COVID-19 pandemic and mental health of universities’ students in Africa: a systematic review

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Table 4: Methodological quality and risk of bias of included studies (according to the tool developed by Hoy et al.)

Study	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Overall risk of study bias
	Yes = 1 = Low Risk, No = 0 = High Risk										
Abas et al. 2021	Low Risk	High Risk	Low Risk	High Risk	High Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Moderate Risk (Score of 7)
Awoke et al. 2021	High Risk	High Risk	High Risk	Low Risk	High Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Moderate Risk (Score of 6)
Ayile et al. 2020	Low Risk	High Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk (Score of 9)
Davis et al. 2021	Low Risk	High Risk	High Risk	High Risk	High Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Moderate Risk (Score of 6)
Elhadi et al. 2021	Low Risk	High Risk	High Risk	High Risk	High Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Moderate Risk (Score of 6)
El-Mommed et al. 2021	Low Risk	High Risk	High Risk	High Risk	High Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Moderate Risk (Score of 6)
Eisangri et al. 2021	Low Risk	Low Risk	Low Risk	High Risk	High Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk (Score of 8)
Gharzawy et al. 2020	Low Risk	High Risk	High Risk	High Risk	High Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Moderate Risk (Score of 6)
Mekonen et al. 2021	Low Risk	Low Risk	Low Risk	Low Risk	High Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk (Score of 9)
Rahabi et al. 2020	High Risk	High Risk	High Risk	High Risk	High Risk	High Risk	Low Risk	Low Risk	Low Risk	Low Risk	High Risk (Score of 4)
Saguem et al. 2021	Low Risk	High Risk	Low Risk	High Risk	High Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Moderate Risk (Score of 7)
Simegn et al. 2021	Low Risk	Low Risk	Low Risk	Low Risk	High Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk (Score of 9)

List of the 10 questions (Q1-Q10) applied to the studies: Q1. Was the study's target population a close representation of the national population in relation to relevant variables, e.g., age, sex, occupation? Q2. Was the sampling frame a true or close representation of the target population? Q3. Was some form of random selection used to select the sample, OR, was a census undertaken? Q4. Was the likelihood of nonresponse bias minimal? Q5. Were data collected directly from the subjects (as opposed to a proxy)? Q6. Was an acceptable case definition used in the study? Q7. Was the study instrument that measured the parameter of interest shown to have reliability and validity (if necessary)? Q8. Was the same mode of data collection used for all subjects? Q9. Was the length of the shortest prevalence period for the parameter of interest appropriate? Q10. Were the numerator(s) and denominator(s) for the parameter of interest appropriate?

Overall risk of bias: considering a score of 1 for low risk of bias item (question), and a score of 0 for high risk, the overall risk of bias is determined according to the sum of question bias score (Q1 score + Q2 score + ... + Q9 score + Q10 score). Studies are therefore be classified according to their total score as low risk of bias (8 – 10), moderate risk of bias (6 – 7), and high risk of bias (0 – 5).

Figure 1: This is a caption

Table 3: Qualitative synthesis of studies included in the systematic review

First author and year of publication	Study characteristics (country, setting, design, period)	Sampling method and Sample size (overall, for male and/or female)	Participants' characteristics (age being in years)	Mental health issues assessed, with tools and cut-off used	Frequencies of mental health issues assessed in the study	Reported factors of mental health issues assessed
Abas et al. 2021	Sudan, 21 universities, online cross-sectional study, May 2020 (during the 1 st COVID-19 wave)	Probabilistic (Stratified random sampling), total sample size of 478 (344 males and 134 females)	Unspecified specialties, mean age of 21.6 ± 2.8 , upper extreme of 39 and lower one not reported	Anxiety. Beck Anxiety Inventory / BAI. Scores of 0-21 = low anxiety; 22-35 = moderate anxiety; ≥ 36 = potentially concerning level of anxiety	Of the study sample, 75.1% had low anxiety, 15.5% had moderate anxiety and 9.4% had potentially concerning level of anxiety	Not complying with the curfew measures, and the preventive etiquette of covering mouth while coughing or sneezing were associated with potentially concerning levels of anxiety while experiencing fever, sore throat and myalgia were associated with moderate anxiety
Awoke et al. 2021	Ethiopia, one university, cross-sectional email-based survey, August to September 5, 2020	Non probabilistic (combination of purposive and snowball sampling techniques), total sample size of 337 (174 males and 163 females)	Health science students, mean age of 22.8 ± 1.8 , age range not reported	Stress. Perceived stress scale (PSS)-10. Scores ≥ 25 = high perceived stress, and scores < 25 = low perceived stress	Of the study sample, 35.9% reported high perceived stress levels while 64.1% reported low perceived stress	Personal perception of being stressed by the daily number of COVID-19 cases/deaths in Ethiopia, rare online talk/chat with friends, confusion due to the inconsistent strategies developed by health/government authorities, perception of self/family members being at risk of getting sick, decreased household income following the COVID-19 pandemic
Aylie et al. 2020	Ethiopia, more than one university, community based cross-sectional study (phone calls), May 15 to June 15, 2020	Probabilistic (Systematic sampling technique), total sample size of 314 (199 males and 115 females)	Unspecified specialties, 22.8 ± 2.8 , lower extreme of 18 years, upper extreme not reported	Depression, anxiety, stress (DAS). DAS Scale (DASS) with subscales for depression, anxiety, stress, and respective cut-offs of ≥ 10 , ≥ 08 and ≥ 15	Of the study sample, 21.3% had depression, 27.1% had anxiety and 32.5% had stress	For depression: being female, staying at home, history of medical illness, and poor and moderate social support For anxiety: not living with their parents, relatives got coronavirus and low family income For stress: substance use, depression, anxiety, and poor social support
Davis et al. 2021	Liberia, one university, cross-sectional email-based survey, July 1 to October 30, 2020	Non probabilistic (Purposive sampling), total sample size of 103 (63 males and 40 females)	Pharmacy and medical students, median age of 29 [interquartile range of 26-3], age ≥ 18 , no range reported	Depression. Patient Health Questionnaire with 8 items (PHQ-8). Positive depression screening if ≥ 10	Of the study sample, 19.4% had a positive depression screen	Concerns about the health of household members, household finances, and sharing a house with more people

Figure 2: This is a caption

Table 2: Data extraction form

BIBLIOMETRIC PROFILE	
Family name of the first author	
Year of publication	
Journal of publication	
STUDY AND PARTICIPANTS CHARACTERISTICS	
Country of the study	
Study design	1. Cross-sectional 2. Cohort study (baseline data) 3. Case control study 4. Unclear study design
Study period	
Study setting	1. One Faculty 2. More than one Faculty of one university 3. More than one university
Subtype of university students	
Sampling method	1. Probabilistic (to specify) 2. Non probabilistic (to specify) 3. Unclear
Minimal sample size	1. Calculated AND attained 2. Calculated BUT NOT attained 3. Not calculated
Type of data collection process	1. Direct (paper version of data collection form) 2. Social media (WhatsApp, Facebook, etc.) 3. E-mail 4. Other (to precise)
Mean or median age (If not reported, please write NR.)	
Inferior limit of age in years (as reported in the results or in the selection criteria) (If not reported, please write NR.)	
Superior limit of age in years (as reported in the results or in the selection criteria) (If not reported, please write NR.)	
KEY DATA EXTRACTION SECTION	
Label of the studied condition	
Tool or method used to conclude (Write NR if not reported)	
Cut-off used (Write NR if not reported)	
Total sample size	
Total number of male participants (Write NR if not reported)	
Total number of female participants (Write NR if not reported)	
Frequency of the studied condition (with details according to the severity)	
Associated or risk factors of the studied condition (Write NR if not reported)	

Figure 3: This is a caption

Table 1: Search strategy used, adapted to each of our databases

Database	Search strategy	Last search date
PubMed	(("Mental health" OR "Psychological" OR "Psychiatric" OR "Stress" OR "Anxiety" OR "Depression" OR "Depressive disorder*" OR "Mood" OR "Addiction" OR "Substance abuse" OR "Substance use disorder*") AND ("Students") AND ("COVID-19" OR "Coronavirus disease 2019" OR "SARS-CoV-2" OR "Severe acute respiratory syndrome coronavirus 2" OR "2019-nCoV" OR "2019 novel coronavirus") AND (((("Africa"[MeSH Terms]) OR "africa*" OR "Algeria" OR "Angola" OR "Benin" OR "Botswana" OR "Burkina Faso" OR "Burundi" OR "Cameroon" OR "Cape Verde" OR "Central African Republic" OR "Chad" OR "Comoros" OR "Congo" OR "Democratic Republic of Congo" OR "Djibouti" OR "Egypt" OR "Equatorial Guinea" OR "Eritrea" OR "Ethiopia" OR "Gabon" OR "Gambia" OR "Ghana" OR "Guinea" OR "Guinea Bissau" OR "Ivory Coast" OR "Cote d'Ivoire" OR "Jamahiriya" OR "Kenya" OR "Lesotho" OR "Liberia" OR "Libya" OR "Libia" OR "Madagascar" OR "Malawi" OR "Mali" OR "Mauritania" OR "Mauritius" OR "Morocco" OR "Mozambique" OR "Mocambique" OR "Namibia" OR "Niger" OR "Nigeria" OR "Principe" OR "Rwanda" OR "Sao Tome" OR "Senegal" OR "Seychelles" OR "Sierra Leone" OR "Somalia" OR "South Africa" OR "Sudan" OR "Swaziland" OR "Tanzania" OR "Togo" OR "Tunisia" OR "Uganda" OR "Western Sahara" OR "Zaire" OR "Zambia" OR "Zimbabwe" OR "Central Africa" OR "Central African" OR "West Africa" OR "West African" OR "Western Africa" OR "Western African" OR "East Africa" OR "East African" OR "Eastern Africa" OR "Eastern African" OR "North Africa" OR "North African" OR "Northern Africa" OR "Northern African" OR "South African" OR "Southern Africa" OR "Southern African" OR "sub Saharan Africa" OR "sub Saharan African" OR "subSaharan Africa" OR "subSaharan African") NOT ("guinea pig" OR "guinea pigs" OR "aspergillus niger" OR "African American" OR "African Americans"))))	July 24, 2021 at 00:00 GMT (Greenwich Mean Time)
EMBASE	((mental health/exp OR 'mental health' OR (mental AND (health/exp OR health)) OR psychological OR psychiatric OR stress/exp OR stress OR anxiety/exp OR anxiety OR depression/exp OR depression OR depressive disorder/exp OR depressive disorder OR (depressive AND (disorder/exp OR disorder)) OR mood/exp OR mood OR 'addiction'/exp OR addiction OR 'substance abuse'/exp OR 'substance abuse' OR (substance AND ('abuse'/exp OR abuse)) OR 'substance use disorder'/exp OR 'substance use disorder' OR (substance AND use AND (disorder/exp OR disorder))) AND ('students'/exp OR 'students') AND (covid-19/exp OR 'covid-19' OR 'coronavirus disease' OR 'sars-cov-2'/exp OR 'sars-cov-2' OR 'severe acute respiratory syndrome coronavirus 2'/exp OR 'severe acute respiratory syndrome coronavirus 2' OR '2019-ncov'/exp OR '2019-ncov' OR	July 24, 2021 at 00:15 GMT

Figure 4: This is a caption

Figure 1: PRISMA Flow Chart of study selection

Figure 5: This is a caption

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Abstract

Background: In addition to its direct mortality and morbidity, it has been reported that the coronavirus disease 2019 (COVID-19) can negatively impact psychological well-being of some populations. This systematic review aimed to summarize data pertaining to African universities students' mental health during this pandemic.

Methods: PubMed/MEDLINE, EMBASE and African Journals Online (AJOL) were systematically searched up to July 24, other to retrieve observational studies realized during the COVID-19 pandemic, and which assessed any mental health condition (notably depression, anxiety and stress) among students from African universities. Risk of bias appraisal of included studies was performed using the tool conceived by Hoy and colleagues. Results were presented as narrative, graphical and tabular summaries.

Results: A total of 12 studies were included for a sample size of 7,293 university students spread over seven countries. The overall quality of finally retained studies was moderate, and the Depression, Anxiety and Stress Scale 21-items (DASS-21) was used in 50% of these studies. We found that the prevalence of depression varied from 21.3% to 78%, with the frequency of severe depression prevalence ranged from 9.7% to 31.5%. We found that the prevalence of all anxiety levels (at least mild) ranged from 27.1% to 64.5%, with a frequency of severe anxiety going from 9.4% to 29.9%. The prevalence of mild to severe stress varied between 22.2% and 47.8%, with severe cases frequencies varying between 12.8% and 17.5%. The most reported factors associated with depression/ anxiety/ stress were poor social support, low economic status and female gender.

Conclusion: Despite limited by the unrepresentativeness of some African regions, and the heterogeneity regarding the tool(s) used to assess outcomes of interest, this systematic review showed high rates of depression, anxiety and stress among African universities' students during the current COVID-19 pandemic.

Keywords: COVID-19, Mental health, Universities' Students, Africa

Other: This review received no funding and is registered in the prospective register of ongoing systematic reviews (PROSPERO). The registration number is CRD42021269772.

Introduction

Rationale

The first confirmed case of coronavirus disease 2019 (COVID-19) in Africa and sub-Saharan Africa were respectively announced on the February 14 and 27, 2020 in Egypt and Nigeria [1,2]. This was correspondingly two weeks after (January 30, 2020) and one month before (March 11, 2020) the categorization of the outbreak as a Public Health Emergency of International Concern (PHEIC) and as a pandemic [3]. According to the Africa branch of the Centre for Disease Control (Africa CDC), on August 1st 2021, they were overall 170,187 COVID-19 related death, the most impacted region being the southern one [4]. Aside its well-recognized and highlighted human and economic consequences, this pandemic also affected the education sector, especially at the university level [5,6].

In order to reduce the spread of the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-Cov-2), numerous governments, under the recommendations of national and international health institutions, have had to reorganize university programs [6,7]. These reorganizations notably involved the closure of universities (especially during lockdown periods), the suspension of face-to-face classes with or without the establishment of distance learning, and this also in Africa [6,8,9]. The reshaping of higher education in response to the COVID-19 pandemic had negative corollaries on universities students' wellbeing not only in terms of academic performances[5,10,11], but also regarding the psychological sphere [12–14]. Indeed, published studies reported high frequencies of mental health issues such as depression, anxiety and stress among universities' students during the current COVID-19 pandemic [14–16]. This not only due to the remodelling of university education negatively influencing their learning processes, but also as a consequence of stressors such as social distancing, loneliness, fear of infection regarding themselves or relatives, and the uncertainty of future [12,13,16]. Otherwise, all the currently existing studies summarizing data on this issue pertain to European, American or Asian settings [16–18].

Considering the unstable evolution of the COVID-19 pandemic worldwide, its reported impact on universities students' well-being amid other settings, and the lack of papers summarizing such information for Africa, we carried out this review.

Objectives

The present systematic review aimed to address the following question: What is the mental health status of African universities' students during the COVID-19 pandemic?

This question was built using the PICOS method [19]. In this approach, "P" refers to "Participants" (universities' students); "I" stands for "Intervention" (not applicable in our review); "C" for "Comparisons" (not applicable in our review); "O" for "Outcomes" (frequencies and associated factors of mental health issues among African universities' students during this COVID-19 pandemic time); and "S" represents "Studies" (observational studies).

This systematic review is reported in accordance with the checklist of the Preferred reporting items for systematic review and meta-analysis protocols (PRISMA) 2020 statement [20].

Methods

Eligibility criteria

The following criteria were needed for an article to be included in our review

1. Time frame: study realized during the coronavirus Disease 19 (COVID-19) outbreak,
2. Reports' characteristics: peer-reviewed articles without language restriction,
3. Design: Observational studies with more than 30 participants and thereby including cross-sectional, case-control and cohort studies (baseline data),
4. Participants and outcomes: articles reporting frequencies with or without associated/risk factors of mental health issues such as depression, anxiety and stress, among African universities' students.

We excluded unrelated or duplicated articles, as well as abstract-only papers in case of unavailability of information required for our review.

Information sources and search strategies: We applied a search strategy on PubMed/MEDLINE, Excerpta Medica Database (EMBASE) and African Journals Online (AJOL) by the July 24, 2021, respectively at 00:00, 00:15 and 00:30 (Greenwich Mean Time). To build the search strategies respectively dedicated to each of the three databases, we associated key-terms groups, with as first group the one related to mental health issues, as second the one related to "students", and as third the one pertaining to African regions and countries. For each group, synonyms and subtypes were joined using the Boolean operator "OR", and the three groups were linked by the Boolean operator "AND". For instance, regarding the group related to mental health issues and the PubMed/MEDLINE database, we associated terms such as "Mental Health", "Psychological", "Depression", "Anxiety" and "Stress". Our search strategies are available in table 1. After applying our strategies in each database, the respective resulting lists were exported and further uploaded in Rayyan, a web and mobile app conceived for screening purpose in systematic reviews (<https://rayyan.qcri.org/>) [21]. In Rayyan, all the records (from the three databases) were joined as a same review project.

Selection process: We performed a two-steps selection process. First, based on the appraisal of titles and abstracts, and considering our eligibility criteria, two authors (FTE and WADL) independently selected articles. Discrepancies were resolved by a consensus or if necessary, by a third assessor (DLTM). After this first selection step, all relevant papers were exported from Rayyan in an appropriate file which later served to create a reference list of our selected articles, by using a reference software, notably Zotero (<https://www.zotero.org/>) [22]. The second step of the selection process involved to search for the full texts, and explore these full-texts considering our eligibility criteria and especially our outcomes of interest. This step was independently performed by two authors (FTE and DLTM), with disagreements solved by a consensus or a third appraiser if necessary (WADL).

Data collection process: The selection process was followed by data extraction. Indeed, we reviewed and collected data of interest from each article retained after titles, abstracts and full-texts screening. For this purpose, we used a predefined and pretested extraction tool, available in table 2. The data extraction process was independently ensured by two authors (FTE and WADL), and a third one intervened if dissimilarities were not solvable through a consensus.

Data items: Throughout the data collection step, we looked at the following items

1. Bibliometric information: family name of the first author, year and journal of publication,
2. Study characteristics: study's country, study design, study period (and related COVID-19 stage if mentioned), study setting (one or more Faculties, one or more universities), sampling method, minimal sample size calculation, type of data collection process (paper and/or electronic version),
3. Participants' characteristics: subtype of university students (medical/ pharmacy/ health science students, etc.), mean or median age, age range, total sample size, sample size for males and females respectively,
4. Outcomes: mental health issues (depression, anxiety, stress, etc.) with the tool used to screen for each one, the cut-off scores potentially used, the reported frequency, as well as associated/risk factors if assessed.

Study risk of bias assessment: We based our risk of bias assessment on the tool developed by Hoy and colleagues [23]. This tool is made of 10 items addressing four domains of bias plus a summary risk of bias assessment. Included studies were classified according to their total score as low risk of bias (8 – 10), moderate risk of bias (6 – 7) and high risk of bias (0 – 5).

Synthesis methods: We planned to present our results as narrative, graphical and tabular summaries, with respect to the following items

1. Information on the study selection process through the PRISMA model of study flow chart presentation,
2. Selected articles' individual characteristics with mental health issues assessed, displayed as narrative and tabular summary, and specifically including articles' bibliometric profiles, study and participants characteristics, tools/ cut-off scores/ frequencies/ factors regarding each studied mental health condition,
3. Methodological quality and risk of bias of each study, presented as narrative and tabular synopsis.

Results

Study selection: Our preliminary search through selected databases yielded a total of 116 articles. After removing duplicates, 83 remaining papers were reviewed based on their titles and abstracts, regarding our eligibility criteria. We excluded 63 articles and therefore retrieved and appraised the 20 lasting articles based on their full-texts and also considering our selection criteria. Finally, 12 articles [24–35] were systematically reviewed and qualitatively summarized. The PRISMA flow chart showing our study selection process is shown in figure 1.

Study characteristics: The sample size of the 12 included studies ranged from 103 to 2430 participants, with a total of 7,293 participants (2,741 males and 4,552 females, thus giving a female/male ratio of 1.66). The enrolled studies were conducted between March 17, and November 30, 2020. The 12 studies were realized in seven countries, namely Ethiopia (n = 4), Egypt (n = 2), Morocco (n = 2), Liberia (n = 1), Libya (n = 1), Sudan (n = 1) and Tunisia (n = 1). Amid selected studies, 11 were reported as cross-sectional studies, and one as a transversal descriptive study [33]. Data were collected exclusively electronically (online surveys) in 9/12 studies, only with a paper version form in one study[32], both with online and paper forms in one study[29], and through phone calls in one study [26]. Most of studies (7/12) used a non-probabilistic sampling method, 4 studies reported a probabilistic sampling technique, and one article reported no details on the sampling method used. A minimal sample size was calculated in five studies [25,26,30,32,35]. Regarding studies' participants, the reported mean/median ages varied from 20 to 29 years, and four studies focused on medical/pharmacy students. Studies and participants' characteristics are summarized in table 3.

Risk of bias in studies: Based on the 10-items questionnaire established by Hoy *et al.* [23], the overall quality of included studies is moderate. More precisely, we classified four studies as “low risk of bias”, seven studies as “moderate risk of bias” and one study as “high risk of bias”. The table 4 displays details of risk of bias assessment.

Results of individual studies and syntheses: Regarding the main outcome of our systematic review, psychological concerns varied across selected studies and especially included depression (depressive symptoms), anxiety and stress. More specifically, the most screened conditions were depression and anxiety (respectively in 9/12 studies), and were followed by stress (8/12 studies). One research work assessed suicidal ideations, and another one studied non-specific psychological distress.

A diversity of scales/tools were used for the appraisal of these mental health outcomes. For depression, anxiety and stress, the most used screening tool was the Depression, Anxiety and Stress Scale 21-items (DASS-21). This tool was used in 6/12 studies of our review [26,28,31,32,34,35]. All these studies used the followings as respective positive screening cut-off scores for depression, anxiety and stress: [?] 10, [?] 08 and [?] 15. These thresholds respectively corresponding to mild cases of depression, anxiety and stress. Regarding depression, two studies [29,30] used the Patient Health Questionnaire 9-items (PHQ-9) with a positive screening cut-off score of [?] 05 (mild cases) for one study and [?] 15 (moderately severe to severe depression) for the other, and one used the PHQ-8 (positive depression screening if [?] 10) [27]. Concerning anxiety, two studies [29,30] used the Generalized Anxiety Disorder 7-item (GAD-7) scale with one study’s threshold at 15 (severe anxiety) and the other’s one at 05 (mild anxiety), and one used the Beck Anxiety Inventory (BAI) [24]. For the BAI, a score of 0-21 was classified as low anxiety, 22-35 as moderate anxiety, and 36 or above as potentially concerning level of anxiety. To evaluate stress, two studies [25,33] used the Perceived Stress Scale (PSS)-10 (Scores [?] 25 = high or pathological perceived stress), and the study that assessed non-specific psychological distress used the Kessler distress scale (K-6) [30].

Overall, eight studies reported a frequency for all depression degrees (at least mild). This one varied from 21.3% [26] to 78% [29]. Severe depression prevalence (from six studies) ranged from 9.7% [29,31] to 31.5% [34]. Eight studies reported a prevalence of all anxiety levels (at least mild) ranging from 27.1% [26] to 64.5% [29], with a frequency of severe anxiety (7/12 studies concerned) going from 9.4% [24] to 29.9% [34]. From six of our 12 included studies, the prevalence of mild to severe stress varied between 22.2% [32] and 47.8% [31], with severe cases (4/12 studies synthesized) frequencies varying between 12.8% [35] and 17.5% [34]. The two studies that used the Perceived Stress Scale (PSS)-10 respectively reported frequencies of pathological perceived stress at 35.9% [25] and 49% [33]. Others negative mental health outcomes assessed by some of the selected studies included suicidal ideations [29] and non-specific psychological distress [30], respectively found at 22.7% and 69%. The summarized findings encompassing frequencies of mental health issues as well as risk/associated factors assessed and reported by included studies, are available in table 3. The most reported factors associated with depression/ anxiety/ stress were poor social support, low economic status and female gender.

Discussion

General interpretation of the results in the context of other evidence

This systematic review aimed to evaluate the mental health issues related to the current pandemic among African universities’ students. Overall, we summarized data pertaining to 12 studies and involving 7,293 students living in seven different countries. Six studies concerned sub-Saharan Africa, with four in Ethiopia. We found that approximately 2-8/10 and 1-3/10 students had respectively depression and severe depression, that nearly 3-6/10 and 1-3/10 suffered from anxiety and severe anxiety, and that around 2-5/10 and 1-2/10 students were stressed and severely stressed.

Compared to data on African universities students’ mental health before the pandemic, we found relatively higher rates of mental health issues. For example, a review assessing the prevalence of depression among universities students in low and middle income countries (LMICs) and that included three studies in Africa, found a depression prevalence of 34.2% for African students [36]. On another side, while focusing on the

COVID-19 pandemic mental health impact amid the general population in Africa during this pandemic, there is a scarcity of review articles [37]. Nevertheless, a systematic review of the prevalence of anxiety among the general population during the COVID-19 pandemic found that the prevalence in Africa was 61.8% (95% CI, 57%-66.4%) [38], which is higher than the one we found. This difference might be due to the role played by populations type such as health care workers (especially doctors and nurses) in the increase of these frequencies [39,40].

We generally found equal or higher frequencies of psychological concerns than studies reporting the same outcomes in others parts of the world. For instance, Li *et al.* in a meta-analysis of 706,415 college students showed that the prevalence of depression was 39% (95% CI: 27-51%) and that of anxiety was 36% (95% CI: 26-46%) [41]. In the same way, Deng and colleagues while summarizing data of eighty-nine studies and 1,441,828 higher education students during the COVID-19 pandemic, found that the pooled prevalence of depressive symptoms and anxiety symptoms was 34% and 32% respectively [42]. More specifically, they reported depression and anxiety pooled prevalence of 55% and 74% for the United States of America, and 24% and 23% for China [42]. Regarding China, a systematic review involving 1,292,811 universities students displayed pooled depressive symptoms prevalence of 26% [16]. Explanatory factors of the dissimilarities between our findings and the one reported in previous published review might be the difference regarding sample size, but also the disparity pertaining to the tools used as well as related cut-off scores. Looking for instance at this last reason, Deng *et al.* in their review reported that most of studies used the PHQ-9 for depression and the GAD-7 for anxiety [42], while in our review most of studies used the DASS-21 for both. Otherwise, the higher prevalence reported by previous papers for some world regions such as America[42], might be linked to a greater COVID-19 morbidity and mortality when compared to Africa [43]. Concerning factors associated with negative mental health consequences among universities' students, other reports in literature highlighted that the pandemic had a more pronounced effect on female students [44,45]. This is also the case for low socio-economic status [45].

Limitations of the review

The findings of our review should be interpreted with caution due to parameters such as the small amount of included studies and their moderate quality, the unrepresentativeness of some African regions, as well as the inconsistency regarding the tool(s) used to assess mental health concerns of interest. Nevertheless, to our knowledge, this review is the first one specifically focused on African universities students' mental health during this COVID-19 pandemic.

Conclusion (*Implications of the results for practice, policy and future research*)

This systematic review showing high rates of depression, anxiety and stress among African universities' students during the current COVID-19 pandemic, might justify the need to reinforce psychological support (face-to-face or at least in remote mode) amid this subpopulation. This especially for students with poor social support and low economic status. While looking at our findings, further longitudinal studies might be interesting since they would provide how these psychological concerns evolve with pandemic. Also, it would be of interest to realize studies assessing the relationship between these mental health outcomes and academic performances.

What is already known on this topic

Studies published amid settings in Asia, Europe and Americas, where the morbidity and the mortality of COVID-19 is higher than in Africa, reported high frequencies of negative mental health repercussions.

What this study adds

There is a scarcity of studies assessing psychological well-being of universities' students in Africa during this COVID-19 pandemic, especially for regions such as Central Africa, West Africa and Southern Africa.

There are high frequencies of depression, anxiety and stress among African universities' students during this pandemic, with approximately similar rates than in areas with higher COVID-19 morbidity and mortality.

Other information

Registration and protocol: The protocol of this review was not published in a peer-review journal, and review is registered in the prospective register of ongoing systematic reviews (PROSPERO). The registration number is CRD42021269772.

Support: This review received no financial support.

Competing interests: The authors declared no competing interests.

Availability of data, code and other materials: Our template form for data collection is available in table 2.

Authors' contributions

FTE: Study conception, protocol registration, article selection, data extraction and synthesis, manuscript drafting, approval of the final article version

DLAW: Article selection, data extraction and synthesis, manuscript correction, approval of the final article version

DLTM: Article selection, data extraction and synthesis, manuscript correction, approval of the final article version

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