



Journal Homepage: -www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI:10.21474/IJAR01/19303
DOI URL: <http://dx.doi.org/10.21474/IJAR01/19303>



RESEARCH ARTICLE

PSYCHOLOGICAL EFFECTS OF COVID-19 PANDEMIC SCHOOL CLOSURE AMONG MEDICAL STUDENTS IN A TERTIARY INSTITUTION IN SOKOTO STATE, NIGERIA

Ango U.M¹, Babazhitsu M.², Bakare A.T³, Hali B.², Yilbat M.T¹, Musa U.¹ and Usman S.D¹

1. Department of Community Health, Faculty of Clinical Sciences, College of Health Sciences, Usmanu Danfodiyo University, Sokoto, Nigeria.
2. Department of Medical Microbiology and Parasitology, Faculty of Basic Clinical Sciences, College of Health Sciences, Usmanu Danfodiyo University, Sokoto, Nigeria.
3. Department of Psychiatry, Faculty of Clinical Sciences, College of Health Sciences, Usmanu Danfodiyo University Sokoto, Sokoto State, Nigeria.

Manuscript Info

Manuscript History

Received: 18 June 2024

Final Accepted: 20 July 2024

Published: August 2024

Key words:-

Covid-19, Lockdown, Medical Students, Sokoto, Stress, Anxiety, Depression

Abstract

Background: Lockdown was one of the preventive measures aimed at reducing the community transmission of COVID-19. This however was not without mental and emotional effects on University students most especially on the Medical students in Usmanu Danfodiyo University (UDU), Sokoto, Nigeria. The aim of this study was to access the sources of anxiety, stress and depression during COVID-19 pandemic school closure among medical students in UDU, Sokoto, Nigeria

Methods: A descriptive study was carried out among medical students of the Usmanu Danfodiyo University, Sokoto, Nigeria selected by multi-stage sampling technique. A set of pretested, semi-structured self-administered questionnaires were used to collect data on the research variables. Data were analyzed using IBM® SPSS version 26 statistical package

Results: The mean age of the respondents was 24.7+ 3.5 SD and majority 101 (56.8%) were within the age range of 18-23 years. Greater proportion (67.6%) of the respondents were males, with about one-fifth 36 (19.6%) of the respondents reported living alone during the school closure while majority 155 (86.6%) had worries for not attending lectures during Covid-19 school closure. A majority, 159 (88.8%) of them were worried about the missed academic session and 153 (85.5%) reported that lost academic session has affected their future plans.

Conclusion: About one-fifth of the respondents lived alone and most of them were worried about the missed academic sessions while a greater proportion of them reported that loss of academic session has affected their future plans. Digital tools learning should be used to ensure online teaching during school closure to avoid loss of academic session for the students and programmes focusing on stress, anxiety as well as depression prevention and management should also be considered and introduced in the institutions of higher learning.

Copyright, IJAR, 2024. All rights reserved.

Corresponding Author:- Dr. Umar Mohammed Ango

Address:- Department of Community Health, Faculty of Clinical Sciences, College of Health Sciences, Usmanu Danfodiyo University, Sokoto, Nigeria.

Introduction:-

Corona Virus disease (COVID-19), a viral Pandemic was discovered in China, in the year 2019. The origin of the viral disease was traced to a wet market in Wuhan, a Chinese City in Hubei province. The disease is caused by a novel virus called Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).¹ As of 23rd, June, 2024, the global confirmed cases of COVID-19 stood at 775 million with over 7 million deaths although the number has been on the decline.²

In Nigeria, 267,188 confirmed cases of COVID-19 were reported as of 13th April, 2024 with 3,155 deaths and 259,953 recoveries.³ At the onset of Covid-19, there were no specific therapeutics or vaccines available; only supportive treatment was used.^{4,5} During the pandemic, several countries at different times implemented social distancing, quarantine, and isolation to reduce the chance of contact between infected and non-infected persons.⁶ Educational institutions host millions of students with high potential for easy transmission of infections. Consequently, closure of the educational institutions was found to reduce the spread of the infectious disease in the community by breaking critical chains of transmission.^{7, 8, 9}

During the COVID-19 pandemic, many universities and other educational institutions worldwide postponed or canceled all university activities and changed the education format from face-to-face to online teaching.^{10,11} Closing down of colleges and universities and shifting to an online mode of education, no direct interaction with teachers, uncertainty about completing courses and exams, and social media overuse were all undoubtedly major causes of stress to the students thus increasing psychological problems among the student population.^{12, 13}

The COVID-19 pandemic along with all its restrictions and changed lifestyle also created many problems like uncertainty about life, deficient hospital resources, job loss, financial difficulties, and even difficulty in the supply of day-to-day needed things. All these things caused an increase in psychological problems in the community as a whole.^{14,15}

Outbreaks such as the Covid-19 pandemic can cause undesirable effects on the psychological health of students, which results in unfavorable effects on learning.^{16,17}

Similarly, some studies indicate that the psychological effects on college students by public health emergencies are expressed as anxiety, worry, and fear.¹⁸

A study done in China during the initial outbreak of COVID-19 reported that out of 53.8% of rated psychological impact of the outbreak, 16.5% reported moderate to severe depression, 28.8% reported moderate to severe anxiety and 8.1% reported moderate to severe stress level.¹⁹

A review of existing literature revealed that the symptoms of anxiety and depression (16 to 28%) and self-reported stress (8%) are common psychological reactions to the COVID-19 pandemic.²⁰

Several studies showed that the prevalence of depression, anxiety, and stress was high among university students. From studies conducted in Pakistan and Bangladesh, the prevalence was 34% and 82.4% for depression and 45% and 87.7% for anxiety respectively.^{21, 22}

A study in Nigeria indicated anxiety and depression among the study subjects to be 31.9% and 41.4% respectively.¹⁵ In Ethiopia, two studies reported that depression, anxiety, and stress among the study subjects were 21.2%, 77.2% and 27.7% and 71.8%, 32.5% and 48.5% respectively.^{24, 25}

To the best of the knowledge of authors, no study has been carried out in Sokoto and its environs to assess the sources of stress, anxiety and depression among the Medical Students. It is in this regards that this study was carried out with the objective of assessment of the psychological effects of COVID 19 pandemic school closure among the study subjects. It is hoped that findings from the study can shape policy decisions that will mitigate future effects of closure of schools during pandemics on the psychological wellbeing of the students

Materials and Methods:-

Study area, design and population

This was a descriptive study conducted among undergraduate medical students of the Usmanu Danfodiyo University, Sokoto. Usmanu Danfodiyo University Sokoto (UDUS) is one of the second generation universities in Nigeria located in Sokoto state, North-Western Nigeria. The University has many colleges, schools and faculties and runs both undergraduates and postgraduate Programmes.

College of Health Sciences is a college under the UDUS, with faculties, schools and departments and offer both undergraduate and post graduate Programmes. All undergraduate medical students from 200 to 600 level who were present at time of study were enrolled into the study while newly admitted and critically ill students were excluded.

Using the Cochran formula for calculating the sample size for the descriptive studies²⁶, and 82.4% anxiety level among university students from the previous study²², a total of 179 students were recruited into the study. **A line list of the student for each level was obtain from the school authority and proportionate allocation was done based on the number of students obtained from each level. A two- stage sampling technique was used to select the study participants.** At first stage, using the students' list from 200 to 600 levels to constitute the sampling frame, a **Stratified sampling technique was employed to obtain total number of male and female in each level and proportionate allocation of the sample size was done** (in direct proportion to the number of males and females in the respective levels). **At the second stage the eligible study subjects were selected by systematic sampling technique based on the number allocated to each strata.** A one in three samples of subjects was selected and this was continued until the desired sample size in the different levels of study was gotten.

A semi-structured, self-administered questionnaire built in Open Data Kit (ODK) software was used to obtain information on respondents' socio-demographic characteristics, sources of stress, anxiety and depression among the respondents during Covid-19 pandemic school closure. The questionnaire was reviewed by senior researchers in the departments of community medicine and psychiatry in Usmanu University, Sokoto (UDUS) to ascertain content validity. It was then pretested on 18 medical and laboratory students in the UDUS, Nigeria. Some questions were rephrased for clarity based on the observations made during the pretesting. Four 500 level nursing students and four medical records staff assisted in questionnaire administration after pre-training on conduct of survey research, the study objectives, and questionnaire administration. Ethical clearance was obtained from the Health Research Ethics committee of Usmanu Danfodiyo University, Sokoto. Written informed consent was obtained from the participants before data collection.

Data was entered into and analyzed using the IBM® SPSS Statistical Package version 26.

Frequency runs were done for further editing and cleansing of the e-data. Frequency and percentages distribution tables were constructed.

Results:-

Table 1:- Socio-demographic characteristics of the respondents.

Variables	Frequency (n = 179)	Percent (%)
Age (years)		
18-23	101	56.4
24-29	73	40.8
30-36	5	2.7
Sex		
Female	58	32.4
Male	121	67.6
Tribe		
Hausa/Fulani	107	59.8
Yoruba	33	18.4
Igbo	15	8.4
Others*	24	13.4
Religion		
Islam	150	83.8

Christianity	27	15.1
Others	2	1.1
Marital status		
Single	156	87.2
Married	21	11.7
Separated	0	0
Divorced	2	1.1
Level of study		
200	47	26.3
300	13	10.1
400	59	33.0
500	37	20.7
600	18	10.1
Mean age (Mean + Standard deviation) = 24.7 + 3.5		
*Others = Zabarma, Igala, etc.		

The mean age of the respondents was 24.7 + 3.5SD and majority were within the age range of 18-23 years. A total, 121 (67.6%) were males, most 121(87.2%) of them were single while 59 (33.0%) were in 400 level

Table 2:- Sources of stress among the respondents.

Variable	Frequency (n = 179)	Percent (%)
Lived alone during school closure		
Yes	35	19.6
No	144	80.4
Had contact with any Covid-19 patient		
Yes	24	13.4
No	155	86.6
Close relative /friend tested positive for Covid-19		
Yes	47	26.3
No	132	73.7
Engaged in physical activities during school closure.		
Yes	31	17.3
No	148	82.7
Worried about lack of adequate facilities to observe COVID 19 preventive measures		
Yes	144	80.4
No	35	19.6
Found it difficulty/impossible to engage in any sport activity during Covid-19 school closure		
Yes	107	59.8
No	72	40.2
Worried that COVID-19 protocols such as social distancing, use of face masks etc. may not be strictly adhered to when schools are reopened		
Yes	153	85.5
No	26	14.5

About one-fifth 35(19.6%) of the respondents lived alone during the COVID 19 school closure while only 31 (17.3%) reported to be engaged in some physical activities. Over a quarter 47 (26.3%) reported that close relatives/ friends had COVID 19 and about 24 (13.4%) had contact with COVID 19 positive patient. Large proportion of the respondents (80.4%) were worried about inadequate facilities to observed COVID 19 preventive measures and most 85.5% were worried that COVID 19 protocols may not be adhered to when schools reopened

Table 3:- Sources of anxiety among the respondents.

Variable	Frequency (n = 179)	Percent (%)
Worried about Covid-9 school closure		
Yes	163	91.1
No	16	50.3
Worried for not attending lectures during Covid-19 school closure		
Yes	155	86.6
No	24	13.4
Worried by being separated from fellow students during Covid-19 school closure		
Yes	161	89.6
No	18	10.1
Finds it difficult/impossible to see colleagues during school closure		
Yes	89	49.7
No	90	50.3
Worried about increased positive cases during school closure		
Yes	157	87.7
No	22	12.3
Worried while waiting for the outcome of Covid-19 test done		
Yes	24	13.4
No	155	86.6

Most 161 (89.6%) of the respondents reported worries for being separated from their colleagues and 155 (86.6%) were worried for not attending lectures. Majority of the respondents 157 (87.7%) were worried about the increased number of cases while 24 (13.4%) expressed worries while waiting for the outcome of COVID 19 test results done

Table 4:- Sources of depression among the respondents.

Variable	Frequency (n = 179)	Percent (%)
Worried about Increased number of deaths from Covid-19 pandemic during school closure		
Yes	146	81.6
No	33	18.4
Social support during the COVID 19 school closure		
Yes	21	11.7
No	158	88.3
Experienced financial hardship during COVID 19 school closure		
Yes	61	34.1
No	118	64.9
Experienced poor sleep during COVID-19 school closure		
Yes	61	34.1
No	118	65.9
Test result		
Positive	1	0.6
Negative	178	99.4
Worried about the lost academic session	159	88.8
Future plans affected by lost academic session	20	11.2
Yes	153	85.5
No	26	14.5

Most of the respondents expressed worries about the increased number of deaths due to COVID 19 although only 1(0.6%) of the respondents tested positive for COVID 19. A small proportion (11.7%) of the respondents had social support while more than one-third of them 61 (34.1%) reported poor sleep and financial hardship. Most, 159 (88.8%) of the study subjects opined that they were worried about lost academic sessions and majority 153 (85.5%) stated that lost academic sessions affected their future plans

Discussion:-

This study assessed the Psychological effects of COVID-19 Pandemic school Closure among medical students in Usmanu Danfodiyo University Sokoto, Nigeria.

The mean age of the respondents was 24.7+ 3.5 SD and majority 101 (56.8%) were aged between 18 to 23 years. The preponderance of young ages among the respondents may not be unrelated to the fact that the study participants were University undergraduate students. This is similar to a study done in Northwest Ethiopia among the graduating class of University of Gondar in which 58.6% of the respondents were within the age group 20-24years²⁷, it is also in keeping with the study which assessed psychological impact of COVID 19 among the health professional students at the university of Zambia where 64.8% of the participants were between 19 to 24 years.²⁸ The current study is also in agreement with the studies done in Southwest Ethiopia, Saudi Arabia and United States of America where majority of the respondents were aged between 18- 25.^{24,29,30}

A higher proportion (67.6%) of the respondents were males; this is in consonance with studies conducted elsewhere with majority of the respondents being males.^{24, 27, 31} However, the high proportion (67%) of males in our current study is at variance with findings from similar studies in Nigeria, Zambia, Saudi Arabia, China, Italy, USA and Germany where majority of the respondents were females.^{23, 28, 29, 30, 32, 33, 36}

Most (87.2%) of the respondents in this study were single, and this preponderance of unmarried respondents is not surprising as the study was carried-out among undergraduate university students who cannot combine family life with the ever demanding medical education they undergo. This finding is in consonance with the studies done by Steward et al., Gewalt et al. and Li et al. where most of their participants were single.^{28, 34, 36} However, our finding is in contrast to a study by Alfawaz et al. in a Saudi state university's academic community where over half (50.4%) of the respondents were reported to be married.²⁹

One of the psychological effects of the covid-19 school closure was stress and living alone was identified as a source of stress. In this study, it was discovered that close to one-fifth of the respondents (19.6%) lived alone during the COVID-19 school closure which is in tandem with the finding of a study in Bangladesh where 21.9% of the respondents reported that they lived alone during COVID-19 school closure.³¹ However, the proportion of our respondents living alone was higher than what was obtained by Mekonen et al. in Ethiopia (12.5%)²⁷, and another study by Aylie and colleagues in Ethiopia (42.0%).²⁴ For students in our study area, living alone is not uncommon since most of the students come from different states of Nigeria and the halls of residence cannot accommodate all students hence their quest to acquire rented apartments and live alone.

Seeing close relations and friends testing positive to Covid-19 was another source of stress. Findings from our study showed that a sizeable number 47 (26.3%) of the study subjects opined that some of their relatives tested positive to COVID-19, which was observed in other studies^{24, 27, 31}, however, a study in Italy reported a very much higher value than the current study (46.7%).³³

Being kept incommunicado with friends and partners was another source of anxiety observed amongst the subjects. Findings from this study revealed that close to half of the respondents mentioned that they found it difficult to see their partners and up to 91.1% said they were worried about the school closure. Regarding the difficulty to see partners, the value obtained in this study is in keeping with finding of a study done by Akin-Odanye et al. (55.8%)³⁵ but higher value was reported by Villani et al. (70.0%).³³ In this same vein, with respect to worries over the closure of schools, other researchers reported much lower values compared to our study and this difference could be attributable to the different study locations.^{27, 36}

One of the sources of depression amongst the subjects during the schools' closure was poor or inadequate sleep. More than one-third 61(34.1%) reported poor sleep during the COVID-19 pandemic school closure and this finding is in agreement with the finding of a study in Saudi Arabia where (32.2%)²⁹ of the participants reported poor sleep;

however, a study in Germany reported a lower value³⁶. In contrast to the finding in our study, another study in Turkey observed that a larger proportion of their respondents reported poor sleep (73.2%).³⁷

The current study showed that most of the participants 159 (88.8%) were worried about the missed academic session and this is supported by the studies of Dhar et al. and Akin-odanye et al.^{31,35} Also up to (85.5%) of the respondents were concerned about the lost academic session affecting their future plans and this in concert with findings from other studies.^{35,38}

Over one-third of the respondents 61(34.1%) in this study reported that they encountered financial hardship during the COVID 19 school closure which may not be unrelated to the fact that most revenue generating avenues and offices where their parents and guardians worked were closed down during the initial stage of the pandemic hence their inability to obtain their usual stipends, and this is in agreement with a study done by Shahira et al. in Malaysia who reported that 34.9% of the participants in their study faced financial hardship.³⁹ However, compared to the current study, lower values were reported in several studies done across the globe.^{22,31,40,41}

Conclusion and Recommendations:-

Findings from this study revealed that sources of stress, anxiety and depression were living alone, worry about lost academic session, financial hardship and future plan affected by lost academic session respectively. Government should ensure regular and adequate financial support during lockdown periods and digital tools learning should be used to ensure online teaching during school closure to avoid loss of academic session for the students. School management should ensure that programmes focusing on prevention and management of stress, anxiety as well depression among the students of institutions of higher learning are put in place and sustained at all times. In addition, longitudinal studies and interventions to promote mental well-being in institutions such as universities need to be intensified.

References:-

1. Cucinotta D, and Vanelli M. WHO Declares COVID-19 a Pandemic. *Acta Biomed.* 2020;91(1): 157–160].
2. World Health Organization(WHO). WHO Coronavirus Disease (COVID-19) Dashboard, Geneva,Switzerland,: WHO; 2024 [Available from: <https://covid19.who.int/>.]
3. Nigeria Center for Disease Control(NCDC). COVID-19 in Nigeria, Abuja, Nigeria:Nigeria Center for Disease Control; 2024 [Available from: <https://covid19.ncdc.gov.ng/>.]
4. Shaker MS, Oppenheimer J, Grayson M, Stukus D, Hartog N, et al. COVID-19: Pandemic contingency planning for the allergy and immunology clinic. *J Allergy ClinImmunolPract.* 2020;8:1477–88.e5
5. Zimmermann P, Curtis N. Coronavirus Infections in Children Including COVID-19: An overview of the epidemiology, clinical features, diagnosis, treatment and prevention options in children. *Pediatr Infect Dis J.* 2020;39:355–68]
6. Wilder-Smith A, Freedman DO. Isolation, quarantine, social distancing and community containment: Pivotal role for old-style public health measures in the novel coronavirus (2019-nCoV) outbreak. *J Travel Med.* 2020;27:1–4.]
7. Kawano S, Kakehashi M. Substantial impact of school closure on the transmission dynamicsduring the pandemic flu H1N1-2009 in Oita, Japan. *PLoS One.* 2015;10:e0144839. [PMC free article]
8. Luca GD, Kerckhove KV, Coletti P, Poletto C, Bossuyt N, Hens N, et al. The impact of regular school closure on seasonal influenza epidemics: A data-driven spatial transmission model for Belgium. *BMC Infect Dis.* 2018;18:29–45. [PMC free article] [PubMed] [Google Scholar]
9. Wheeler CC, Erhart LM, Jehn ML. Effect of school closure on the incidence of influenzaamong school-age children in Arizona. *Public Health Rep.* 2010;125:851–9]
10. Gewin V. Five tips for moving teaching online as COVID-19 takes hold. *Nature.* 2020;580:295–6;
11. Lau J, Yang B, Dasgupta R. Will the coronavirus make online education go viral? 2020. [Accessed 27th July 2024]. Available from: <https://www.timeshighereducation.com/features/will-coronavirusmake-online-educationgo-viral>]
12. Gupta N, Luthra A, Shailaja B, Chaudhury S, Saldanha D. Impact of COVID-19 pandemic on mental health of health-care workers in a tertiary care teaching and dedicated COVID-19 hospital. *Ind Psychiatry J* 2021;30(Suppl S1):56–62.
13. Shailaja B, Singh H, Chaudhury S, Thyloth M. COVID-19 pandemic and its aftermath:Knowledge, attitude, behavior, and mental health-care needs of medical undergraduates. *Ind Psychiatry J* 2020;29:51–60.

14. Srivastava K, Chaudhury S, Soumya B, Prakash J. Mental health aspects of Pandemics with special reference to COVID 19. *Ind Psychiatry J* 2020;29:1–8.
15. Chag J, Chaudhury S, Saldanha D. Economic and psychological impact of COVID-19 lockdown: Strategies to combat the crisis. *Ind Psychiatry J* 2020;29:362–8.
16. Luca GD, Kerckhove KV, Coletti P, Poletto C, Bossuyt N, Hens N, et al. The impact of regular school closure on seasonal influenza epidemics: A data-driven spatial transmission model for Belgium. *BMC Infect Dis* 2018;18:29-45.
17. Wheeler CC, Erhart LM, Jehn ML. Effect of school closure on the incidence of influenza among school-age children in Arizona. *Public Health Rep* 2010;125:851-9.
18. Gewin V. Five tips for moving teaching online as COVID-19 takes hold. *Nature* 2020;580:295-6
19. Zhu N, Zhang D, Wang W, Li X, Yang B, Song J, Zhao X, Huang B, Shi W, Lu R: A novel coronavirus from patients with pneumonia in China, 2019. *New England journal of medicine* 2020, 382:727-33. 22:423-9.
20. Rajkumar RP. COVID-19 and mental health: A review of the existing literature. *Asian J Psychiatr.* 2020; 52:102066. doi:10.1016/j. ajp.2020.102066
21. Salman M, Asif N, Mustafa ZU, et al. Psychological impact of COVID-19 on Pakistani University Students and how they are coping. *medRxiv.* 2020.11.
22. Islam MA, Barna SD, Raihan H, Khan MNA, Hossain MT. Depression and anxiety among university students during the COVID-19 pandemic in Bangladesh: a web-based cross-sectional survey. *PLoS One.* 2020;15(8):e0238162. doi:10.1371/journal. pone.023816213
23. Ojewale LY Psychological state, family functioning, and coping strategies among students of the University of Ibadan, Nigeria, during the COVID –19 lockdown. 2020.14.
24. Aylie NS, Mekonen MA, Mekuria RM. The psychological impacts of COVID-19 pandemic among university students in Bench-Sheko Zone, South-west Ethiopia: a community-based Cross-sectional Study. *Psychol Res Behav Manag.* 2020; 13:813. doi:10.2147/ PRBM.S27559315.
25. Tadesse AW, Mihret S, Biset G, Muluneh A. Psychological impacts of COVID-19 among college students in Dessie Town, Amhara Region, Ethiopia; Cross-sectional Study. 2020.
26. Ibrahim, T. *Research Methodology and dissertation writing for the health and allied health professionals.* Abuja: Cress Global links ltd; 2009.
27. Mekonen EG, Workneh BS, Ali MS, Muluneh NY. The Psychological Impact of COVID-19 Pandemic on Graduating Class Students at the University of Gondar, Northwest Ethiopia, *Dove Press journal: Psychology Research and Behavior Management* 2021:14 109–122
28. Steward Mudenda et al. Psychological impact of coronavirus disease (COVID-19) on health professions students at the University of Zambia: a cross-sectional study. *Pan African Medical Journal.* 2022;42(237). 10.11604/pamj.2022.42.237.34041
29. Alfawaz HA, Wani K, Aljumah AA, Aldisi D, Ansari MGA, Yakout SM, Sabico SM. Al-Daghri NM. Psychological well-being during COVID-19 lockdown: Insights from a Saudi State University’s Academic Community, *Journal of King Saud University – Science* 33 (2021) 101262
30. Browning MHEM, Larson LR, Sharaievskaya I, Rigolon A, McAnirlin O, Mullenbach L, et al. (2021) Psychological impacts from COVID-19 among university students: Risk factors across seven states in the United States. *PLoS ONE* 16(1): e0245327. <https://doi.org/10.1371/journal.pone.0245327>
31. Dhar BK, Ayitte FK, and Sarkar SM. Impact of COVID-19 on Psychology among the University Students from different public and private universities of Bangladesh, *Global Challenges* 2020, Vol.4, 2000038
32. Ren Z, Xin Y, Ge J, Zhao Z, Liu D, Ho RCM and Ho CSH (2021) Psychological Impact of COVID-19 on College Students After School Reopening: A Cross-Sectional Study Based on Machine Learning. *Front. Psychol.* 12:641806.
33. Villani L, Pastorino R, Molinari E, Anelli F, Ricciardi W, Graffigna G, Boccia S. Impact of the COVID-19 pandemic on psychological well-being of students in an Italian university: a web-based cross-sectional survey *Globalization and Health* (2021) 17:39
34. Li H, Hafeez H and Zaheer MA (2021) COVID-19 and Pretentious Psychological Well-Being of Students: A Threat to Educational Sustainability. *Front. Psychol.* 11:628003
35. Akin-Odanye EO, Kaninjing E, Ndip RN, Warren CL, Asuzu CC, Lopez I, Muiruri C, Vilme H. Psychosocial Impact of COVID-19 on students at Institutions of Higher Learning, *Eur J Educ Stud.* 2021 ; 8(6): 112–128. doi:10.46827/ejes.v8i6.3770.
36. Gewalt SC, Berger S, Krisam R, Breuer M (2022) “Effects of the COVID-19 pandemic on university students’ physical health, mental health and learning, a cross-sectional study including 917 students from eight universities in Germany”. *PLoS ONE* 17(8): e0273928. <https://doi.org/10.1371/journal.pone.0273928>

37. Kara B. Understanding the psychological impact of the COVID-19 pandemic on university students. *AIMS Medical Science*, 9(1): 1–4: <http://www.aimspress.com/journal/medicalScience>
38. Sauer N, Sałek A, Szlasa W, Ciciela T, Obara J, Gawe S, Marciniak D,³ and K Karłowicz-Bodalska K. The Impact of COVID-19 on the Mental Well-Being of College Students, *Int J Environ Res Public Health*. 2022 May; 19(9): 5089.
39. Shahira MN, Hanishya H, Lukman ZM, Normala R, Azlini C, Kamal MY. Psychological Well-Being among University Students in Malaysia. *International Journal of Research and Innovation in Social Science (IJRISS)*, December 2018 Volume II, Issue XII
40. Sujan M S H, Haghithoseini A, Tasnim R, Ripon R K, Akter M, Ripon S A, Hasan M M, Uddin M R, Ferdous M Z. Prevalence and determinants of mental well-being and satisfaction with life among university students amidst the COVID-19 pandemic. *Asian J. Health Sci.*; 2023, 9(1):50
41. Carmem M, Nathalie D, Granic GD. University Students' Well-Being and Engagement in Activities in the Early Days of Covid-19, *Applied Research in Quality of Life* (2023) 18:279–303 <https://doi.org/10.1007/s11482-022-10119-y>.