Sleep Quality and Anxiety Among College Students in West Kalimantan, Indonesia

Triyana Harlia Putri[1*)]; Djoko Priyono[2]

[1*),2] Medical Faculty, Nursing study program, Tanjungpura University,

ARTICLE INFO

A B S T R A C T

The purpose of this study was to assess college students' sleep quality and the prevalence of anxiety in this group. This study was conducted cross-sectionally online and was carried out at universities in the province of West Kalimantan. 663 students were selected as participants through snowball sampling. Instruments used included the General Anxiety Disorder-7 (GAD-7) and the Pittsburgh Sleep Quality Index (PSQI). We found that of students had poor sleep quality and high anxiety levels, while of students had good sleep quality but also experienced high levels of anxiety. We also observed a correlation between sleep quality subscales (subjective sleep quality, duration of sleep, sleep latency, disturbance of sleep) and anxiety (p = 0.293, p = 0.182, p = 0.279, p = 0.361). Overall, sleep quality correlated with anxiety (p = 0.735). Sleep quality was significantly associated with academic major (OR = 0.73, 95% CI [0.49, 1.51]) and anxiety was significantly associated with age (OR = 1.139, 95% CI [0.769, 1.68]). Sleep quality and anxiety were significantly correlated in students, and they both correlated with socio-demographic characteristics such as age and academic major. Coping strategies are considered a control point that could help overcome the impact of COVID-19.

Kata kunci:

Anxiety
COVID-19
Students
Sleep Quality

*) corresponding author

Dept. Mental Health and Community, Nursing Study Program, Faculty of Medicine, University of Tanjungpura
Jl. Profesor Dokter Haji Hadari Nawawi, Bansir Laut, Kec. Pontianak Tenggara, Kota Pontianak, Kalimantan Barat 78115

Email: triyana.harliaputri@ners.untan.ac.id

A B S T R A K

Tujuan dari penelitian ini adalah untuk menilai kualitas tidur mahasiswa dan prevalensi kecemasan pada kelompok ini. Penelitian ini dilakukan secara cross-sectional secara online dan dilakukan pada perguruan tinggi di provinsi Kalimantan Barat. 663 mahasiswa dipilih sebagai partisipan dengan snowball sampling. Instrumen yang digunakan adalah General Anxiety Disorder-7 (GAD-7) dan Pittsburgh Sleep Quality Index (PSQI). Kami menemukan bahwa mahasiswa memiliki kualitas tidur yang buruk dan tingkat kecemasan yang tinggi, sedangkan mahasiswa yang memiliki kualitas tidur baik tetapi juga mengalami tingkat kecemasan yang tinggi. Kami juga mengamati korelasi antara subskala kualitas tidur (kualitas tidur subjektif, durasi tidur, latensi tidur, gangguan tidur) dan kecemasan (p = 0,293, p = 0,182, p = 0,279, p = 0,361). Secara keseluruhan, kualitas tidur berkorelasi dengan kecemasan (p = 0,735). Kualitas tidur secara signifikan terkait dengan jurusan akademik (OR = 0,73, 95% CI [0,49, 1,51]) dan kecemasan secara signifikan terkait dengan usia (OR = 1,139, 95% CI [0,49, 1,68]). Kualitas tidur dan kecemasan berkorelasi secara signifikan pada mahasiswa, dan keduanya berkorelasi dengan karakteristik sosio-demografis seperti usia dan jurusan akademik. Strategi koping dianggap sebagai titik kontrol yang dapat membantu mengatasi dampak COVID-19

INTRODUCTION

The Covid-19 pandemic is attracting attention on an international scale. According to WHO data, on April 9, 2021, the number of worldwide coronavirus cases had reached 133,146,550 people. Indonesia is facing an increasing number of positive cases and has reached 1,552,880 people. Meanwhile, in West Kalimantan, 6,211 cases of Covid-19 have been confirmed (WHO, 2021).

Indonesia has been implementing activity restrictions to slow the virus for the past year. Around the world, social isolation and distance restrictions have been essential in preventing Covid-19 infection (Shen, Yang, Wang *et al*, 2020). Many campuses have suspended face-to-face lectures and are using virtual learning (Zhai & Du, 2020), including those in West Kalimantan (*Tribun Pontianak*, 2020). Studies indicate that students have experienced more stress attending virtual classes during the pandemic (AlAteeq, Aljhani, & AlEesa, 2020). Lockdown has increased feelings of loneliness and anxiety, both of which have been emphasized during the pandemic (Boursier, Gioia, Musetti, & Schimmenti, 2020). Students think of campus as their home, but this inevitable state is beyond everyday experience and may cause stress, anxiety, and feelings of helplessness that affect activity levels (López, Suárez, Sanchez, & Ayán, 2021). This suggests that mental health problems among students have worsened during the pandemic.

Several studies have examined the mental health impact of Covid-19 on students in the past year. Literature has reported worsening sleep quality, insomnia, and depression, evidenced by increased sleep latency, sleep hours, and wake times compared to before the pandemic (Marelli, Castelnuovo, Somma *et al*, 2020). Students have moderate to extreme anxiety, and anxiety is closely related to age, gender, and education level (Khoshaim, Al-Sukayt, & Chinna *et al*, 2020). Students describe negative impacts from the pandemic such as decreased social interaction, difficulty concentrating, disturbed sleep patterns, due to physical distance, and increased attention to academic performance (Son, Hegde, Smith, Wang, & Sasangohar, 2020). Meanwhile, a study conducted in 15 countries showed higher rates of post-traumatic stress disorder, stress, anxiety, depression, and disturbed sleep quality in students (Batra, Sharma, Batra, Singh, & Schvaneveldt, 2021). Mental health and poor sleep quality can increase the chance of contracting a Covid-19 infection.

Mental health difficulties such as stress, anxiety, and depression have been correlated with students' academic performance and grades (Eisenberg, Daniel, & Ezra, 2009). However, stress and sleep quality do not correlate with academic performance (Alotaibi, Alosaimi, Alajlan, & Bin, 2020). To overcome the anxiety created by the pandemic and the effects of activity limitation, college students have shown greater use of maladaptive coping strategies (compared to adaptive coping strategies) (Kamaludin, Chinna, Sundarasen *et al*, 2020). An even more concerning threat is emerging from the pandemic: stigma. This study examines how students who have experienced discrimination related to Covid-19 relate to internalized shame and stigma, which impacts mental health (Li, Zheng, Le *et al*, 2020). Recent reports have identified another development of significant concern: students are at risk for self-harm. Nearly 13% of suicide cases occur in college students, with risk factors including insufficient or excessive sleep, smoking, a history of suicide, depression, anxiety, and stress (Wu, Tseng, Lin, Lee, & Chung, 2020). Research is needed on college students' reactions to the pandemic to minimize mental health problems, but limited attention has been paid to this area. Through this study, we hope to examine the impact of mental health: sleep quality and anxiety on college students in West Kalimantan, Indonesia.

METHOD

Participant characteristics and research design

This study used an online, quantitative, cross-sectional, independent measures design. It was conducted from June 20, 2020, to June 25, 2020, at public and private universities throughout the West Kalimantan Province. The population was all students who lived on campus in the West Kalimantan province. The inclusion criteria were: 17 to 26 years old, residing on a university campus in the West Kalimantan region, willing to fill out the questionnaire, and could read and use gadgets. The Institutional Ethics Committee of the Tanjungpura University of Medical Sciences approved this study. Participants were assured that their responses would remain confidential until the end of this survey. All procedures completed in parts of the study requiring human participants on the institutional national research committee's ethical.

Sampling procedures

A snowball sampling technique was used. A structured instrument was created using Google Forms. It also contained the agreement form. Researchers, research assistants, and research data collectors contacted potential participants and informed them of the inclusion and exclusion criteria and the snowball sampling selection method. The instrument's link was distributed via social media, e.g., email, Instagram, Telegram, WhatsApp, and other to contact. Assistants distributed the link to all students in the Kalimantan area using snowball sampling techniques. Hence, the link was passed to participants by a person separate from the first point of contact. The internet was required to participate in this study. Participants sent their responses to the questionnaire form, and then the researcher checked whether the respondent had filled in all the questions. When completing the form, participants agreed to take the survey and completed a screening. If they met inclusion criteria, the link was automatically provided and they proceeded to the informed consent procedure and filled out demographic information. Questions were administered in a fixed sequence and participants were required to answer all questions. Socio-demographic variables include age, sex, education, ethnicity, religion, and academic major. The online questionnaire developed by the researcher contains empathy for sections related to sleep quality (PSQI) and anxiety (GAD-7).

Sociodemographic, Generalized Anxiety Disorder-7, and Pittsburgh Sleep Quality Index.

Five survey instruments were used, including a socio-demographic form, the GAD-7, and the PSQI. The socio-demographic form contained information about participants' age, sex, ethnicity, religion, and academic major. The GAD-7, which was translated English to Bahasa Indonesia, consisted

of 7 items, including symptoms of anxiety and their frequency within the last two weeks. The measure uses a 4-item Likert rating scale ranging from 0 (not at all) to 3 (almost every day), while the total score ranges from 0 to 21. The GAD-7 has good validity (Cronbach's α = .811). The PSQI, which was translated, has nineteen items that assess the essential components of sleep difficulties: sleep efficiency, sleep medication use, sleep latency, duration of sleep, disturbance of sleep, daytime dysfunction, and subjective sleep quality. This measure uses a Likert rating scale ranging from 0 to 4. To get a total form, a sleep profile was applied for each of the items, ranging between 0-3, and a total score of between 0-21. A sleep score of five or fewer was considered good quality sleep; scores above five were considered low quality sleep. The PSQI has excellent internal consistency (Cronbach's α = .832).

Sample size, power, and precision

The total number of students in the population was 90,181. Based on Issac and Michael's population-specific sam-pling table and an error rate of 1%, the necessary sample size was 663 students.

Data Analysis

Before data collection was carried out, we had carried out an ethical review at the institution and it was accepted without risking harm to humans. In analyzing the data, descriptive statistics showing prevalence, mean, and standard deviation (SD) were calculated. We were conducted to relate the socio-demographic characteristics among college students, we reported generality of anxiety and sleep quality. We also conducted multivariate logistic regression analysis with an adjusted odds ratio (OR) and a 95% confidence interval (CI) to assess the correlations among different socio-demographic characteristics, sleep quality, and anxiety. Statistical analysis was conducted with SPSS 18 for Windows.

RESULT AND DISCUSSION

Based on the table 1, 63% of participants were female, 37% were male, and 53% were >20 years old. Most of the students were Malay (39.2%), Muslim (70.4%), and from the Department of Health (40.4%) (Table 1). We found that 8.3% of students had poor sleep quality and high anxiety levels, while 7.6% of students had good sleep quality but also experienced high levels of anxiety (Table 2). We also observed correlations between subscales of our sleep quality measure and anxiety, including disturbance of sleep,

subjective sleep quality, sleep latency, and duration of sleep (p = 0.361, p = 0.293, p = 0.279, p = 0.182). Overall, sleep quality correlated with anxiety (p = 0.735) (Table 3). In the multivariate logistic regression analysis, sleep quality correlated with academic major (OR = 0.73, 95% CI [0.49, 1.51]). Similarly, anxiety was correlated with age (OR = 1.139, 95% CI [0.769, 1.68]) (Table 4).

Table 1
Frequency Distribution of Sociodemographic Variables of the Students (n=663)

Characteristic	F (%)
Age	
<20	478 (72.1)
>20	185 (27.9)
Sex	
Male	245 (37.0)
Female	418 (63)
Etnic	
Malay	260 (39.2)
Dayak	103 (15.5)
Chinese	42 (6.3)
Javanese	117 (17.6)
Madurese	13(2)
Bugis	33(5)
Batak	27(4.1)
Sundanese	10(1.5)
Minangkabau	10(1.5)
Banjar	7(1.1)
Others	41(6.2)
Religion	
Islam	467(70.4)
Catholic	111(16.7)
Christian	71(10.7)
Budha	13(2.0)
Konghucu	1(2)
Major	
Health	268(40.4)
Technical	88(13.3)
Teacher Training	98(14.8)
Economic	23(3.5)
Law	55 (8.3)
Management	47(7.1)
Agriculture	44(6.6)
Math and Science	5(.8)
Social and Political Science	21(3.2)
Computer Science	5(.8)
Others	9(1.4)

Table 2.
Frequency Distribution of PSQI and GAD-7 of the Students (*n*=663)

Sleep Quality	Anxiety				Total F(%)
	Normal F(%)	Mild F(%)	Moderate F(%)	High F(%)	
Poor	92 (18.7)	219 (44.5)	140 (28.5)	41 (8.3)	492 (100)
Good	66 (38.6)	50 (29.2)	42 (24.6)	13 (7.6)	171 (100)
Total	158 (23.8)	268 (40.6)	182 (27.5)	54 (8.1)	663 (100)

Table 3.
Correlation PSQI Global and Sub-Scales with GAD-7 Score of the Students (*n*=663)

Variabel	Mean	SD	Anxiety Score P value
Subjective Sleep quality	1.61	0.74	0.293**
Sleep latency	1.40	0.94	0.279**
Sleep Duration	1.60	1.04	0.182**
Sleep efficiency	0.54	0.87	-0.33
Sleep Disturbance	1.45	0.57	0.361**
Sleep Medication	0.12	0.35	0.108
Daytime disfunction	1.55	0.80	0.011
Global Sleep Quality	5.64	4.24	0.735**

Note : n= (663), ** p < 0.01 p=pearson

Table 4. Multivariate Logistic Regression Analyses

Variables	Anxiety		Sleep Quality	
	OR (95%CI)	P-Value	OR (95%CI)	P-Value
Age				
<20	1.00	-0.096*	1.00	-0.013
>20	1.139 (0.769-1.68)		1.23(0.77-1.62)	
Sex				
Male	1.00	0.039	1.00	0.037
Female	1.009 (0.669-1.52)		1.31 (0.85-1.67)	
Ethnic				
Malay	0.87 (0.62-1.35)	0.060	0.86 (0.53-1.37)	0.559
Dayak	0.72 (0.59-1.46)		0.81 (0.66-1.36)	
Javanese	0.82 (0.79-1.32)		0.93 (0.71-1.52)	
Other[a]	1.00		1.00	
Religion				
Islam	1.41 (1.05-1.88)	-0.038	1.33 (0.71-1.87)	-0.021
Catholic	1.51 (0.91-1.83)		1.27 (1.11-1.77)	
Christian	1.24 (0.85-1.91)		1.30 (0.91-1.82)	
Other[b]	1.00		1.00	
Major				
Sains[c]	1.139 (0.769-1.68)	0.073	0.73 (0.49-1.51)	-1.131*
Non-Sains[d]	1.00		1.00	

*p=0,05, *spearman-rank

DISCUSSION

The results showed that college students had poor subjective sleep quality, poor sleep duration, poor sleep latency, and increased sleep disturbance. Several studies reported significant sex differences between males and females regarding subjective sleep quality, sleep latency, sleep efficiency, duration of sleep, and disturbance of sleep (Tang, Liao, Kelly *et al*, 2017). Substantial differences in sleep quality before and after the outbreak of Covid-19 have been reported (Patra, Kanungo, & Bawa, 2020). A study reported that students showed poor sleep quality related to their level of daytime sleepiness (Pensuksan, Lertmaharit, Lohsoonthorn *et al,* 2016) increased anxiety ex-acerbates the problem, negatively affecting students' strength and sleep quality. Their experiences include changes to their daily habits, boredom, fear, discomfort, and uncertainty about when the pandemic will end. Students feel overwhelmed adjusting their study schedules at home and receiving their assignments online instead of face-to-face. Every change in timetable and routine can negatively influence sleep and rest (Ishak, Illangkumaran, Muthiah, & Wajeeh, 2020). According to another study, longer times to fall asleep and wake up and shorter night-time sleep duration were both correlated with severely worsened sleep quality post-lockdown (Gupta, Girish, Yadav, Shanker, & Yadav, 2020). The shift to longer sleep and wake times during the pandemic has in-creased nighttime sleep and daytime naps (Kandeger, Guler, Egilmez, & Guler, 2018).

Sleep quality is significantly correlated with anxiety and the results showed that almost all students reported experi-encing poor sleep quality during the pandemic. Previous studies identified PSQI as having a cause-and-effect disor-der with symptoms of insomnia, symptoms correlating with poor sleep quality with depression and depression (Frangopoulos, Zannetos, Nicolaou *et al*, 2021). Students with poor sleep quality have high anxiety levels, but this study also reports that students with good sleep quality still experience high anxiety levels . Even when symptoms of anxiety have subsided, the quality of sleep still deteriorates (Hacimusalar & Karaaslan, 2020). Another study found that sleep quality and anxiety were significantly associated with depressive symptoms (Tu, He, & Zhou, 2020).

We found that sleep quality was correlated with academic major. Academic pressure medical students are

owned by other majors (law and economics). Physical and cognitive health are threatened if the quality of night sleep deterio-rates and results in daytime sleepiness (Khero, Fatima, Shah, & Tahir, 2019). Other studies have reported that medical students' poor sleep quality neg-atively impacted their academic achievement (Wondie, Molla, Mulat *et al*, 2021) and an increase in sleep disorder symptoms decreased their GPA (Yassin *et al,* 2020). Research also suggests that nursing students have had poor sleep quality because in their final year of study are canceled for placement, while students in their first year must adapt to online learning and virtual assessments to graduate (Romero *et al,* 2020).

This study found that anxiety levels were mild to severe among college students. The results of the systematic review found that anxiety was most common in medical students from Asia and the Middle East, and the prevalence of anx-iety was high compared to the general population (Quek, Tam, Tran *et al*, 2019). During the pandemic, students' anxiety was due to the rising number of confirmed and suspected instances of Covid-19 and its spread. High anxiety scores were found in stu-dents who were afraid of being infected (Savitsky, Findling, Ereli, & Hendel, 2020). Having a friend or relative affected by Covid-19 resulted in a significant increase in Anxiety (Halperin, Henderson, Prenner, & Grauer, 2021). These students also faced stigma.

Anxiety and age were correlated in this study. Students under the age of 20 are more anxious during the pandemic (Biswas & Biswas, 2021). Stress, anxiety, and depression are under twenty-five years, and the lowest rates are among those over sixty years of age Nwachukwu, Nkire, Shalaby *et al*, 2020). This is in contrast to other studies that do not show significant differences in anxiety correlated with age, social distance, or location (suburban, urban, or rural) (Halperin, Henderson, Prenner, & Grauer, 2021). Students receive much negative information during the pandemic, which increases their anxiety. Special attention should be paid to the psychological state of students dur-ing long-term home isolation (Fu, Yan, Zong *et al*, 2021). The higher students' anxiety, the more coping strategies are used. Students have different abilities regarding overcoming problems and the coping strategies that they use are not the same. Inappro-priate coping was observed in this study, triggered by the pandemic situation. When trying to overcome problems, it is crucial to maintain health, especially mental health (Huang & Zhao, 2020). Those who prefer to solve their problems outside the home are forced to stay at home and do not know when the epidemic will end. Students living with parents is one factor that can prevent anxiety during a pandemic (Biswas & Biswas, 2021).

LIMITATION OF THE STUDY

This study has limitations in that this study only looks at the respondents' factors due to limited time, energy, and cost.

CONCLUSION AND SUGGESTION

This study reported negative impacts on students' mental health during the pandemic. Sleep quality and anxiety are significantly correlated, and both are correlated with socio-demographic characteristics, including age and academic major. This situation is expected to continue and cause more severe problems.

Coping strategies are considered a control point to help students overcome the impact of Covid-19, even if students' limitations make anxiety difficult to handle. Professional nurses (primarily mental and community nurses) and poli-cymakers can contribute to efforts to reduce the pandemic's impact on students via various interventions and coun-selling to improve student coping.

Conflict of Interest statement

The author declares that there is no potential conflict of interest in relation to the authorship and publication of this article.

REFERENCE

AlAteeq, D. A., Aljhani, S., & AlEesa, D. (2020). Perceived stress among students in virtual classrooms during the COVID-19 outbreak in KSA. *Journal of Taibah University Medical Sciences*, *15*(5), 398-403. doi:10.1016/j.jtumed.2020.07.004.

Alotaibi, A., Alosaimi, F., Alajlan, A., Bin, A. K. (2020). The relationship between sleep quality, stress, and academic performance among medical students. *Journal of Family & Community Medicine*, *27*(1), 23-28. doi:10.4103/jfcm.JFCM_132_19

Batra, K., Sharma, M., Batra, R., Singh, T. P., & Schvaneveldt, N. (2021). Assessing the Psychological Impact of COVID-19 among College Students: An Evidence of 15 Countries. *Healthcare*, 9(2),222. doi:10.3390/healthcare9020222

Biswas, S., & Biswas, A. (2021). Anxiety level among students of different college and universities in India during lock down in connection to the COVID-19 pandemic. *Journal of Public Health: From Theory to Practice*, 7, 1-7. doi:10.1007/s10389-020-01431-8

Boursier, V., Gioia, F., Musetti, A., & Schimmenti, A. (2020). Facing Loneliness and Anxiety During the COVID-19 Isolation: The Role of Excessive Social Media Use in a Sample of Italian Adults. *Frontiers in Psychiatry*, 11, 1-10. doi:10.3389/fpsyt.2020.586222.

Eisenberg., Daniel., & Ezra, G. J. H. Mental Health and Academic Success in College (revised and resubmitted to the. *Journal of Economic Analysis & Policy*, 9(1), 40. doi: 10.2202/1935-1682.2191.

Frangopoulos F, Zannetos S, Nicolaou I, et al. The Complex Interaction Between the Major Sleep Symptoms, the Severity of Obstructive Sleep Apnea, and Sleep Quality. *Frontiers in*

Psychiatry, 12(February), 1-14. doi:10.3389/fpsyt.2021.630162

Fu, W., Yan, S., Zong, Q., et al. (2021). Mental health of college students during the COVID-19 epidemic in China. *Journal of Affective Disorders, 280* (2021), 7-10. doi:10.1016/j.jad.2020.11.032

Gupta, M. D., Girish, M. P., Yadav, G., Shanker, A., & Yadav, R. (2020). Coronavirus Disease 2019 and Cardiovascular System: Impacts and Implications. *Indian Heart Journal*, 72(1), 1-6. doi:10.1016/j.ihj.2020.03.006

Hacimusalar, Y., & Karaaslan, O. (2020). Assessment of sleep quality of patients with panic disorder and generalized anxiety disorder during remission: A case-control study. *Revista de Psiquiatria Clinica*, 47(1), 19-24. doi:10.1590/0101-60830000000224

Halperin, S. J., Henderson, M. N., Prenner, S., & Grauer, J. N. (2021). Prevalence of Anxiety and Depression Among Medical Students During the Covid-19 Pandemic: A Cross-Sectional Study. *Journal of Medical Education and Curricular Development*, 8, 1-7. doi:10.1177/2382120521991150

Huang, Y., & Zhao, N. (2020). Generalized anxiety disorder, depressive symptoms and sleep quality during COVID-19 outbreak in China: a web-based cross-sectional survey. *Psychiatry Research*, 288(2020), 1-6. doi:10.1016/j.psychres.2020.112954

Ishak, A. B., Illangkumaran, N. A. P., Muthiah, V. A. P. M., & Wajeeh, A. (2020). A Cross-Sectional Study on Digital Media Use , Sleep Quality and Sense of Time During Covid-19 Pandemic Among Undergraduate Students. *Journal of Social Sciences and Humanities*, 6(3):209-219. Retrieved from http://www.aiscience.org/journal/jssh

Kamaludin, K., Chinna, K., Sundarasen, S., et al. (2020). Coping with COVID-19 and movement control order (MCO): experiences of university students in Malaysia. *Heliyon*, 6(11), 1-7. doi:10.1016/j.heliyon.2020.e05339

Kandeger, A., Guler, H. A., Egilmez, U., & Guler, O. (2018). Major depressive disorder comorbid severe hydrocephalus caused by Arnold – Chiari malformation Does exposure to a seclusion and restraint event during clerkship influence medical student ' s attitudes toward psychiatry ? *Indian Journal of Psychiatry*, 59(4):520-521. doi:10.4103/psychiatry.IndianJPsychiatry.

Khero, M., Fatima, M., Shah, M. A. A., & Tahir, A. (2019). Comparison of the Status of Sleep Quality in Basic and Clinical Medical Students. *Cureus*, 11(3), 1-6. doi:10.7759/cureus.4326

Khoshaim, H. B., Al-Sukayt, A., & Chinna, K., et al. (2020). Anxiety Level of University Students During COVID-19 in Saudi Arabia. *Frontiers in Psychiatry*. 11(December), 1-7. doi:10.3389/fpsyt.2020.579750

Li, H., Zheng, L., Le, H., et al. (2020). The mediating role of internalized stigma and shame on the relationship between covid-19 related discrimination and mental health outcomes among back-to-school students in wuhan. *International Journal of Environmental Research and Public Health*, 17(24), 1-14. doi:10.3390/ijerph17249237

López, V. A., Suárez, I. D., Sanchez. L. M. A., & Ayán, C. (2021). Impact of COVID-19 Pandemic on University Students' Physical Activity Levels: An Early Systematic Review. *Frontiers in Psychology*, 11, 1-10. doi:10.3389/fpsyg.2020.624567

Marelli, S., Castelnuovo, A., Somma, A., et al. (2020). Impact of COVID-19 lockdown on sleep quality in university students and administration staff. *Journal of Neurology*, 11(July), 1-8. doi:10.1007/s00415-020-10056-6

Nwachukwu, I., Nkire, N., Shalaby, R., et al. (2020). Covid-19 pandemic: Age-related differences in measures of stress, anxiety and depression in Canada. *International Journal of Environmental Research and Public Health*, 17(17), 1-10. doi:10.3390/ijerph17176366

Patra, R. C., Kanungo, B., & Bawa, P. (2020). Mental health, sleep quality and quality of life in individuals with and without multiple health conditions during home quarantine in India due to the COVID-19 pandemic: a cross-sectional study. *F1000Research*. 9, 718. doi:10.12688/f1000research.24321.1

Pensuksan, W. C., Lertmaharit, S., Lohsoonthorn, V., et al. (2016). Relationship between poor sleep quality and psychological problems among undergraduate students in the Southern Thailand. *Walailak Journal of Science and Technology*, 13(4), 235-242. doi:10.14456/vol13iss3pp%p.

Quek, T. T. C., Tam, W. W. S., Tran, B. X., et al. The global prevalence of anxiety among medical students: A meta-analysis. *International Journal of Environmental Research and Public Health*, 16(15), 1-18. doi:10.3390/ijerph16152735

Romero, B. C., Rodríguez, A. J., Onieva, Z. M. D., Parra, F. M. L., Prado, L. M. D. C., & Hernández, M. A. (2020). Sleep pattern changes in nursing students during the COVID-19 lockdown. *International Journal of Environmental Research and Public Health*, 17(14):1-11. doi:10.3390/ijerph17145222

Savitsky, B., Findling, Y., Ereli, A., & Hendel, T. (2020). Anxiety and coping strategies among nursing students during the covid-19 pandemic. *Nurse Education in Practice*, 46(2020), 1-7. doi:10.1016/j.nepr.2020.102809

Shen, K., Yang, Y., Wang, T., et al. (2020). Diagnosis, treatment, and prevention of 2019 novel coronavirus infection in children: experts' consensus statement. *World Journal of Pediatrics*, 16(3), 223-231. doi:10.1007/s12519-020-00343-7.

Son, C., Hegde, S., Smith, A., Wang, X., & Sasangohar, F. (2020). Effects of COVID-19 on college students' mental health in the United States: Interview survey study. *Journal of Medical Internet Research*, 22(9),1-14. doi:10.2196/21279

Tang, J., Liao, Y., Kelly, B. C., et al. (2017). Gender and Regional Differences in Sleep Quality and Insomnia: A General Population-based Study in Hunan Province of China. *Scientific Reports*, 7(1), 1-9. doi:10.1038/srep43690

Tribun Pontianak. (2020). *Sejumlah Kampus di Kalbar Belum Berlakukan Kuliah Tatap Muka, Berikut Alasannya*. Retrieved from https://pontianak.tribunnews.com/2021/01/04/sejumlah-kampus-di-kalbar-belum-berlakukan-kuliah-tatap-muka-berikut-alasannya.

Tu, Z. H., He, J. W., & Zhou, N. (2020). Sleep quality and mood symptoms in conscripted frontline nurse in Wuhan, China during COVID-19 outbreak: A cross-sectional study. *Medicine (Baltimore)*, 99(26), 1-5. doi:10.1097/MD.0000000000020769

Wondie, T., Molla, A., Mulat, H., et al. Magnitude and correlates of sleep quality among undergraduate medical students in Ethiopia: cross –sectional study. *Sleep Science and Practice*, 5(1), 1-8. doi:10.1186/s41606-021-00058-2

World Health Organization. (2021). *Info Virus Corona.* Retrieved from https://covid19.who.int/.

Wu, J., Tseng, W., Lin, C., Lee, T., & Chung, M. (2020). Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the

novel coronavirus COVID- 19 . The COVID-19 resource centre is hosted on Elsevier Connect , the company ' s public news and information.

Yassin, A., Al-Mistarehi, A. H., Beni, Yonis. O., Aleshawi, A. J., Momany, S. M., & Khassawneh, B. Y. (2020). Prevalence of sleep disorders among medical students and their association with poor academic performance: A cross-sectional study. *Annals of Medicine and Surgery,* 58, 124-129. doi:10.1016/j.amsu.2020.08.046

Zhai, Y., & Du, X. (2020). Mental health care for international Chinese students affected by the COVID-19 outbreak. *The Lancet Psychiatry*, *7*(4), e22. doi:10.1016/S2215-0366(20)30089-4.