Contents lists available at ScienceDirect

SSM - Mental Health

COVID-19 school closures and mental health of adolescent students: Evidence from rural Mozambique

Feliciano Chimbutane [a], Catalina Herrera-Almanza [b], Naureen Karachiwalla [c,*], Carlos Lauchande [d], Jessica Leight [c]

[a] Universidade Eduardo Mondlane, Av. Julius Nyerere nr 3453, C.P. 257, Maputo, Mozambique
[b] University of Illinois at Urbana-Champaign, 1301 W Gregory Drive, Urbana, IL, 61801, USA
[c] International Food Policy Research Institute (IFPRI), 1201 I Street NW, Washington DC, 20005, USA
[d] Universidade Pedagógica de Maputo, Av Trabalho, Maputo, Mozambique

ARTICLE INFO

ABSTRACT

The onset of the COVID-19 pandemic, entailing widespread school closures as well as acute disruptions to household livelihoods, had substantial consequences for adolescent well-being in low-income countries. We present novel evidence about the prevalence of mental health challenges among adolescent students in rural Mozambique using data from an in-person survey conducted in 105 schools in 2021, immediately following the post-pandemic school reopening. In our sample, 31% of students reported low levels of well-being (though only 10% suffer from high anxiety): students enrolled in schools that used a wider variety of distance learning measures and who had more robust social networks reported lower anxiety, while students who experienced household-level disruptions linked to the pandemic reported higher anxiety and lower well-being.

1. Introduction

Following the onset of the COVID-19 pandemic in March 2020, schools around the world experienced prolonged periods of closures that disrupted the educational progression of hundreds of millions of students.[1] According to the United Nations Educational, Scientific and Cultural Organization (UNESCO), school closures peaked around June 2020, when 50% of all students worldwide were out of school (UNESCO, 2021). Particularly in low-income countries, where schools are a crucial path out of poverty (and the technology for learning at a distance is almost entirely absent), the disruption in schooling over a prolonged period of time had meaningful implications for children's learning, health, and emotional well-being (Engzell et al., 2021). Moreover, these closures coincided with a period in which children were potentially exposed to widespread household-level disruptions linked to illness, interrupted livelihoods, and challenges in access to food and other subsistence goods (Egger et al., 2021).

Adolescent students are a population that is uniquely vulnerable to the adverse effects of the pandemic for several reasons. Adolescents may be particularly likely to substitute away from school into work, marriage, or parenthood (especially for girls) during school closures (Bandiera et al., 2019), and, as they are proximate to transitions to secondary or tertiary school, any educational disruptions are potentially extremely costly (Gilligan et al., 2022). In addition, evidence from previous health crises suggests out-of-school adolescent girls may be particularly vulnerable to the early initiation of sexual activity, or physical and sexual violence (Bandiera et al., 2019). Finally, adolescence is broadly a period of increased risk for mental health disorders (Allen and Sheeber, 2008). Accordingly, understanding the association between COVID-19-related disruptions and adolescent mental health is essential. Given that schools play an extremely important role in children's lives, school policies can be highly influential in shaping students' well-being.

The objective of this paper is to present novel evidence about the prevalence of mental health challenges among adolescent students in public primary schools in rural Mozambique, and explore whether variation in pandemic-related schooling policies and exposure to pandemic-linked disruptions at the household level is associated with variation in measures of mental health. Existing evidence around adolescent well-being and mental health during the pandemic period in low- and middle-income countries relies substantially on phone surveys and is also substantially drawn from China and, to a lesser extent, South Asia; systematic reviews of this evidence are provided in Jones et al. (2021), Kumar et al. (2022), and Sharma et al. (2021). Findings in these systematic reviews suggest that given severe and persistent lock downs, high rates of depression and anxiety were observed particularly among Chinese youth who experienced higher exposure to COVID-19 and lower levels of social support. Other evidence is drawn from on-line or phone-based surveys conducted in Brazil (Garcia de Avila et al., 2020), Bangladesh (Islam et al., 2020, 2021; Khan et al., 2020; Mallik and Radwan, 2021), the Philippines (Tee et al., 2020), India (Pinchoff et al., 2020; Verma, 2020), Argentina (Torrente et al., 2021), Jordan (Al-Rahamneh et al., 2021), Kenya (Dyer et al., 2021), Palestine (Radwan et al., 2021), and Indonesia (Wiguna et al., 2020; Arundhana et al., 2020). A rare analysis of quarantine impacts on adolescent mental health using data collected in-person in India is reported by Saurabh and Ranjan (2021).

Focusing on evidence from sub-Saharan Africa, a recent study drawing on a phone survey conducted in Senegal with a sample of girls and women aged 14 to 35 finds heterogeneous shifts in well-being vis-à-vis the pre-pandemic period (Dione et al., 2021); conversely, Wang et al. (2021) reports cross-country data on adolescents' experience of the pandemic in Nigeria, Ethiopia, and Burkina Faso using phone surveys, but does not analyze mental health. Favara et al. (2021) analyzes a phone survey in Ethiopia, India, Vietnam, and Peru conducted with a cohort of youth aged 19–20 and measures rates of depression and anxiety during the period of school closures, finding evidence of declining well-being vis-à-vis pre-pandemic baselines. Vishwakarma et al. (2021) finds high rates of depression in an on-line survey among students in three sites, one of which is Nigeria. Similarly, Oakley et al. (2022) analyze a phone survey in three sites, one of which is Ethiopia, and find that pandemic-related disruptions are associated with worse outcomes for resilient coping, particularly for girls.

Evidence around the correlates of well-being and mental health in the pandemic period is also extremely limited in sub-Saharan Africa, even for adults. Chen et al. (2021) reports a meta-analysis of the prevalence of depression among adults in north and sub-Saharan Africa. However, none of the papers reported in this meta-analysis are in southern Africa, where the only available evidence is from South Africa. Here, Visser and van Wyk (2021) use web-based data from undergraduate students in South Africa to analyze the predictors of emotional well-being and finds that lockdown-related discomfort and social isolation are predictive of emotional challenges; Kim et al. (2020) uses a small ($N = 250$) in-person sample to analyze multivariate models predicting mental health among adults and finds that higher perceived COVID-19 risk predicts a higher risk of depressive symptoms. Yitayih et al. (2021) analyzes socioeconomic characteristics that are correlated with acute stress following the onset of the COVID-19 pandemic in Ethiopia.

This paper is the first study to our knowledge to explore the relationship between household- and school-level variation in pandemic experiences and adolescent well-being in a low-income country. Our study is also one of the first large-scale, in-person surveys of mental health among adolescent students in sub-Saharan Africa since the pandemic began. Much of the existing literature uses data collected digitally or by phone, while we use in-person data that may be more reliable especially for the measurement of sensitive attributes such as mental health. Our data was also collected soon after schools re-opened, which is rare in the literature.

2. Setting

2.1. Primary education in Mozambique

Mozambican primary schools operate with two compulsory levels: lower primary school comprises grades one to five and upper primary school comprises grades six and seven. In grade seven, students are required to participate in the primary school leaving exam, and their score determines access to secondary school. The official age of entry into school is six years old. Prior to the pandemic, the school year ran from February to December, with five days of classes per week (Monday to Friday).

Even prior to the pandemic, the Mozambican educational system was characterized by high absenteeism and dropout rates. A United Nations International Children's Emergency Fund (UNICEF) report that used pre-pandemic data from 2018 noted that children were frequently absent, missing 39% of school days on average (UNICEF, 2020). Additionally, there are significant disparities between urban and rural areas, with students in rural areas half as likely to attend school (UNICEF, 2020). Nationwide, the primary school completion rate is below 40% (Mambo et al., 2019), one of the lowest rates in the world, and less than one third of students progress to secondary school (UNESCO Institute of Statistics, 2021). In Nampula province, the site of this study, the dropout rate from primary school was 11% prior to the pandemic (UNICEF, forthcoming). Nampula is the third poorest province in Mozambique (of ten) and accordingly, poverty rates are high and educational achievement is low. The national illiteracy rate is 40%, while that in Nampula is 52%. Enrollment of girls is also lower than the rest of the country (UNICEF, 2022).

2.2. COVID-19 policies in the education sector

While the school year began normally in February 2020 in Mozambique, schools subsequently closed in March 2020 following the onset of the COVID-19 pandemic.

Public schools were closed for a year, during which period Nampula province emerged as one of the national centers of the pandemic (allAfrica, 2020). During the period of school closures, the Ministry of Education and Human Development (MINEDH) promoted distance learning, emphasizing the development and provision of learning materials to students and the continuation of instruction using other platforms including radio and television (MINEDH, 2020a). However, given the suddenness of the pandemic, stakeholders were largely unprepared and reports suggest that the challenges were significant, particularly for educators (e.g. Ferrão et al., 2020; Reimers and Shleicher, 2020). Teachers were not trained in distance education or online platforms, and in rural areas, they generally lacked access to the requisite equipment as digital platforms and technologies for online learning were not available to schools or households.

After schools reopened in March 2021, many moved to a shift system in which half of the students would attend school on any given day, on alternate days, from Monday to Saturday. In some schools, grade seven was the first grade to return to school since the students needed to take the primary leaving exam and required adequate time to prepare (APHRC, 2021). Additionally, all students who were enrolled in 2020 were automatically promoted to the next grade (MINEDH, 2020b). For example, a student who was in grade five in 2019 and enrolled in grade six in 2020 would be a grade seven student in 2021; students who were in grade six in 2019 and would have been in grade seven in 2020 participated in the leaving exam in February 2020 and, unofficially, the government adjusted the exam to render it easier to pass. This decision allowed for new students in grade one to be admitted; otherwise, schools would not have been able to accommodate two cohorts of grade one students simultaneously if students had been taught the grade they missed. Grade three students sometimes also returned to school earlier as students take a government standardized exam in grade three. Teachers

were instructed to teach the previous grade level for the first half of the school year and the current grade level for the second half of the school year (MINEDH, 2021).

In addition, the MINEDH recommended several measures for schools to implement following reopening, including: installing hand-washing systems, using a shift system, seating students further apart, closing common spaces such as libraries, holding classes outdoors if possible, and encouraging students and staff to use personal protective equipment (PPE) when available (allAfrica, 2021). In a national survey conducted by Forum for the Rights of the Child in Mozambique in 2020, parents indicated hesitancy in sending children back to school, partly due to concerns about safety, and partly due to children potentially not being ready to return because of the emotional trauma that many suffered. Additionally, Nampula province experienced a surge in internally displaced people from Cabo Delgado, where extremist violence was prevalent during this time. There was also concern about how these internally displaced students would adapt to the return to school (Cardozo, 2020).

2.3. COVID-19 pandemic and mental health in Mozambique

As of January 30, 2023, Mozambique reported over 232,000 confirmed cases of COVID-19 infection and 2200 deaths (World Health Organization, 2022); however, data on local COVID-19 incidence is only available at the province level. For this reason, we are not able to identify the local prevalence of COVID-19 in the communities that are examined in this study.

Data around mental health in Mozambique is sparse, particularly for adolescents, but the available data suggests a meaningful prevalence of mental health disorders in the population even prior to the pandemic, and some evidence of an increase since the pandemic began. According to recent data, 4.1% of the adult population suffered from depression in 2021 (World Population Review, 2021), compared to 3.5% in 2019 (Direcção Nacional de Saúde Pública, 2020). For adolescents specifically, Amu et al. (2020) measures "psychological distress" (including depression and anxiety) and finds that 21% of adolescents experienced distress, with lower rates among boys and among respondents reporting more social support.

3. Methods

3.1. Data

We use data from a large-scale in-person survey conducted in 105 schools between June and August 2021 in Nampula province, Mozambique, approximately three months following the post-pandemic reopening of schools in March 2021. Our survey includes data from 1,383 grade seven students reporting on their households' experiences during the school closures, their access to social support, and their mental health.

The broader sampling frame includes 175 public schools in Nacaroa, Muecete, and Murrupula districts in Nampula province, Mozambique. This specific sample was constructed as follows: eligible schools included all schools in Nacaroa and Muecete districts (totaling 160) and 15 randomly selected schools in Murrupula district (selected using simple random sampling). The eligibility criteria were determined by inclusion within the sample of a separate randomized controlled trial that was launched at the same time as this survey. Within this sample of 175 schools, 105 schools served grade seven students and thus were included in this analysis, while the remaining 70 schools served students through grade five only and were not included in this analysis.

The surveys were administered by a local survey firm (ELIM Serviços) in Portuguese and Macua (the local vernacular); enumerators received a week-long training on survey ethics, survey content, and appropriate COVID-19 protocols prior to the survey launch. In each school, interviews were conducted with 10 randomly selected grade seven students. Given the number of schools that served grade seven students (105) was

ultimately substantially lower than the original number of target schools in the sample (175), we also oversampled grade seven students in some larger schools. Ethical review and approval was provided by the Institutional Review board at IFPRI and the Comité Nacional de Bioética para Saúde in Mozambique.

The surveys of grade seven students collected data on demographic characteristics (age, gender, parental literacy, household size, assets), experiences with COVID-19 (household hunger, income loss, and early marriage), and mental health (subjective well-being and anxiety).[2] Informed consent was obtained from the parents of the students surveyed since they were minors, and informed assent was obtained from the minors themselves.

3.2. Primary outcomes of interest

We focus on two mental health measures in our analysis: the Generalized Anxiety Disorder or GAD-7, an index that captures anxiety (Spitzer et al., 2006), and the WHO-5, an index that captures subjective well-being and is used as a predictor for depression (Topp et al., 2015). For both measures, we report the continuous raw score and indicators for a classification of moderate to severe anxiety and low well-being, respectively. For the GAD-7, a cutoff of 10 for moderate to severe anxiety is widely used (Spitzer et al., 2006), and for the WHO-5, a cutoff of 50 has been identified in the literature as appropriate to identify low well-being or vulnerability to depression (Topp et al., 2015). The Appendix provides detailed questions and variable definitions. Note that at the beginning of the survey period, we administered the Patient Health Questionnaire (PHQ-9) depression questionnaire to students. However, these questions were viewed as disruptive in the school environment, and accordingly the WHO-5 instrument was subsequently employed; data for the WHO-5 is thus missing for part of the sample (315 students) who were surveyed in the first schools visited. Missing data were not imputed; this sample of students is omitted from the analysis.

We use both the binary and continuous measures because the continuous scores include more variation, while the binary measures effectively capture the extent of severe distress. Additionally, particularly for the WHO-5 variable, there is no consensus on how to define a binary variable corresponding to low well-being, so any particular choice may be an imperfect solution. Using the continuous variable as well allows us to maximize predictive power.

The GAD-7 has been validated in several contexts in sub-Saharan Africa, including in studies of adolescents (Adjorlolo, 2019; Nyongesa et al., 2020), and in a recent study of Mozambican adolescents published following the conclusion of our survey (Lovero et al., 2022). The WHO-5 has previously been validated as a measure of vulnerability to depression in several countries in sub-Saharan Africa (Garland et al., 2018; Nolan et al., 2018; Chongwo et al., 2018), including among adolescents.

3.3. Analysis

We first calculate descriptive statistics of the sample, and report means or proportions, standard deviations, and the number of observations for the main variables used in this study. The variables relate to demographic characteristics of the adolescents and their households, school characteristics, household experiences with COVID-19, and the mental health outcomes.

The empirical strategy for estimating associations is relatively simple: we estimate the association between mental health outcomes and the pandemic-related variables of interest using the following regression specification:

---

[2] While we also collected some preliminary data on whether students reported cases of illness in their households, we found that it was challenging for them to differentiate between illness caused by different factors including but not limited to COVID-19; accordingly, we have not analyzed the data.

$$Y_{isd} = \alpha + \beta_1 S_{sd} + \beta_2 C_{isd} + \beta_1 X_{isd} + \delta_d + \varepsilon_{isd} \qquad (1)$$

where Y_{isd} is the mental health outcome for student i in school s located in district d. As noted above, Y_{isd} includes both binary and continuous measures of anxiety and well-being.

The vector S_{sd} includes the policies that schools implemented to address the pandemic-related school closures, as reported by the deputy school director. We include indicator variables for whether a school i) encouraged students to listen to radio education programming, ii) telephoned parents to encourage them to supervise at-home learning and return to school, and iii) employed other measures, such as encouraging students to watch television education programming, visiting students at home, and gathering small groups of students for lessons. Almost all schools (98.5%) reported that they distributed take-home materials for students, and thus there is insufficient variation to analyze this dimension.

We also construct two standardized indices reflecting various measures that schools employed to mitigate the spread of COVID-19 once schools re-opened (again, as reported by the deputy school director). The first captures purely public health-related measures and is constructed using principal components analysis on the following binary variables indicating whether a school: i) spaced students further apart, ii) ensured students and staff washed their hands frequently, iii) required staff to wear masks or other personal protective equipment (PPE), and iv) provided information about COVID-19 to students and parents. The second index captures mitigation measures that were taken to respond to COVID-19 but could potentially have effects on educational outcomes. This index is also constructed using a principal components analysis on the following binary variables indicating whether a school: i) only allowed grade seven students when schools first reopened, ii) only allowed grade 3 students at first, iii) continued to keep libraries and other common spaces closed, and iv) had different students attend on different days. Both indices are standardized to have mean zero and standard deviation one. Means and standard deviations of each of these variables are provided in Table A1.

S_{sd} also includes school-level covariates that capture school quality in two ways. The first is the average grade four reading test score; we construct this variable as the school-level average of students' number of correct answers in the oral reading fluency section of the Early Grade Reading Assessment (EGRA) test that was administered as part of the larger study. The second is a standardized school infrastructure quality index that captures school-level infrastructure, such as the availability of latrines, electricity, and reading materials for students. We create this quality index using principal component analysis on the following binary variables: whether a school has i) latrines, ii) latrines that are gender separated,

iii) electricity, iv) Portuguese reading materials for grade four students, v) local language reading material for grade four students, vi) soap/detergent for staff, vii) soap/detergent for students, vii) hand-washing station or tippy tap, and ix) whether the school has an appropriate water source, and then standardize the index to have mean zero and standard deviation one. Note that the variable "reading and learning materials for grade four students" serves as a proxy for the general availability of reading materials in the school since schools generally either have textbooks for most grades or for none. Summary statistics on each of these variables are provided in Table A1.

C_{isd} is a vector of variables containing household-level experiences of COVID-19-related disruptions. This vector includes a set of binary variables for whether students report that at least one member of their household i) went hungry, ii) lost employment, iii) migrated, and iv) married earlier than expected (for female household members) due to the pandemic. We also include an indicator equal to one if the student reported having any social support during the school closures: if s/he shared his/her fears, frustrations, or challenges with peers from school, family members, neighbors, or others.

X_{isd} is a vector of demographic and household controls, including gender, age, a standardized household-level asset index used as a proxy for wealth, and household size. We calculate the asset index using a principal component analysis conducted on binary variables reported for household ownership of radio, cattle, a mobile phone, and a bicycle. The index is also standardized. We also include a set of binary variables for whether a household reports i) farm income, ii) a non-farm business, iii) completion of primary school by the father, and iv) completion of primary school by the mother.

The regression is estimated using ordinary least squares (OLS), and all models control for district fixed effects (δ_d), and include standard errors clustered at the school level. All analysis is conducted in Stata version 17, and index reliability (Cronbach's alpha) is assessed using the command "alpha" (StataCorp, 2021). For variables with missing data (school information on mitigation measures, age, father's and mother's education) we replace the missing value with zero and create an indicator variable equal to one if the value was missing for that student. We include these indicator variables in the regressions as well.

4. Results

In this section, we report our findings including sample demographic summary statistics and challenges faced by adolescents, the overall prevalence of mental health challenges, and evidence around the correlates of adolescent mental health.

4.1. Characteristics of the sample

Demographics We begin by briefly describing our sample (see Panels A and B of Table 1). Our cohort of grade seven students is 40% male with an average age of 15 years. Almost all households are engaged in farming, and 79% of adolescents worked on the family farm in the past week. Households are relatively large with approximately six household members on average, and education levels are low; only 58% of fathers and 40% of mothers have completed primary education.

In Panel B, we can observe that schools are large (on average, nearly 650 students), and between 11% and 30% implemented various distance learning measures during the COVID-related shutdowns.

COVID-19 experiences Panel C of Table 1 presents summary statistics regarding pandemic-related disruptions experienced by adolescent students. Our evidence suggests 53% of students report experiences of hunger in their household, and 28% report that a female member of the household married earlier than expected. Other reported pandemic-related disruptions include migration of a household member (prevalence of 13%) and loss of employment of a household member (8%).

4.2. Prevalence of mental health challenges

Next, we report the prevalence of mental health challenges among students in Panel D of the same table. The average GAD-7 score among students is five (out of a maximum of 21), and according to the GAD-7 cutoff for moderate to severe anxiety (a score above 10), 10% of adolescents are classified as experiencing general anxiety disorder.[3] Turning to subjective well-being, as measured by the WHO-5 scale (that runs from 0 to 100), the mean score of the WHO-5 well-being scale was 62 among adolescent students. According to the cutoff for low levels of well-being (corresponding to a score below 50), 31% were classified as experiencing a low level of well-being and thus identified as vulnerable to depression.

Both the WHO-5 and GAD-7 scales appear to perform well in this

---

[3] Note that the number of observations differs across the two measures. Initially, the survey administered the PHQ-9 depression scale questionnaire. However, students found it challenging to respond to these questions, and thus the simpler WHO-5 scale was used for subsequent respondents. The number of observations using the PHQ-9 is too small to produce meaningful estimates.

Table 1
Descriptive statistics (means/proportions and standard deviations) of the sample.

Variable	Mean/Proportion	SD	Observations
Panel A: Demographic Characteristics			
Male	0.402	0.490	1,383
Age	15.076	2.047	1,382
Household reports farm income	0.960	0.197	1,383
Household reports non-farm business	0.495	0.500	1,383
Student works on family farm	0.788	0.409	1,383
Household size	6.142	2.187	1,383
Father completed primary education	0.579	0.494	1,153
Mother completed primary education	0.401	0.490	1,207
Panel B: School Characteristics			
School size (enrollment)	642.229	421.633	105
School closures: radio education	0.105	0.308	105
School closures: school contacted parents	0.305	0.463	105
School closures: school took other measures	0.133	0.342	105
Panel C: Experiences with COVID-19			
Household member went hungry	0.530	0.499	1,383
Household member lost employment	0.083	0.276	1,383
Household member migrated	0.131	0.337	1,383
Female household member married early	0.275	0.447	1,383
Panel D: Mental Health			
GAD-7: Moderate or severe anxiety	0.102	0.303	1,383
GAD-7: Score	4.925	3.973	1,383
WHO-5: Low well-being	0.308	0.462	1,068
WHO-5: Score	61.940	26.221	1,068

Notes: This table displays means or proportions, standard deviations, and the number of observations for demographic characteristics (Panel A), school characteristics (Panel B), the prevalence of COVID-19- related disruptions experienced by adolescent students (Panel C), and mental health outcomes (Panel D) for adolescent students. WHO-5 is a subjective well-being score ranging from 0 to 100 and low well-being is represented by a score below 50. Higher values represent higher levels of well-being. GAD-7 is a measure of generalized anxiety disorder and ranges from 0 to 21. Moderate to severe anxiety is present when the score is above 10. Higher values represent more anxiety. Note that 315 students did not complete the WHO-5 module, and instead completed the PHQ-9 module during the first survey phase; this module was phased out due to respondent distress, and is not analyzed.

context. Cronbach's α is 0.79 for the WHO-5 index and 0.69 for GAD-7; these estimates are above or equal to the recommended cutoff of 0.7 indicative of internal reliability. In addition, there is strong evidence of an association between depression and anxiety, as the correlation between the GAD-7 and the WHO-5 scores is 0.83 in our data.

4.3. Associational evidence: adolescent mental health

We now report the results of estimating Equation (1) analyzing the associations between pandemic-related variables of interest and adolescent mental health. We report on associations that are statistically significant at the 5% or 1% level of significance. Table 2 presents results on anxiety in columns 1 and 2, and inverted subjective well-being in columns 3 and 4. Columns 1 and 3 report results for binary variables (experiencing moderate to severe anxiety or a low level of well-being, respectively) and columns 2 and 4 report results for continuous measures of the GAD-7 and WHO-5 scales, respectively. To be consistent with the anxiety measure, we have inverted the WHO-5 subjective well-being scale so that a higher number denotes lower well-being for both scales.

Table 2
Associations: Adolescent mental health.

	GAD-7: Anxiety		WHO-5: Binary	Well-being Continuous (inverted)
	Binary	Continuous		
	(1)	(2)	(3)	(4)
School closures: school promoted radio education	0.0313 (0.0395)	1.078 (0.722)	−0.0927 (0.0799)	−3.020 (3.920)
School closures: school contacted parents	−0.00962 (0.0216)	−1.167* (0.478)	−0.0102 (0.0570)	−1.990 (3.692)
School closures: school took other measures	−0.0747** (0.0261)	−1.873** (0.577)	−0.0460 (0.0703)	−5.928 (4.643)
Mitigation index - public health measures	0.0128 (0.00991)	0.102 (0.209)	0.0207 (0.0295)	1.818 (1.769)
Mitigation index - education measures	−0.0241* (0.0115)	−0.152 (0.166)	−0.0238 (0.0323)	−1.281 (1.925)
Average grade 4 test score	0.00146* (0.000635)	0.0272* (0.0126)	−0.00105 (0.00178)	−0.0207 (0.129)
School quality index	0.00120 (0.0142)	−0.0461 (0.238)	−0.0280 (0.0383)	−2.005 (2.449)
COVID-19: Household member went hungry	0.0188 (0.0188)	0.886** (0.301)	0.0951* (0.0374)	8.167** (2.537)
COVID-19: Household member lost employment	−0.0266 (0.0259)	−0.475 (0.409)	0.00480 (0.0592)	−2.254 (3.198)
COVID-19: Household member migrated	−0.0438 (0.0249)	0.384 (0.348)	−0.00209 (0.0413)	1.336 (2.236)
COVID-19: Female household member got married	0.0840** (0.0225)	1.028** (0.296)	0.0744 (0.0473)	6.991** (2.618)
Any social support	−0.00398 (0.0208)	−0.720* (0.289)	−0.157** (0.0450)	−8.124** (2.895)
Male	−0.0180 (0.0125)	−0.550** (0.195)	−0.0624* (0.0294)	−3.839* (1.605)
Age 13–14	0.0273 (0.0251)	0.442 (0.370)	0.0560 (0.0515)	1.461 (3.152)
Age over 14	0.0301 (0.0311)	0.247 (0.390)	0.0303 (0.0628)	−0.705 (3.652)
Household asset index	0.0000415 (0.00689)	0.176 (0.0900)	−0.00387 (0.0144)	−0.506 (0.807)
Household reports farm income	−0.0242 (0.0416)	−0.661 (0.542)	0.0948 (0.0754)	4.378 (3.397)
Household reports non-farm business	0.0364* (0.0172)	1.219** (0.235)	0.0188 (0.0320)	1.559 (1.839)
Household size	−0.00435 (0.00369)	−0.0299 (0.0487)	−0.0116* (0.00575)	−0.520 (0.347)
Father completed primary school	0.00350 (0.0184)	−0.0159 (0.259)	−0.00219 (0.0359)	1.404 (2.036)
Mother completed primary school	0.00512 (0.0231)	0.0231 (0.275)	−0.000505 (0.0368)	−0.664 (2.401)
Observations	1,383	1,383	1,068	1,068
Adjusted R^2	0.035	0.135	0.051	0.095

Notes: This table shows associations between adolescent students' anxiety and well-being and covariates of interest. The outcomes in columns 1 and 3 are an indicator equal to one if a student is classified as having moderate or severe anxiety according to the generalized anxiety disorder (GAD-7) scale or low well-being according to the WHO-5 subjective well-being scale, respectively. The outcomes in columns 2 and 4 are continuous measures of the GAD-7 measure of generalized anxiety disorder, which runs between 0 and 21 and the WHO-5 scale, which runs between 0 and 100. Here, the WHO-5 scale has been reverse coded so that a higher value is a worse outcome, consistent with the anxiety score. See the Appendix for variable definitions. All regressions include district indicator variables and standard errors, reported in parentheses, are clustered at the school level. *$p < 0.05$ **$p < 0.01$.

Our findings suggest that school policies during the period of school closures were associated with lower anxiety: in schools in which parents were contacted or schools employed other measures such as visiting students at home or holding lessons with small groups of students, students' GAD-7 scores were between 25% and 40% lower relative to the mean, and the second set of measures is associated with a decline in moderate to severe anxiety of seven percentage points. However, COVID-19 mitigation policies implemented following school re-opening that were purely related to public-health were not associated with anxiety. COVID-19 mitigation policies that could affect education were associated with a decline in the probability of being classified as moderately or severely anxious. Higher test scores among grade four students were associated with higher levels of anxiety.

Students whose families experienced substantial negative disruptions during school closures also reported higher levels of anxiety: students who reported that a family member went hungry exhibited a GAD-7 score 18% higher relative to the mean, and students who reported that a female member of the household married early exhibited a GAD-7 score that was 21% higher than the mean and were eight percentage points more likely to be classified as experiencing moderate to severe anxiety. By contrast, reported access to social support (a classmate, family member, neighbor, or other person to talk with) was associated with lower levels of anxiety. For demographic variables, the presence of a household non-agricultural business was also associated with higher anxiety: students from these households were about four percentage points more likely to report moderate or severe anxiety and they reported higher GAD-7 scores.[4] There was also some evidence of an association between the GAD-7 score and gender: male students showed a score about 11% lower relative to the mean.

The estimated associations between inverted subjective well-being (also interpreted as vulnerability to depression) and covariates of interest were broadly similar, as reported in columns 3 and 4 of the same table, but with some notable differences. School policies were not significantly associated with subjective well-being. However, as with anxiety, students who report that their family went hungry during the pandemic were more likely to be classified as having a low level of well-being (a difference of 10 percentage points) and had a continuous score that was 14% higher relative to the mean (again, an increase in the inverted score signifies lower well-being). Students who reported early marriage of a female household member had an inverted well-being score that was 11% higher than the control mean. Once again, social support was positively associated with well-being, associated with a 13% lower inverted continuous score relative to the mean and a 16 percentage point decline in the probability of experiencing low well-being.

For demographic variables, again we observe a substantial association with gender: male students were six percentage points less likely to be characterized by low well-being and had inverted scores around four percent lower compared to the mean, suggestive of higher well-being. Other demographic variables were not significantly correlated with subjective well-being. In Appendix Table A2, we further explored differences between male and female students across all variables by interacting each one with an indicator variable equal to one if a student is male. There were no consistent or systematic patterns among variables predicting anxiety or well-being.

5. Discussion

The findings presented in this paper suggest a meaningful prevalence of low well-being (and to some extent high anxiety) among students in rural Mozambique in the period immediately following post-pandemic school re-openings in 2021. There is also evidence of significant exposure to pandemic-related disruptions that are strongly associated with adverse mental health outcomes. Among adolescents, the implementation of a wider range of distance learning methods by schools (including contacting parents and meeting with students in small groups) may have played a protective role, with students in these schools exhibiting lower anxiety.

Relative to the existing literature, our findings around the prevalence of low levels of subjective well-being (31%) and high levels of anxiety (10%) are broadly similar to other recent data collected among adolescents. A recent study drawing on data from 2020 found that the prevalence of at least mild anxiety among adolescents was 15%, 10%, 40%, and 10% in Ethiopia, India, Peru, and Vietnam respectively, and the rates of at least mild depression were 15%, 9%, 32%, and 11% in the same contexts (Favara et al., 2021). By contrast, a recent systematic review of estimates of mental health challenges among diverse adult populations in Africa during the pandemic estimated a pooled prevalence of 31% for depression and 30% for anxiety (Chen et al., 2021). While these rates may be high given the inclusion of studies focusing on populations that were particularly affected by the pandemic (e.g., health care workers), it does suggest that adolescents in our Mozambican sample may be experiencing a lower rate of mental health challenges compared to adults more broadly in the region, potentially indicative of some resilience in the adolescent population.

There is also a substantial gap observed between the rates of low levels of well-being and the rates of moderate to severe anxiety in the data. This is consistent with both the theoretical and empirical literature, insofar as well-being encompasses more than simply depression or other mental health outcomes; it represents a person's subjective assessment of their overall welfare. While the WHO-5 does predict susceptibility to depression, it does not measure actual levels of depression (Krieger et al., 2014). By contrast, the GAD-7 measures a specific aspect of mental health, generalized anxiety disorder. Our findings are also similar to a recent analysis of mental health during the pandemic among Ghanaian adults that also used both the GAD-7 and WHO-5, and reported a higher prevalence of low well-being vis-à-vis significant anxiety (Boateng et al., 2021).

Our analysis also builds on a growing body of evidence suggesting that the COVID-19 pandemic and related disruptions had meaningful consequences for adolescent well-being in low-income countries. Though our data around mental health is novel in the region, Wang et al. (2021) find that adolescents in Nigeria, Burkina Faso, and Ethiopia reported declines in food consumption as well as a complete absence of access to education during the pandemic period, in conjunction with a self-assessed decline in the ability to learn. These patterns are consistent with the evidence presented here that pandemic-related disruptions were associated with anxiety and low well-being, while the implementation of distance learning instruction was associated with lower student anxiety, presumably by increasing student learning or student confidence in learning. Relatedly, data from a sample of university students in South Africa — who are of course somewhat older — suggests that social isolation was meaningfully associated with emotional challenges, and these challenges were more common among girls (Visser and Law van Wyk, 2021).

We also observe higher rates of anxiety and lower well-being among female students in this sample, consistent with broader evidence that girls and women have been particularly vulnerable during the pandemic (de Paz et al., 2020; UNESCO et al., December 2021; Amu et al., 2020). Early marriage of a female household member was also strongly associated with adverse mental health outcomes. This pattern is particularly significant given the broader body of evidence that early marriage is associated with a range of adverse health outcomes for both young women and their future children (Godha et al., 2016; Santhya, 2011; Delprato and Akyeampong, 2017), suggesting that any increase in early marriage could have intergenerational implications.

---

[4] In our data, there is some evidence that wealthier households experienced more COVID-related disruptions, in particular, a family member having to migrate due to COVID-19. A one standard deviation increase in the asset index was associated with a three percent higher likelihood that a family member needed to migrate.

Conversely, reported access to social support (a classmate, family member, neighbor, or other person to talk with) was associated with lower levels of anxiety, consistent with the findings of Amu et al. (2020). This result, in conjunction with the finding that schooling measures taken during closures were associated with less anxiety, is consistent with the literature showing that loneliness is an important consequence of prolonged school closures (Loades et al., 2020).

There is evidence that COVID-19 mitigation measures that had to do with education – such as having students attend school on different days or keeping libraries closed – was associated with reduced anxiety. The former measure led to smaller class sizes, which are often associated with higher learning levels since teachers have to spread their attention over fewer students (Glewwe and Muralidharan, 2016). The latter measure could have negative effects on learning since students would not have access to books and other learning materials, though this hypothesis is speculative.

Finally, there was also some evidence of higher anxiety and lower well-being among students characterized by higher socioeconomic status, consistent with a positive correlation between socioeconomic status and household-level disruptions in our data. Evidence from other contexts in sub-Saharan Africa has similarly suggested that it is primarily non-agricultural households, characterized by higher income ex-ante, that experienced a greater loss of income during the pandemic (Mahmud and Riley, 2021; Aggarwal et al., 2020; Bundervoet et al., 2022). These patterns are also consistent with the finding that higher test scores among grade four students in the same schools were associated with higher levels of anxiety. Given that student test scores are a good proxy for school quality and thus higher levels of retention and progression to secondary school (Hanushek, 2005), one speculative hypothesis is that grade seven students in these schools were more anxious about disrupted learning because of its impact on their own future test scores and prospects for secondary school. To our knowledge, there is no evidence around this channel in the existing literature.

Our research is characterized by some important limitations. First, our sample of students consists of those who returned to schools following their re-opening; therefore, we are unable to infer the prevalence of mental health challenges among those youth who dropped out of school and might be more likely affected by adverse COVID-19-related disruptions. In this sense, our results might be a lower bound estimate of the prevalence of mental health challenges among Mozambican adolescents. Unfortunately, there are no alternative surveys or administrative data sets that would provide data relevant to this question. As noted in section 2, pre-pandemic dropout rates were already high, particularly in rural areas, and thus many students in our sample may not have returned to school. Second, while we can report the pre-pandemic prevalence of depression and anxiety in the general Mozambican population, we lack pre-pandemic estimates for the study's specific population, and thus we are unable to assess trends in mental well-being. Third, given our data limitations and methods used, we cannot establish causal relationships between the pandemic-related disruptions examined and the mental well-being of students in our sample.

Stepping back, it is clear that meaningful challenges lie ahead for schools in low-income countries in managing a range of challenges faced by their students during school closures and following school reopening. This study highlights that increased anxiety and decreased well-being may be among these challenges and may merit a focused response by educators.

CRediT authorship contribution statement

Feliciano Chimbutane: Funding acquisition, Data curation, Writing – review & editing. **Catalina Herrera-Almanza:** Formal analysis, Conceptualization, Methodology, Project administration, Writing – original draft, Writing – review & editing. **Naureen Karachiwalla:** Funding acquisition, Formal analysis, Conceptualization, Methodology, Project administration, Writing – original draft, Writing – review & editing. **Carlos Lauchande:** Funding acquisition, Data curation, Writing – review & editing. **Jessica Leight:** Formal analysis, Conceptualization, Methodology, Writing – original draft, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ssmmh.2023.100203.

References

Adjorlolo, Samuel (2019). Generalised anxiety disorder in adolescents in Ghana : examination of the psychometric properties of the Generalised Anxiety Disorder-7 scale. *African J. Psychol. Assessment, 1*(1).

Aggarwal, Shilpa, Jeong, Dahyeon, Kumar, Naresh, David, S., Park, Robinson, Jonathan, & Spearot, Alan (2020). Did COVID-19 market disruptions disrupt food security? Evidence from households in rural Liberia and Malawi. In *Center for Effective Global Action Working Paper 142*.

Al-Rahamneh, Harran, Arafa, Lubna, Orani, Anas Al, & Baqleh, Rahaf (2021). Long- term psychological effects of COVID-19 pandemic on children in Jordan. *Int. J. Environ. Res. Publ. Health, 18*(15).

allAfrica. (2020). *Mozambique: Sharp Increase in Coronavirus Cases in Nampula*.

Allen, Nicholas B., & Sheeber, Lisa B. (2008). The importance of affective development for the emergence of depressive disorders during adolescence. In Nicholas B. Allen, & Lisa B. Sheeber (Eds.), *Adolescent Emotional Development and the Emergence of Depressive Disorders* (pp. 1–10).

Amu, Hubert, Abdul-Aziz, Seidu, Agbemavi, Wonder, Owusu, Ahinkorah, Bright, Ameyaw, Edward, & Kissah-Korsah, Kwaku (2020). Psychosocial distress among in-school adolescents in Mozambique: a cross-sectional study using the global school-based health survey data. *Child Adolesc. Psychiatr. Ment. Health, 14*, 1–9, 09.

APHRC, DEA AU/CIEFFA. (2021). *School Reopening in Africa during the COVID-19 Pandemic*. Abidjan, Ouagadougou, Nairobi: ADEA, AU/CIEFFA, APHRC.

Arundhana, Andi Imam, Iqbal, Muhammad, Maharani, Siti Annisa, & Syam, Aminuddin (2020). The emotional state and physical condition of Indonesian college students: an emerging situation during the coronavirus disease-19 crisis in Indonesia. *Open Access Macedonian Journal of Medical Sciences, 8*(T1), 261–267.

Bandiera, Oriana, Buehren, Niklas, Goldstein, Markus, Rasul, Imran, & Smurra, Andrea (2019). *The Economic Lives of Young Women in the Time of Ebola: Lessons from an Empowerment Program*. World Bank Policy Research Working. Paper No. 8760.

Boateng, Godfred O., Doku, David Teye, Innocentia Ebu Enyan, Nancy, Owusu, Samuel Asiedu, Aboh, Irene Korkoi, Kodom, Ruby Victoria, Ekumah, Benard, Quansah, Reginald, Boamah, Sheila A., Obiri-Yeboah, Dorcas, Nsabimana, Epaphrodite, Jansen, Stefan, & Armah, Frederick Ato (2021). Prevalence and changes in boredom, anxiety and well-being among Ghanaians during the COVID-19 pandemic: a population-based study. *BMC Publ. Health*, 21.

Bundervoet, Tom, Dávalos, Maria E., & Garcia, Natalia (2022). The short-term impacts of COVID-19 on households in developing countries: an overview based on a harmonized dataset of high-frequency surveys. *World Dev.*, Article 105844

Cardozo, Marta (2020). Maioria é contra reabertura das escolas em Moçambique. *segundo relatório*. Retrieved https://www.dw.com/pt-002/maioria-%C3%A9-contra-reabertura-das- escolas-em-mo%C3%A7ambique-segundo-relat%C3%B3rio/a-54415745. (Accessed 11 October 2022).

Chen, Jiyao, Farah, Nusrat, Rebecca, Kechen Dong, Chen, Richard Z., Xu, Wen, Yin, Allen, Chen, Bryan Z., Delios, Andrew, Miller, Saylor, Wan, Xue, & Zhang, Stephen X. (2021). The mental health under the COVID-19 crisis in Africa: a systematic review and meta-analysis. *medRxiv*.

Chongwo, Esther, Ssewanyana, Derrick, Nasambu, Carophine, Mwangala, Patrick N., Mwangi, Paul M., Nyongesa, Moses K., Newton, Charles R., & Abubakar, Amina (2018). Validation of a Swahili version of the world health organization 5-item well-being index among adults living with HIV and epilepsy in rural coastal Kenya. *Global Health Res. Pol., 3*.

de Avila, Garcia, Marla Andréia, Hamamoto Filho, Pedro Tadao, Silva Jacob, Francine Leticia da, Regina Souza Alcantara, Léia, Berghammer, Malin, Nolbris, Margaretha Jenholt, Olaya-Contreras, Patricia, & Nilsson, Stefan (2020). Children's anxiety and factors related to the COVID-19 pandemic: an exploratory study using the children's anxiety questionnaire and the numerical rating scale. *Int. J. Environ. Res. Publ. Health, 17*(16).

de Paz, Carmen, & Muller, Miriam (2020). *Ana Maria Munoz Boudet, and Isis Gaddis, "Gender Dimensions of the COVID-19 Pandemic*. Washington, DC: World Bank. https ://openknowledge.worldbank.org/handle/10986/33622.

Delprato, Marcos, & Akyeampong, Kwame (2017). The effect of early marriage timing on women's and children's health in sSub-Saharan Africa and Southwest Asia. *Ann. Global Health, 83*(3), 557–567 (Current Topics in Global Health).

Dione, Malick, Lo, Codé, Seye, Moustapha, Fall, Abdou Salam, Hidrobo, Melissa, Port, Agnès Le, Heckert, Jessica, & Peterman, Amber (2021). *Women and Adolescent Girls' Experience with COVID-19 in Rural Senegal*. https://doi.org/10.2499/ p15738coll2.134274. IFPRI Project Note.

Direcção Nacional de Saúde Pública. (2020). Comunicado de imprensa de actualizaão da informaçao sobre a Covid-19 no páis no mundo. *Technical Report*.

Dyer, Jessica, Wilson, Kate, Badia, Jacinta, Agot, Kawango, Neary, Jillian, Irene, Njuguna, James, Kibugi, Healy, Elise, Beima-Sofie, Kristin, John-Stewart, Grace, et al. (2021). The psychosocial effects of the COVID-19 pandemic on youth living with HIV in Western Kenya. *AIDS Behav., 25*(1), 68–72.

Egger, Dennis, Miguel, Edward, Warren, Shana S., Shenoy, Ashish, Collins, Elliott, Dean, Karlan, Parkerson, Doug, Mushfiq Mobarak, A., Fink, Günther, Udry, Christopher, Walker, Michael, Haushofer, Johannes, Larreboure, Magdalena, Athey, Susan, Lopez-Pena, Paula, Benhachmi, Salim, Humphreys, Macartan, Lowe, Layna, Meriggi, Niccoló F., Wabwire, Andrew, Austin Davis, C., Johann Pape, Utz, Graff, Tilman, Voors, Maarten, Nekesa, Carolyn, & Vernot, Corey (2021). Falling living standards during the COVID-19 crisis: quantitative evidence from nine developing countries. *Sci. Adv., 7*(6), Article eabe0997.

Engzell, Per, Frey, Arun, & Verhagen, Mark D. (2021). Learning loss due to school closures during the COVID-19 pandemic. *Proc. Natl. Acad. Sci. USA, 118*(17).

Favara, Marta, Freund, Richard, Porter, Catherine, Sánchez, Alan, & Scott, Douglas (2021). Young lives, interrupted: short-term effects of the COVID-19 pandemic on adolescents in low-and middle-income countries. *Covid Economics: Vetted and Real-Time Papers, 67*, 172–198.

Ferrão, Jorge, Collinson, Ivan, & Lauchande, Carlos (2020). Educaçao, Capital Humano e Economia, em Tempos de Covid-19, em Moçambique. *Semina: Ciências Sociais e Humanidades, 07*, 02–07.

Garland, Ann, Deyessa, Negussie, Desta, Menelik, Alem, Atalay, Zerihun, Tigist, Hall, Kristopher, Goren, Nicole, & Fish, Irving (2018). Use of the WHO's perceived well-being index (WHO-5) as an efficient and potentially valid screen for depression in a low income country. *Fam. Syst. Health, 36*(2), 148–158.

Gilligan, Daniel O., Karachiwalla, Naureen, Kasirye, Ibrahim, Adrienne, M Lucas, & Neal, Derek (2022). Educator incentives and educational triage in rural primary schools. *J. Hum. Resour., 57*(1), 79–111.

Glewwe, Paul, & Muralidharan, Karthik (2016). Improving education outcomes in developing countries: evidence, knowledge gaps, and policy implications. In *Handbook of the Economics of Education* (vol. 5, pp. 653–743). Elsevier.

Godha, Deepali, Anastasia, J Gage, Hotchkiss, David R., & Cappa, Claudia (2016). Predicting maternal health care use by age at marriage in multiple countries. *J. Adolesc. Health, 58*(5), 504–511.

Hanushek, Eric A. (2005). *The Economics of School Quality* (vol. 6, pp. 269–286). German Economic Review, 3.

Islam, Md Akhtarul, Dey Barna, Sutapa, Raihan, Hasin, Khan, Md Nafiul Alam, & Hossain, Md Tanvir (2020). Depression and anxiety among university students during the COVID-19 pandemic in Bangladesh: a web-based cross-sectional survey. *PLoS One, 15*(8), Article e0238162.

Islam, Md Saiful, Safaet Hossain Sujan, Md, Tasnim, Rafia, Tajuddin Sikder, Md, Potenza, Marc N., & Jim van Os. (2021). Psychological responses during the COVID-19 outbreak among university students in Bangladesh. *PLoS One, 15*(12), 1–15, 12.

Jones, Elizabeth A. K., Mitra, Amal K., & Bhuiyan, Azad R. (2021). Impact of COVID- 19 on mental health in adolescents: a systematic review. *Int. J. Environ. Res. Publ. Health, 18*(5).

Khan, Abid Hasan, Sultana, Mst Sadia, Hossain, Sahadat, Tasdik Hasan, M., Ahmed, Helal Uddin, & Tajuddin Sikder, Md (2020). The impact of COVID-19 pandemic on mental health wellbeing among home-quarantined Bangladeshi students: a cross-sectional pilot study. *J. Affect. Disord., 277*, 121–128.

Kim, Andrew Wooyoung, Nyengerai, Tawanda, & Mendenhall, Emily (2020). Evaluating the mental health impacts of the COVID-19 pandemic: perceived risk of COVID-19 infection and childhood trauma predict adult depressive symptoms in Urban South Africa. *Psychol. Med.*, 1–13.

Krieger, Tobias, Zimmermann, Johannes, Huffziger, Silke, Ubl, Bettina, Diener, Carsten, Kuehner, Christine, & Holtforth, Martin Grosse (2014). Measuring depression with a well-being index: further evidence for the validity of the WHO well-being index (WHO-5) as a measure of the severity of depression. *J. Affect. Disord., 156*, 240–244.

Kumar, Manasi, Akbarialiabad, Hossein, Kouhanjani, Mohsen Farjoud, Kiburi, Sarah, Shidhaye, Pallavi, Hossein Taghrir, Mohammad, & Shidhaye, Rahul (2022). Association of major disease outbreaks with adolescent and youth mental health in low- and middle-income countries: a systematic scoping review. *JAMA Psychiatr., 79*(12), 1232–1240, 12.

Loades, Maria Elizabeth, Chatburn, Eleanor, Higson-Sweeney, Nina, Reynolds, Shirley, Shafran, Roz, Brigden, Amberly, Linney, Catherine, McManus, Megan Niamh, Borwick, Catherine, & Crawley, Esther (2020). Rapid systematic review: the impact of social isolation and loneliness on the mental health of children and adolescents in the context of COVID-19. *J. Am. Acad. Child Adolesc. Psychiatr., 59*(11), 1218–1239.e3.

Lovero, Kathryn L., Adam, Salma Ebrahim, Bila, Carolina Ezequias, Elda, D Canda, Maria Eduarda, Fernandes, Baltazar Rodrigues, Teresa I., Sander, Mariel C Tai, Mellins, Claude A., Cristiane, S Duarte, Fortunato dos Santos, Palmira, & Wainberg, Milton L. (2022). Validation of brief screening instruments for internalizing and externalizing disorders in Mozambican adolescents. *BMC Psychiatr., 22*(1), 549.

Mahmud, Mahreen, & Riley, Emma (2021). Household response to an extreme shock: evidence on the immediate impact of the covid-19 lockdown on economic outcomes and well-being in rural Uganda. *World Dev., 140*, Article 105318.

Mallik, Chiro Islam, & Radwan, Rifat Binte (2021). Impact of lockdown due to COVID-19 pandemic in changes of prevalence of predictive psychiatric disorders among children and adolescents in Bangladesh. *Asian J. Psychiat., 56*, Article 102554.

Mambo, F., Basso, M., Salvucci, V., & Santos, R. (2019). *An Analysis of School Dropout in Mozambique, 2014-15*. WIDER Working Paper. *No. 2019/49*.

MINEDH. (2020a). *Circular No 5/GM/MINEDH/2020: Preven, cão do COVID-19 - Medidas Adicionais de Reforco a Serem Aplicadas nas Instituiões Públicas e Privadas de Educaão Geral e Formaão de Professores, May 18 2020*.

MINEDH. (2020b). *Instrução Ministerial GM/MINEDH/2020: Diploma Ministerial: Revisão Pontual do Regulamento Geral de Avaliação do Ensino Primário, Alfabetiza cão e Educacão de Jovens e Adultos e Ensino Secundário, December 31 2020,*. Mozambique: Maputo.

MINEDH. (2021). *Instrução Ministerial No 11/GM/MINEDH/2021: Instrucão Ministerial No 11/GM/MINEDH/2021: Organizaçₐo do Processo Pedagógico no Quadro da Retoma das Aulas Presenciais nas Escolas, Autorizada pelo Decreto No 62/2021, de 27 de Agosto, August 30 2021*. Mozambique: Maputo.

Nolan, C. P., O'Donnell, P. J. M., Desderius, B. M., Mzombwe, M., McNairy, M. L., Peck, R. N., & Kingery, J. R. (2018). Depression screening in HIV-positive Tanzanian adults: comparing the PHQ-2, PHQ-9 and WHO-5 questionnaires. *Global Mental Health, 5*, e38.

Nyongesa, Moses K., Paul, Mwangi, Koot, Hans M., Cuijpers, Pim, Newton, Charles R. J. C., & Abubakar, Amina (2020). The reliability, validity and factorial structure of the Swahili version of the 7-item generalized anxiety disorder scale (GAD-7) among adults living with HIV from Kilifi, Kenya. *Ann. Gen. Psychiatr., 19*(1), 62.

Oakley, Erin, Abuhamad, Shoroq, Seager, Jennifer, Avuwadah, Benjamin, Hamory, Joan, Jones, Nicola, Ma-lachowska, Agnieszka, Yadete, Workneh, Abu Hamad, Bassam, & Baird, Sarah (2022). COVID-19 and the gendered impacts on adolescent well- being: evidence from a cross-sectional study of locally adapted measures in Ethiopia, Jordan, and Palestine. *EClinicalMedicine, 52*, Article 101586.

Pinchoff, Jessie, Santhya, K. G., White, Corinne, Rampal, Shilpi, Acharya, Rajib, & Ngo, Thoai D. (2020). Gender specific differences in COVID-19 knowledge, behavior and health effects among adolescents and young adults in Uttar Pradesh and Bihar, India. *PLoS One, 15*(12), 1–13, 12.

Radwan, Eqbal, Radwan, Afnan, Radwan, Walaa, & Pandey, Digvijay (2021). Prevalence of depression, anxiety and stress during the COVID-19 pandemic: a cross-sectional study among Palestinian students (10–18 years). *BMC Psychol., 9*(1), 1–12.

Reimers, F. M., & Shleicher, A. (2020). *A Framework to Guide an Education Response to the COVID-19 Pandemic of 2020*.

Santhya, K. G. (2011). Early marriage and sexual and reproductive health vulnerabilities of young women: a synthesis of recent evidence from developing countries. *Curr. Opin. Obstet. Gynecol., 23*(5), 334–339.

Saurabh, Kumar, & Ranjan, Shilpi (2021). Compliance and psychological impact of quarantine in children and adolescents due to covid-19 pandemic. *Indian J. Pediatr., 87*(7), 532–536.

Sharma, M., Idele, P., Manzini, A., Aladro, C. P., Ipince, A., Olsson, G., Banati, P., & Anthony, D. (2021). *Life in Lockdown: Child and Adolescent Mental Health and Well-Being in the Time of COVID-19*. UNICEF.

Spitzer, Robert L., Kurt Kroenke, Janet B., Williams, W., & Lowe, Bernd (2006). A brief measure for assessing generalized anxiety disorder: the GAD-7. *Arch. Intern. Med., 166*(10), 1092–1097, 05.

StataCorp. (2021). *Stata Statistical Software: Release 17*. College Station, TX: StataCorp LLC.

Tee, Michael L., Tee, Cherica A., Anlacan, Joseph P., Aligam, Katrina Joy G., Reyes, Patrick Wincy C., Kuruchittham, Vipat, & Roger, C. Ho (2020). Psychological impact of COVID-19 pandemic in the Philippines. *J. Affect. Disord., 277*, 379–391.

Topp, Christian, Østergaard, Søren, Søndergaard, Susan, & Bech, Per (2015). The WHO-5 well-being index: a systematic review of the literature. *Psychother. Psychosom., 84*, 167–176, 04.

Torrente, F., Yoris, A., Low, D. M., Lopez, P., Bekinschtein, P., Manes, F., & Cetkovich, M. (2021). Sooner than you think: a very early affective reaction to the COVID- 19 pandemic and quarantine in Argentina. *J. Affect. Disord., 282*, 495–503.

UNESCO. (2021). Education: from disruption to recovery. https://en.unesco.org/covid1 9/educationresponse. (Accessed 6 December 2021). retrieved.

UNESCO Institute of Statistics. (2021b). http://data.uis.unesco.org,. (Accessed 1 December 2021). retrieved.

UNESCO, UNICEF, and World Bank. (2021). *The State of the Global Education Crisis*. December: A Path to Recovery.

UNICEF, "Longitudinal Assessment of Dropout in Mozambique," (forthcoming).

UNICEF. (2020). *Attendance and Educational Attainment of Primary School Children in Mozambique. The Results of the 2018 Round of the Longitudinal Assessment of School Dropout*. Mozambique: Maputo.

UNICEF. (2022). *Main Sociodemographic Indicators of Nampula 2022*.

Verma, Kalpana (2020). The mental health impact of the COVID-19 epidemic on college students in India. *Asian J. Psychiat., 53*, Article 102398.

Vishwakarma, Deepak, Ravi, Rejoice Puthuchira, & Thomas, Ebbie (2021). Impact of COVID-19 pandemic on mental health and effects of a sense of verdict of selected college students in Nepal, Nigeria and India. *Indian J. Pub. Health Res., 12*(1), 60.

Visser, Maretha, & Law van Wyk, Eloise (2021). University students' mental health and emotional wellbeing during the COVID-19 pandemic and ensuing lockdown. *S. Afr. J. Psychol., 51*(2), 229–243.

Wang, Dongqing, Chukwu, Angela, Millogo, Ourohiré, Assefa, Nega, James, Christabel, Young, Tara, Bruno, Lankoande, Workneh, Firehiwot, Hemler, Elena C., Korte, Michelle L., Mattei, Josiemer, Bassiahi Soura, Abdramane, Ali, Sie, Oduola, Ayoade, Berhane, Yemane, & Fawzi, Wafaie W. (2021). The COVID-19 pandemic and adolescents' experience in Sub-Saharan Africa: a cross-country study using a telephone survey. *Am. J. Trop. Med. Hyg., 105*(2), 331–341.

Wiguna, Tjhin, Anindyajati, Gina, Kaligis, Fransiska, Irawati Ismail, Raden, Minayati, Kusuma, Hanafi, Enjeline, Murtani, Belinda Julivia, Wigantara, Ngurah Agung, Putra, Anggi Aviandri, & Kent, Pradana (2020). Brief research report on adolescent mental well-being and school closures during the COVID-19 pandemic in Indonesia. *Front. Psychiatr.*, 11.

World Health Organization. (2022). https://covid19.who.int/region/afro/country/mz. (Accessed 16 October 2022). retrieved.

World Population Review. (2021). *Depression Rates by Country*.

Yitayih, Yimenu, Lemu, Yohannes Kebede, Mekonen, Seblework, Mecha, Mohammed, & Ambelu, Argaw (2021). Psychological impact of COVID-19 outbreak among Jimma University Medical Center visitors in Southwestern Ethiopia: a cross-sectional study. *BMJ Open, 11*(1).