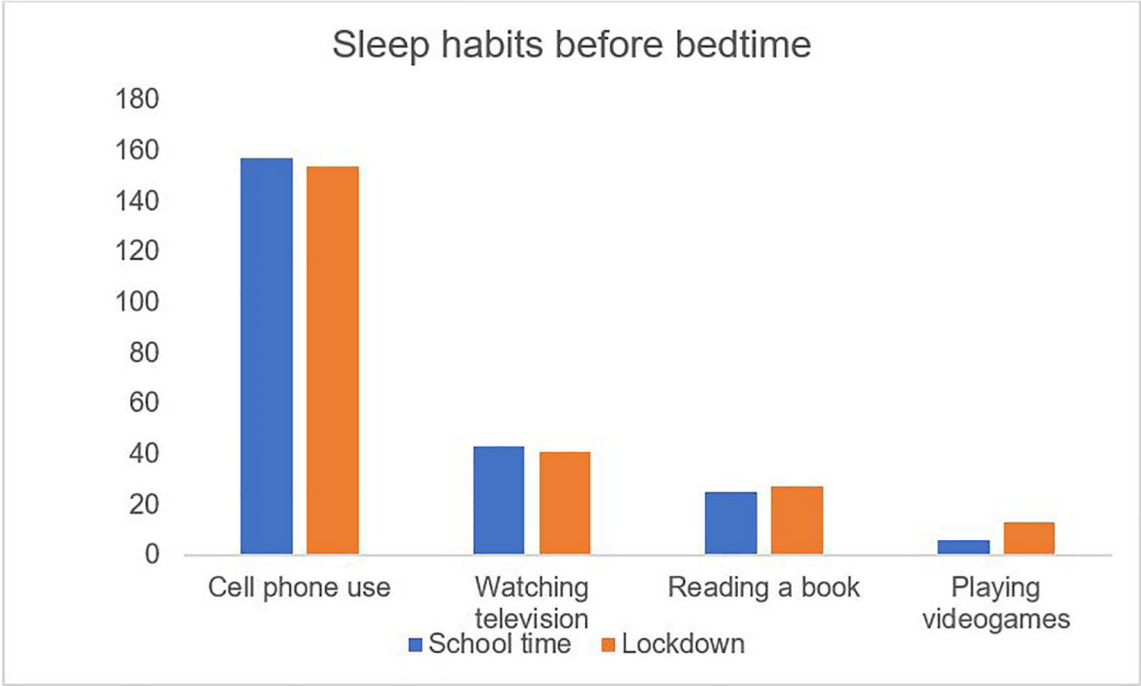
Graphic 1. Bedtime hours during school time and lockdown.



Graphic 2. Wake-up time hours during school time and lockdown.

DISCUSSION

In the present study we verified that school closure and home confinement during the COVID-19 pandemic significantly impacted health and well-being of adolescent students. The major findings during lockdown were as follows: (1) adolescents delayed bedtime and wake-up time; (2) the sleep quality was worse for those who already had a bad sleep quality; (3) adolescents did not meet sleep duration requirements; (4) utilization of screen-based electronic devices increased before going to sleep; (5) adolescents found it easier to get up in the morning; (6) adolescents felt less tired throughout the day; and (7) feelings such as anxiety and sadness were more prevalent.



Graphic 3. Sleep habits before bedtime during school time and lockdown.

In pre-pandemic area, a systematic review and a meta-analysis reported 25% sleep disturbances in normally developing children[11]. This number increased to concerning values as high as 38% to 46% in children during the pandemic[12,13]. The most significant change observed during lockdown was a delay in the bedtime and wake up time[12,13]. In line with other studies, adolescents delayed bedtime and wake-up time during lockdown. This can be explained as the result of a combination between their natural tendency to sleep late and the redefinition of the daily routine imposed by the pandemic itself. This adjustment allowed adolescents to align to their biologically delayed sleep phase, feeling less daytime sleepiness.

Another curious finding is the higher prevalence of sleep disturbances in 2021 publications compared to 2020, implying the negative continuous impact of COVID-19 pandemic on sleep[12].

In our survey, adolescents reported an average sleep duration between 6 and 8 hours per night (both during and after lockdown) which is lower than the 8 to 10 hours recommended for this age group[14]. During weekdays, around 76.7% and 82.9% did not meet sleep requirements during and after lockdown, respectively. Likewise, Sharma *et al*. alert that almost half of the children did not meet sleep duration recommendations during lockdown[12]. This is concerning as sleep deprivation is linked to multiple health issues ranging from specific organ system issues, such as, renal and cardiovascular systems' diseases, contributing to the development of metabolic abnormalities such as obesity and diabetes mellitus, to mental disorders and impaired cognitive performance.

As expected, during lockdown adolescents increased the use of screen-based electronic devices near bedtime. Delayed bedtime has been linked to increased screen time use[15]. The use of digital media near bedtime has a negative effect on sleep with both physical and mental health implications[16], such as sleeping disorders and dismissal of other sleep-beneficial activities such as physical exercise[15]. Bright light leads to melatonin suppression contributing to a delayed sleep phase disorder, reason why the American Academy of Paediatrics suggests to avoid digital screen device use at least one hour before bedtime[17]. In a cross-sectional study of Italian young adults during lockdown, the increase of use of digital media before going to bed mildly affected sleep habits as sleep latency, bedtime and wake up were affected but not sleep quality[18]. However, as sleep-wake up cycles significantly changed during lockdown with people going to bed and waking up later, and hence, spending more time in bed, they, contrastingly, also reported a lower sleep quality[18].

Feelings such as sadness, anxiety and fear of infection were reported in our study. Repeated and prolonged quarantines, social isolation, fear of infection and boredom are some of the issues associated with negative psychological impact experienced in lockdown[5,18]. Zhou *et al* described symptoms of depression and anxiety in 43.7% and 37.4%, respectively, in Chinese teenagers during the COVID-19 outbreak[19]. According to Scapaticci *et al*.[5], an increase of 11.6% in psychiatric drugs prescription was documented in the Italian paediatric population in 2020, compared to the previous year, mainly antipsychotics and antidepressants.

CONCLUSION

The COVID-19 pandemic and its related lockdowns have had a profound impact on health and lifestyle behaviours.

Although this is a partial snapshot of the current Portuguese situation and to our knowledge, the first one, our data confirmed the evidence already observed in quarantine individuals resulting in sleep habits changes as well as negative psychosocial changes. The major limitation of the present study is that sleep habits was not objectively determined but based on self-report. However, whether or not these changes observed during lockdown will have any long-term implications for adolescence's sleep and daytime functioning, is still unknown.

Considering that COVID-19 is still troublesome in some countries and, with multiple peaks, there is a continuous need to monitor the psycho-physiological well-being of the paediatric population and develop programmes to support healthy sleep routines and hygiene for these age group.

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