

# Young Adult Sleep Health during COVID-19 Pandemic

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## Abstract

Young adults, as a group, have poor quality sleep. While possessing the knowledge of the value of sleep health, young adults often allow their social schedules to encroach upon sleep time. Since March of 2020, the prevalence of COVID-19 reached a rate where quarantine, shelter in place mandates were employed worldwide. The obvious public health necessity of this action, along with the uncertainty with increasing rates of COVID-19 is compounded by distribution issues related to the vaccine. This literature review presents the factors related to young adult sleep followed by psychological consequences of COVID-19 factors. Several studies identify the need to attend to not only the sleep quality needs of young adult sleep but also the increased number of reporting depressed mood. Suggestions for improvement of young adult sleep given the factors of quarantine and uncertainty due to the COVID-19 pandemic are provided.

## Keywords

Sleep Health, COVID-19, Quarantine, Depression

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## 1. Introduction

Colleges and universities are ranked third behind bars and restaurants as a source of COVID-19 contagion in online postings. Colleges and universities are the academic home for the student coming into themselves as a scholar, an adult in the world and as their own person. So, as it seems, the change in this setting, most predominantly to remote, also shifts the resources provided to the young adult. Consequently young adults have had to change their behavior patterns which may impact their sleep health.

Sleep health is a public health concern. Inadequate sleep is associated with poor grades, deficient cognitive functioning, and predisposition to depression,

heart disease, and diabetes [1]. In a measurement of sleep length, cell phone use and sedentary time using the sedentary app [2], reported an increase in anxiety, depression related to news coverage of COVID-10 in the U.S. media [1] [3] [4]. It is possible that the increased social media use during the quarantine worsens the factors related to mental health.

## 2. Impact of the Quarantine

The implementation of quarantine policies in the United States for the development of herd immunity and regulation of COVID-19 outbreak began in Spring, 2020. Sleep disturbances impact on health and quality of life is a public health challenge [5]. An increase in anti-depression medication prescriptions at the onset of outbreak in the United States implies poor sleep linked to depression association [5].

Results from a sleep app called “Sleep Cycle” of respondents, worldwide, indicated increased sleep and longer (approximately 37%) sleep onset latency times (<https://www.sleepcycle.com/coronavirus/>). Additionally, the changes in routine secondary to the “shelter in place” mandate lead to increasing levels of anxiety and depression secondary to loneliness, isolation and unemployment factors. Further, documented cases of individuals with diagnosed mental health conditions of depression and anxiety experienced increases in symptoms with a rise in suicide rates [6] [7] [8] [9].

Young adults (13 - 30 years) are a vulnerable population given their developmental level of skills to manage psychological/emotional/social challenges. By contrast, the only population that slept worse than young adults, survey findings indicated, were health care providers. A gender difference prevailed with women, according to the sleep cycle survey reporting sleep difficulties twice as much as men, across all ages [10]. Thus, the greatest impact on sleep to young adults reflects the magnitude of change in their daily routine. The sleep cycle survey reported 50% of young adult respondents experienced difficulty falling asleep (sleep onset latency) [10]. The transition to remote learning, connecting less and spending less time in daylight were reported by young adult sleep cycle respondents. Collectively this group reported feeling more anxious (47.6%) and more depressed (34.8%) than before the start of the COVID-19 pandemic and shelter in place mandate (<https://www.sleepcycle.com/coronavirus/>). The loss of daytime light is experienced by young adults in two ways: 1) increased technology use, leisure (e.g., Netflix, Hulu, gaming) and 2) remote learning classes. The net effect of increased technology use is increased amount of blue light from devices and a reduction in natural sunlight. Both outcomes result in a disruption in circadian sleep cycle due to the inhibition of melatonin release and control of sleep wake cycle. Young adults are worried about being lonely, becoming ill as well as experiencing diffuse upset (<http://www.sleepcycle.com/coronavirus/>).

A tracer to measure a metabolic waste product inside neuron brain cells [11]. A buildup of this metabolic product has been associated with Alzheimer’s disease

and impaired brain function. In a comparison of scans from young adult participants groups of normal night of sleep and one of 31 hours sleep deprivation, [11] reported changes mid-brain structure functioning (hippocampus-memory, amygdala-emotion). The sleep deprived group performed poorer on vigilance and attention tasks as well as reported more metabolic waste product.

Evidence of dissociative functioning in young adults following high levels of daily stress has been identified [3]. The participants experienced fatigue, insomnia and content of dreams while enduring daily stress. Stress triggers brain activation of limbic system functioning and consequentially activation of endocrine functioning specifically adrenal cortex epinephrine and cortisol release [12] [13]. This excitatory function incites a hypervigilance in patients. Poor sleep quality in young adults, as measured by minutes to fall asleep, number and length of wake-ups and shortened sleep duration.

Positive results for EEG biofeedback with young adults in terms of increased cerebral blood flow that translates to efficient brain activity [8]. An analysis of sleep and activity in young adults that engaged regularly in activities that involved social engagement [6]. Less variability in wake time, it was found, leads to earlier exposure to bright light thus providing more opportunity for activity in the day and earlier bedtimes [6]. An association between obesity and self-reported sleep duration as measured by leptin levels and sleep logs [9]. Worsened sleep (*i.e.* sleep deprivation) is associated with reduced appetite inhibiting hormone leptin and an increase of appetite stimulating hormone ghrelin [6] [9].

Decreased cognitive performance and overall mood in young adults based on their measured difference of two hours weekday mornings and weekend mornings [10] [11]. Poor sleep hygiene in young adults has having both direct and indirect effects on their sleep quality [14].

### 3. Impact of COVID-19: The Quarantine

The COVID-19 pandemic, for safety and public health reasons, is to be managed by quarantine (e.g., frequent hand washing, six foot social distance). With this, the closing of schools, which from news sources as high-ranking sources of contagion of COVID-19, hence the transference to online courses [15] [16]. The online course setup removes, however, the college campus milieu, so instrumental in social development for young adults. For some young adults, it is essential to provide a sense of a safe environment with social supports to facilitate sleep [17] [18] [19] [20]. Young adults were queried and found to have reported more loneliness during the pandemic and had a greater use of social media [5].

### 4. Approaching Solutions

From a questionnaire study conducted with participants five months later with measured increases in resilience, grit, subjective happiness [15]. Perceived stress decreased significantly in the second measurement of participants [15]. The reconnection to relatives, increasing comfort in the home, reconnecting to rela-

tionship [21] [22] [23] [24]. Additionally, a finding of a collective acceptance of the COVID-19 pandemic changes that were necessary (e.g. hand washing, 6' social distance, reduced social contact) [16]. Perceived stress concept using questionnaires to participants, again, in a pre to post manner [25] [26] [27]. This dispersal of questionnaires across several countries [27] [28]. Moderate levels of perceived stress was associated with fear and helplessness of being infected with COVID-19. Further, the sleep loss documented in sleep logs corresponded to the sustained, moderate levels of perceived anxiety.

Young adults engage in high risk behaviors, struggles with health issues, and onset of conditions that are preventable by a healthier lifestyle [29] [30] [31] [32] [33]. In **Table 1**, reported sleep hygiene suggestions were tallied at one of the first post lockdown points in the United States. A survey study that young adults spend more time on gadget use than in class [34]. Now, with the quarantine condition, gadget use and computer use to social media has increased 30% [25] [26].

## 5. Coping

Social support is a coping mechanism key to loneliness and isolation factors related to COVID-19 [26] [32] [33]. Increased mental health concerns of depression in young adults has been identified [33] [34]. The mediating effects of uncertainty that lead to depression are identified as maladaptive coping and low adaptive coping [22] [34] [28]. It is imperative that adaptive coping. A series of suggestions to promote adaptive coping include the provision of education and information [25] [26]. Providing information about COVID-19 but an abundance, provide clear communications in terms of warning signs and ways/means to seek care, engage in meaningful activities [35] [36] [37].

In an effort to examine the factors that may lead to depression, investigations using questionnaires about depression have been used with results indicating sleep and Chronotype as interdependent with mood [20] [34]. In **Table 2**, several rigorous studies of sleep schedule (*i.e.*, chronotypes such as eveningness or morningness where peak awareness is the evening or morning respectively). The implication of these findings point to the essential need to couple one's sleep

**Table 1.** Common suggestions to young adults to mediate quarantine isolation effects.

Exercise more	29.0%
Have a consistent sleep schedule	23.3%
Listen to white noise or sleeping music	15.3%
Use drug, CBD oil or other supplements	11.0%
Only use bedroom for sleeping or sex	9.6%
Clean your bedroom more often	9.5%
Use apps to help you sleep better	8.7%
Nothing	24.7%

Source: [15] [20] [30].

**Table 2.** Evidence table for the association between chronotype with depression and anxiety in post-secondary students.

Author, year, country	Source population periods of recruitment/data collection	Total number of eligible subjects ( <i>n</i> ) Response rate (%)	Outcomes of interest	Key findings
Hirata, <i>et al.</i> (2017) Brazil	Medical students, 19 - 30 y.o. (mean age = 22.1 ± 2.1), in their first to fourth semester of the medical course at Federal University of Ceará, Brazil, during a 4-month period	<i>n</i> = 161 Participation rate 97% Females 52.2%	Depressive symptoms (BDI: score range 0 - 63, >10 indicates depressive symptoms). Exposure measurement: Home-Ostberg morning/eveningness self-report questionnaire (MEQ), score range 16 - 86) classification of types into: <ul style="list-style-type: none"> <li>• Definitely evening (26 - 30)</li> <li>• Moderately evening (31 - 41)</li> <li>• Indifferent (42 - 58)</li> <li>• Moderately morning (59 - 69)</li> <li>• Definitely morning (70 - 86)</li> </ul>	The MEQ scores were inversely correlated to the BDI scores ( $p = 0.005$ ) Odds of depressive symptoms in students with: <ul style="list-style-type: none"> <li>(a) Evening-type preference (definitely and moderately evening): OR = 0.66 (95% CI 0.05, 0.88)</li> <li>(b) Evening-type preference after controlling for family history of depression: OR = 0.69 (95% CI 0.52 - 0.93)</li> <li>(c) Evening-type preference after controlling for physical activity: OR = 0.66 (95% CI 0.49 - 0.89)</li> <li>(d) Evening-type preference after controlling for family history of depression and physical activity: OR = 0.71 (95% CI 0.52 - 0.95)</li> </ul>
Hsu <i>et al.</i> (2012)	First-year undergraduate students (mean age = 19.4 y.o.) attending the National Taiwan University, completed self-administered questionnaires at school in September 2002.	<i>n</i> = 2919 Participation rate 79.2% Females = 51.5%	Depression and anxiety symptoms (BSRS domains): Items scored from 0 (not at all) to 4 (extremely), with higher scores reflecting degrees of discomfort in past week. Exposure measurement = M-E Scale (MES): score ranging from 13 to 55, with higher scores suggesting <p>morningness tendency:</p> <p>Eveningness (E)</p> <p>Intermediate (I)</p> <p>Morningness (M)</p>	Association between Chronotype and depression score in males ( $F = 6.32, p < 0.01$ ): E vs I: Cohen's $d^{\#} = 0.33$ E vs M: Cohen's $d^{\#} = 0.55$ I vs M: Cohen's $d^{\#} = 0.22$ Association between Chronotype and depression score in females ( $F = 13.89, p < 0.001$ ): E vs I: Cohen's $d^{\#} = 0.39$ E vs M: Cohen's $d^{\#} = 0.43$ I vs M: Cohen's $d^{\#} = 0.04$ Association between Chronotype and anxiety score in males ( $F = 3.9a2, p \leq 0.05$ ) E vs I: Cohen's $d^{\#} = 0.31$ E vs M: Cohen's $d^{\#} = 0.49$ I vs M: Cohen's $d^{\#} = 0.18$
Prat <i>et al.</i> (2013) Spain	Undergraduate students 17 - 30 y.o. (mean age = 21.4), completed questionnaires while attending a psychology course at the University of Barcelona	<i>n</i> = 517 Response rate = 93.5% Females 66.5%	Psychological symptoms (GHQ-28): incorporates 4 subscales (psychosomatic symptoms, anxiety and insomnia, social dysfunction, and severe depression). Exposure measurement = Spanish version of the CSM: categories based on scores indicating evening-type ( $\leq 25$ ), neither-type (26 - 36), Morning-type ( $\geq 37$ ).	Association between circadian typology (evening-, morning-, neither-type) and total GHQ-28 score: $F = 11.02, p \leq 0.001$ , partial $\eta^2 = 0.041$ Association between circadian typology (evening-, morning-, neither-type) and insomnia score: $F = 7.74, p \leq 0.001$ , partial $\eta^2 = 0.029$ Association between circadian typology (evening-, morning-, neither-type) and severe depression: $F = 3.22, p \leq 0.05$ , partial $\eta^2 = 0.029$

<sup>#</sup>Bonferroni method to adjust for multiple comparisons between chronotypes,  $p \leq 0.05$ . BDI Beck Depression Inventory, BSRS, Brief Symptom Rating Scale, CI confidence interval, CSM composite scale of morningness, GHQ General Health Questionnaire 28, MEQ morningness/evenings questionnaire, MES morningness-eveningness scale. OR odds ratio, y.o. years old. \*Adjusted for age, sex, smoking, alcohol drinking, stimulant use, body mass index, and physical activity. International Journal of Mental Health and Addiction (2019) 17:716-730. Source: [24].

schedule with a chronotype that is most suitable, otherwise the mismatch leads to maladaptive coping [29] [30] [31].

## 6. Sleep Health

Greater emphasis on sleep health for young adults as a public health focus is needed. Standard recommendations for sleep health are to be employed. **Table 1** provides a summarization of young adult responses to how they have been spending their time. The sleep habits post lock down survey amplified the issue of poor sleep in young college students. These suggestions are strongly suggested for young adult sleep health: Regular wake up time, exposure to natural bright light, activity/exercise during the day approximately 4 hours before sleep, adequate hydration, two to three meals per day and advisedly some relaxation de-stressing routine (*i.e.*, yoga, meditation). These sleep health recommendations are within the context of addressing the increasing mental health needs in young adults in terms of anxiety and depression [22]. While remote and fewer safe opportunities for mental health care, the necessary addressing loneliness in young adults can be accomplished. The use of telehealth for suicide prevention has been successful [15]. Mental health services addressing depression and suicide will also positively affect sleep health [21] [25] [31]. Specific recommendations for Young Adult Sleep would include adopting a stress management approach such as using a free app to guide them in a mindfulness relaxation [3] [30] [33]. Organizing one's time, a standard time management approach common to stress management would provide the Young Adult College student sleeper with control over their time and provide them with knowledge when they can study, work, sleep, eat and relax [3] [30] [33]. This level of specific schedules within schedules similar to the familiar "to do" list the student has for their assignments in a course can be used for the each segment of the day. For example, the morning can be divided into segments of wake-up hygiene, breakfast, study, break time with light snack, water and relaxation followed by a return to study [3] [30] [33] [38] [39]. These intervals of study could be replaced with remote classtime learning for the time being. The afternoon can be a further division of time to class time, study, relaxation and nutrition/hydration [3] [39]. The self-control of setting and keeping the schedule will provide some comfort and the net result of productivity and achievements from relaxation and nutrition/hydration will afford the Young Adult/College student with a balance of their time.

## Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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