Validation of the Child Depression Screening Tool in Three African Settings: Rwanda, Senegal and South Africa

Sharain Suliman[1], Jennifer Bloom[1], Naeem Dalal[2,3], Eric Remera[4], Raissa Muvunyi[4], Mohammed Abdulaziz[5], Adelard Kakunze[3], Ismahan Soukeyna Diop[6], Djena Fafa Cisse[7], Ndeye Awa Dieye[7] , Britt McKinnon[8], Mohamadou Sall[9], Agnes Binagwaho[10,11], Soraya Seedat[1]

[1]Affiliation: MRC Genomics of Brain Disorders Unit and Department of Psychiatry, Stellenbosch University, Cape Town, South Africa

[2] Zambia National Public Health Institute, University of Zambia School of Medicine, Lusaka, Zambia

[3] Non-communicable diseases (NCDs), Injuries and Mental health Program, Africa Centres for Disease Control and Prevention (Africa CDC)

[4] Rwanda Biomedical Centre, University of Global Health Equity (UGHE), Kigali, Rwanda

[5] Division of Disease Control and Prevention, Africa Centres for Disease Control and Prevention (Africa CDC)

[6] Department of Psychology, The Cheikh Anta Diop University (UCAD), Senegal

[7] Faculty of Medicine, The Cheikh Anta Diop University (UCAD), Senegal

[8] University of Montreal, Canada

[9] Institute for Training and Research in Population, Development and Health Reproduction (IPDSR), The Cheikh Anta Diop University (UCAD), Senegal

[10] Department of Pediatrics, University of Global Health Equity, Kigali, Rwanda

[11] London School of Hygiene and Tropical Medicine, London, United Kingdom

This peer-reviewed article has been accepted for publication but not yet copyedited or typeset, and so may be subject to change during the production process. The article is considered published and may be cited using its DOI.

10.1017/gmh.2025.10022

This is an Open Access article, distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives licence (http://creativecommons.org/licenses/by-nc-nd/4.0/), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is unaltered and is properly cited. The written permission of Cambridge University Press must be obtained for commercial re-use or in order to create a derivative work.

https://doi.org/10.1017/gmh.2025.10022 Published online by Cambridge University Press

Abstract

Background: The unavailability of reliable, easy-to-use depression screening tools adapted for sub-Saharan African children is one of the significant barriers to the treatment of childhood depression. We thus adapted the Child Depression Screening Tool (CDST) to the South African (SA), Senegalese (S) and Rwandan (R) contexts, as a tool that could screen for depression in children suffering from chronic illnesses, trauma, and difficulties related to COVID-19, family, and community hardships. A DSM-5 based diagnostic interview and the CDST screening measure were administered to 1001 participants aged between 7-16 years.

Findings: The prevalence of depression ranged between 9.5% and 16.8%. It was more prevalent in youth with chronic illness and those exposed to negative/ adverse life events Older age (R and SA), female sex (S), dislike of school (R and SA), and cannabis use (SA) were also associated with worse depression. Receiver Operator Characteristic (ROC) analysis showed that sensitivity and specificity were optimised at a CDST cut-point of 5.0 and that the performance of the measure was satisfactory (79%–89%).

Implications: The CDST is a valid tool to screen for depression in the settings assessed in. If found to be suitable in other countries and settings, it may offer a clinically sound, sustainable path towards the identification of child depression in Africa.

Keywords: Child depression; Child Depression Screening Tool; Sub-saharan Africa

Impact Statement

- There are few affordable and easy to use measures adapted for childhood depression in Africa.

https://doi.org/10.1017/gmh.2025.10022 Published online by Cambridge University Press

- The Child Depression Screening Tool (CDST), developed in Africa, is a free rapid screening tool for depression in children, that may fill this gap.
- This new tool can contribute towards improved identification of depression, and referral to appropriate mental health care for children at risk of depression.
- Cannabis use was associated with depression, poor school performance and considerations of dropping out of school. Use of the CDST may provide opportunities to evaluate and treat associated difficulties such as these.

https://doi.org/10.1017/gmh.2025.10022 Published online by Cambridge University Press

Background

Mental health difficulties are a major burden for children and adolescents globally, with the World Health Organisation (2021) estimating that approximately 14% of 10-19 year-olds worldwide experience mental disorders. Evidence suggests that depression is one of the most commonly experienced mental disorders in adolescents, and that its prevalence is increasing (Daly, 2022; Mojtabai et al., 2016. Around, 1.1% of children and adolescents aged 10–14 years, and 2.8% of adolescents aged 15–18 years are estimated to have clinical depression (WHO 2021a). In Sub-Saharan Africa (SSA), a systematic review encompassing twenty studies reported clinically significant depressive symptoms in 27% of adolescents in the general population and of 29% in adolescents from at risk groups (Jorns-Presentati et al., 2021). A more recent review among SSA youth under 19 years of age found a pooled prevalence rate of 15% (Jakobsson *et al.* 2024). More specifically, in Rwanda rates of clinically assessed depression in children with HIV were found to range between 14% and 25% (Binagwaho *et al.* 2016, 2021). South African studies have reported that between 4 and 41% of adolescents report experiencing symptoms of depression potentially indicative of a diagnosis (De Vries et al. 2018; Morojele N et al. 2013; Pluddemann et al. 2008).

Risk factors for child and adolescent depression in Africa include biopsychosocial stressors, such as age, sex, food insecurity, bullying and, low perceived levels of social support, substance use, poor access to healthcare and exposure to stressful and traumatic events (Partap *et al.* 2023). Medical risk factors include Chronic diseases, such as diabetes, cancer, HIV, TB and asthma (Harrison *et al.* 2023). Additionally, studies, mostly from high-income countries, report increased level of depressive symptoms during and after the recent COVID-19 pandemic (Racine *et al.* 2021; Wang *et al.* 2022). Youth well-being during this time

https://doi.org/10.1017/gmh.2025.10022 Published online by Cambridge University Press

was likely affected by stress about one's own or loved one's health, social isolation, and increased family stressors (i.e., parental job loss, domestic violence) (Barendse *et al.* 2023; Liang and Zeng 2021; Loades *et al.* 2020). Although, in SSA youth, low levels of depressive symptoms have been associated with the pandemic, studies are needed to explore the longer-term effects (Matovu *et al.* 2021; Wang *et al.* 2021).

Childhood and adolescent depression are associated with functional impairment in home, school and social domains as well as increased suicide risk (WHO, 2021). It is also associated with negative health outcomes in adulthood, such as higher levels of adult anxiety and substance use disorders, worse health and social functioning, less financial and educational achievement, and increased criminal behaviour (Clayborne *et al.* 2019; Copeland *et al.* 2021; Johnson *et al.* 2018).

Despite their prevalence and long-lasting effects, child and adolescent mental health and well-being has been overlooked in global health planning (UNICEF 2021). Most mental-health needs in young people are still unmet, especially in low- and middle-income countries (LMIC) where adversity is most prevalent. It is estimated that about four out of five people in LMIC who need services for mental health conditions do not receive them despite there being effective treatments available (Mangione et al., 2022).

Systematic and scoping reviews have identified several barriers to treatment seeking and accessing professional help for mental health problems. These include limited mental health literacy, perceived social stigma and embarrassment, perceptions around confidentiality and trust of an unknown person, financial costs, resource shortages (i.e. limited access to

https://doi.org/10.1017/gmh.2025.10022 Published online by Cambridge University Press

mental health care providers) and logistical barriers (Radez *et al.* 2021; Saade *et al.* 2023). Another systematic review, from the primary care providers perspective, identified barriers related to identification, management, and/or referral (O'Brien *et al.* 2016). A scoping review of barriers specific to African youth found that a preference for traditional or complementary treatments, stigma and mental health literacy were the most common (Saade *et al.* 2023).

Given the above there is consensus that child and adolescent mental health services need to be strengthened. This is particularly so in LMIC and SSA where risk factors may be greater and resources fewer (WHO | Regional Office for Africa 2021). In a system such as this, it is understandable that many depressed youths may slip through the cracks, and not receive the help they need. A brief screening test, that is free, will assist greatly in this regard. Firstly, it may assist with the early diagnosis of depression in children and adolescents allowing them to receive the care that they need to recover. Secondly, being short and concise, it should not place more of a burden on an already stretched healthcare system where time and capacity are in short supply, and thirdly, as a free tool it can be administered without limitations to those children and adolescents who might need it.

In Rwanda, the Children's Depression Inventory (CDI) and the Center for Epidemiological Studies Depression Scale for Children (CES-DC) have been validated with reasonable results (Betancourt *et al.* 2012; Binagwaho *et al.* 2016). The CDI, however, requires a fee for administration, and the CES-DC was not validated in youth with HIV. Thus, Binagwaho and colleagues undertook to develop a tool that was both free and tailored to young people with HIV (Binagwaho et al., 2021). The Child Depression Screening Test (CDST) was

https://doi.org/10.1017/gmh.2025.10022 Published online by Cambridge University Press

developed with the support of local skilled and knowledgeable professionals with the assurance that the tool is valid, reliable, affordable, and easy for primary care level providers to use (Binagwaho *et al.* 2021). This approach has the advantage of ensuring that socioeconomic and cultural differences are considered, so as to fully capture the symptoms of depression, ensuring that respondents would fully understand the questionnaire and that the expression of depression within the Rwandan cultural context is truly actualized (Owen *et al.* 2016).

Given the positive psychometric results obtained in the Rwandan validation, CDST may also offer a clinically sound, sustainable path forward to support the diagnosis and treatment of child depression, particularly in at risk youth, in SSA. However, for a tool to be used with confidence, validation and adaptation of mental health screening tools for use in a particular setting is crucial to ensure that they accurately identify mental health issues, are culturally appropriate, and linguistically accessible, (Juhász et al. 2003).

The primary aim of this study was to adapt and validate the CDST, a rapid screening tool, to effectively screen for depression in at risk children in three SSA countries- Rwanda, Senegal and South Africa (Binagwaho *et al.* 2021). This included children suffering from HIV and other chronic illnesses, displacement, trauma, as well as experiencing difficulties because of COVID-19, family, and community hardships, that put them at higher risk of depression (Awad *et al.* 2024; Boyes *et al.* 2019; Collings and Valjee 2024; Davidson *et al.* 2017). Secondary aims were to assess prevalence and correlates of depression in the three countries.

https://doi.org/10.1017/gmh.2025.10022 Published online by Cambridge University Press

Methodology

Study design and setting

This was a multi-country cross sectional study design and was conducted in Rwanda, Senegal and South Africa between December 2021 and March 2022.

Participants

The sample size calculation was calculated using Buderer Formula and assuming sensitivity of 88% and specificity of 96%, based on results of the initial CDST study conducted in Rwanda (with the cut- off of 6), a 10% width for sensitivity and specificity and 95% Confidence interval. The sample size calculation was adjusted for non-response (5-10%), and the sample size and allocation were adjusted to the study population size in each country to give the following sample sizes: Rwanda- N=340, Senegal- N=500, South Africa- N=300.

At all sites we included children aged 7-16 years who gave written assent and whose parent/guardian's gave consent to participate. Recruitment took place via convenience sampling. Participants from refugee/ displacement camps (e.g., youth who left their countries/ homes to escape conflict, violence, persecution or natural disaster) were required to have lived in the camp for a minimum of 12 months. No additional inclusion or exclusion criteria were applied. We did, however, select sites where our yield of participants living with chronic diseases (HIV, Cancer, Diabetes or cardiovascular diseases) and other adverse events (lifetime DSM-5 trauma, recent frightening events (includes DSM-5 trauma in the last month, and experiencing COVID or the effects of COVID e.g., loss of income or close family members) would be high.

https://doi.org/10.1017/gmh.2025.10022 Published online by Cambridge University Press

In Rwanda recruitment took place at refugee camps, schools and health facilities. In Senegal recruitment sites included refugee camps, schools, sites with street-involved youth (e.g. at homeless shelters and with those living and engaged in begging on the streets) and impoverished (poor) youth. In South Africa recruitment took place at health facilities, children's homes, schools and in communities with high levels of trauma.

Measures

The data collection tools included a sociodemographic questionnaire, the Child Depression Screening Tool (CDST) Binagwaho et al. 2021. and a DSM 5-based clinical interview as a gold standard to assess depression. Further, medical data were extracted from patient files where available. The CDST is comprised of 11 items, each with four response options that are scored from 0 to 3 (0=absence of symptoms, 1=symptoms sometimes present, 2=symptom frequently present, 3=symptom always present). The 11 items cover the following areas: Mood, Representation of the future, - Interest in the games, - Sleep, - Fatigue, - Appetite, - Attention, - Agitation, - Relationships with others, and - Suicidal thoughts. Scores range from 0-33, with a cut point of 6 suggested in the original validation study (Binagwaho et al. 2021).

In Senegal and South Africa the CDST was translated from English to the local languages by a team of experienced research nurses, clinical psychologists or psychiatrists. To ensure accuracy, the tool was back-translated to English by a different team of clinicians. The translation process had already been completed in Rwanda as part of the development and first validation study (Binagwaho *et al.* 2021). After testing the tool in small pilot studies and adapting it to each setting, the tool was programmed into the ODK, open-source Android

https://doi.org/10.1017/gmh.2025.10022 Published online by Cambridge University Press

application, which was used to gather data in electronic format. Data was collected by trained psychologists, nurses and counsellors.

Procedures

Ethical approvals were obtained before the start of the study.

Children and adolescents who gave written assent and whose parent's gave consent to participate were included in the study. The purpose of the study, procedures involved, voluntary nature, potential risks and benefits, and assurance of confidentiality of collected information were fully explained and children were given the option to opt out at the time of the assessment. Measures were made available in the most common languages used in the setting (Rwanda: Kinyarwanda; Senegal: Wolof and French; SA: Afrikaans, English, and isiXhosa) in order to ensure the efficacy and accuracy of the cut-offs obtained.

Psychologists, research nurses and psychological counsellors were trained to administer the CDST and evaluate depression in a standardised manner, in the child's preferred language. The interviewer who administered the CDST was blinded to the outcome on the clinical interview and vice versa. Children who were identified as requiring further assessment or treatment were referred to mental health clinicians and further specialized services.

Data Analysis

Percentages and 95% confidence intervals (95% CI) were calculated to describe sample characteristics. Scores on the CDST were then compared to MDD diagnoses on the clinical interview to determine sensitivity (proportion of children who have depression according to

https://doi.org/10.1017/gmh.2025.10022 Published online by Cambridge University Press

clinical interview and who are correctly identified by the CDST) and specificity (proportion of children without depression and who have been correctly identified as non-depressed by the CDST) at different cut-points. Receiver operating characteristic (ROC) curve analysis was used to determine the ability of the CDST to discriminate between individuals who did and did not meet the criteria for depression according to diagnostic interview. The area under the curve (AUC) provides an indication of the diagnostic ability of the CDST: values between 0.5 and 0.7 indicate low discriminatory ability; values between 0.7 and 0.9 indicate moderate discriminatory ability; and values above 0.9 indicate high discriminatory ability of a measure (Hosmer and Lemeshow 2000).

Assumptions for computing confidence intervals were met. (i) Independent observations: visual inspection of our data suggests that each case represents a distinct respondent. (ii) Normality: given our sample size, the central limit theorem ensures that the sampling distributions for means, sums and proportions approximate normal distributions.

Results

Sample characteristics

A total of 1001 children and adolescents participated in the study. In Rwanda 340 children and adolescents participated: a) 186 (54%) with chronic diseases, b) 80 (24%) primary and high school children and c) 75 (22%) children from refugee camps. Their ages ranged between 7 and 15 years. In Senegal 345 vulnerable youth participated in the study: a) 151 (43.8%) of these had chronic diseases and b) 122 (35.4%) were street-involved, refugee, and displaced youth, as well as those living in poverty and from schools. Nearly half the children classified as vulnerable were street-involved youth from the capital city of Dakar, approximately one-third were refugee or displaced children, and 18% were living in extreme

https://doi.org/10.1017/gmh.2025.10022 Published online by Cambridge University Press

poverty. The most common chronic diseases among the children were sickle-cell anemia (34%) and HIV (29%), followed by diabetes and cancer. Ages ranged between 7 and 14 years. In South Africa, 315 children and adolescents were included: a) 9 (2.9%) with a known chronic disease i.e., HIV+, diabetic, or direct COVID experience, b) 84 (26%) who had ever been exposed to DSM-5 trauma and 50 (15.8%) who had experienced a frightening event in the last few weeks. Ages ranged between 7 and 16 years.

Rwanda

A total of 340 children with a mean age of 11.3 years participated in the study. Table 1 shows that while 88.5% of participants lived with their parents, 11.5 % were not living with their parents for various reasons including death of parents or separation. Majority of participants (78.8 %) were students in primary school and 21.2% were in high school. A considerable proportion of participants had poor academic performance as 60 % repeated a year at least once in their lifetime. Additionally, 48.4% missed class time due to health or family reasons and 9.06% considered dropping the school.

The mean score on the CDST was 2.9 (95%CI: 1.6, 4.2). Based on the clinical interview, 14.3 % (95% CI: 10.9, 18.5) of children were found to have depression. Prevalence was similar in male (14.5%, 95% CI: 10.0, 20.7) and female (14.0%, 95% CI: 9.5, 20.3) participants, but was higher in adolescents aged 13-15 (20.3%, 95% CI: 14.4, 27.9) years than in children in younger age groups (ages 7-9 years = 5.9% 95% CI: 2.5, 13.4 and 10-12 years = 13.3%, 96% CI: 8.1, 20.9). Children living with their parents reported fewer depressive symptoms than those living elsewhere (13.2%, 95% CI: 9.8, 17.6 vs 23.1%, 95% CI: 12.4, 38.8). Higher rates of depression were observed in children not attending school regularly (26.7%, 95% CI: 19.5,

https://doi.org/10.1017/gmh.2025.10022 Published online by Cambridge University Press

35.3 vs 9.2%, 95% CI: 5.3, 15.5) and in those who contemplating dropping out the school (43.5%, 95% CI: 25.1, 63.8 vs 14.9%, 95% CI: 10.8, 20.2).

Senegal

A sample of 345 participants with a mean age of 11.0 years was included. As shown in Table 1, the vulnerable children included more boys than girls, which largely reflects the much higher number of street-involved boys than girls (52 boys vs. 3 girls, respectively). A similar proportion of boys and girls were represented among the students and the children with chronic diseases, except for sickle-cell aneamia (32 boys vs. 16 girls).

The overall prevalence of depression determined by standard clinical interview was 16.8% (95% CI: 13.2, 21.2). Table 1 displays depression prevalence for the sample according to sociodemographic characteristics. More girls experienced depression than boys (22.6%, 95% CI: 16.2, 30.5 vs. 13.2%, 95% CI: 9.3, 18.5), as did children living in rural vs. urban areas (27.8%, 95% CI: 18.6, 39.2 vs. 13.9%95% CI: 10.3, 18.6).

The mean CDST score was 4.1 (95% CI: 3.7, 4.4). Depression prevalence based on clinical interview was particularly high in the Matam and Ziguinchor regions (44.8%, 95% CI: 28.0, 62.9 and 29.3%, 95% CI: 20.4, 40.0). While children educated in traditional Islamic schools (Daaras) had lower depression prevalence (7.2%, 95% CI: 3.0, 16.3) as compared to those in primary or secondary formal schools (20.3%, 95% CI: 15.1, 26.8) and 16.4%, 95% CI: 9.6, 26.8) nearly all were boys. Among participants classified as vulnerable children, children with chronic diseases, and students, depression prevalence was 16.1% (95% CI: 10.5,23.9), 19.2% (95% CI: 13.7, 26.3) and 13.2% (95% CI: 7.2, 22.8), respectively. While sample sizes are small when stratified by type of vulnerability, results suggest that refugee (29.2%, 95% CI: 11.0, 47.4) and displaced (27.3%, 95% CI: 8.7, 45.8) children are more likely to suffer

https://doi.org/10.1017/gmh.2025.10022 Published online by Cambridge University Press

from depression compared with street-involved youth (9.1%, 95% CI: 1.5, 16.7) and children living in extreme poverty (9.5%, 95% CI: -3.0, 22.1). More than one in five children with cancer, sickle-cell anemia and HIV were identified to have depression. When we stratified results by sex, vulnerable girls had a particularly elevated prevalence of depression (32.3%, 95% CI: 15.8, 48.7) compared to boys (10.3%, 95% CI:3.9, 16.7).

South Africa

In South Africa 315 participants with a mean age of 11.6 years were include. Just over a quarter, 26.7%, of the 315 children endorsed lifetime trauma exposure, and 15.9% had experienced a frightening event in the last few weeks. Only a few children had direct exposure to COVID–related trauma with 1.0% indicating that they had lost a close family member to COVID. Of the 2.9% who indicated that they were aware of having a chronic disease, 1.9% indicated that they were HIV+ and 1.0% indicated that they were diabetic. A large number were from disadvantaged environments, with just over a third (36.5%) indicating that their family received a government grant (e.g., disability grant or pension). The majority (96.1%) resided in urban areas in the Cape Metropole region of South Africa. While 27.8% had lived away from home for more than 3 months at some time, at the time of this study only 23.2% were currently living in a group or boarding home. Socio-demographic characteristics of participants are displayed in Table1.

The mean CDST score was 5.4 (95% CI: 4.9, 5.9). The number of children who scored above the recommended cut-off of 6 on the CDST (Binagwaho et al., 2021) i.e. those with probable depression was 22 (26.7%). The prevalence of depression, as determined by clinicians conducting the clinical interviews, was 9.5%. A diagnosis of major depressive disorder was more prevalent in older children, 13-16 years old (16.8%, 95% CI: 11.6, 23.7), than in

https://doi.org/10.1017/gmh.2025.10022 Published online by Cambridge University Press

younger children (7-9 years old (1.5%, 95% CI: 0.2, 9.9) and 10-12 years old (3.1%, 95% CI: 1.0, 9.1)). Children who indicated that they considered dropping out of school (27.8%, 95% CI: 22.8, 32.8 vs 8.1%, 95% CI: 5.1, 11.1), and children who had lost their mothers were more likely to be depressed (20.7% 95% CI: 9.6, 39.2 vs 8.4% 95% CI: 5.7, 12.3). Those who experienced a recent frightening event (22%, 95% CI: 17.4, 26.6 vs 95% CI: 69.9, 86.1], and those who had experienced COVID or had a chronic illness 33.3 [95% CI: 28.1, 38.5 vs 57.8, 76.2] were also more likely to be depressed. Of note, almost half (43%) who smoked cannabis were depressed. Cannabis use was related to age with older children more likely to be using the substance (95% CI: -0.003, 0.052).

Criterion validity of the CDST

CDST scores were compared to the clinical interview results to obtain sensitivity and specificity. Table 1 below provides the sensitivity and specificity of different scores per country. For all the three countries, Rwanda, Senegal and South Africa, the cut of 5 provided the best sensitivity and specificity.

The area under the curve (AUC) is used to assess the overall performance of a test. In ROC analyses, the CDST showed good discriminatory power relative to the DSM-5 based structured clinical interview for depression, with an area under the curve of 0.90 for Rwanda, 0.89 for Senegal and 0.79 for South Africa. See Figures 1-3. These AUCs of above 0.79 indicate that the CDST performed significantly better than chance at discriminating between those with and without depression in the three countries.

Discussion

https://doi.org/10.1017/gmh.2025.10022 Published online by Cambridge University Press

Although numerous tools to screen for depression in children are available, few are accessible and adapted to African settings. This cross-sectional study aimed to adapt the CDST, a rapid tool to screen for childhood depression. Accurate assessments can be critical to targeting resources, especially when there are limited resources for mental health treatment. A total sample of 1001 children and adolescents were recruited across three countries (Rwanda: n=340; Senegal: n=345; South Africa: n=316).

Receiver Operator Characteristic (ROC) analysis was conducted to identify the CDST cut-point that best predicted depressive status as assessed by the clinical interview. The ROC curve demonstrated that sensitivity and specificity in all three samples was optimised at a cut-point of 5.0. This is one point lower than the recommended cut-off of 6, based on the original validation study (Binagwaho et al., 2021). At the cut-point of 5 sensitivity was highest in the Senegalese sample (90%) as compared to the Rwandan (81%) and South African (80%) samples. Specificity at this cut-point this was best in the Rwandan sample (95%) as compared to the Senegalese (75%) and South African (71%) samples. Additionally, the performance of the measure, according to the ROC analysis, was satisfactory – 89-90% (medium - high) in the Rwandan and Senegalese samples and 79% (medium) in the South African sample. These robust AUCs statistics indicate that depressed youth are 79-90% more likely to have a high total score on the CDST than those who do not have depression. The sound psychometric properties and anecdotal ease of use expressed by those who administered the CDST, suggests that the CDST can be a useful tool to screen for depression in children and adolescents in these settings.

https://doi.org/10.1017/gmh.2025.10022 Published online by Cambridge University Press

Secondary aims included estimating the prevalence and correlates of depression in the three countries. Based on diagnostic clinical interviews, the prevalence of depression was lowest in South African youth (9.3%) as compared to Rwandan and Senegalese youth (14.3% and 16.8% respectively). Given the heterogeneity of the youth samples in the three countries, these prevalence estimates cannot be directly compared. The sample from South Africa was predominantly composed of children exposed to family and community hardships, and had a lower number of children diagnosed with chronic illnesses, - less than 3% of the sample as compared to 54% and 43.8% in the Rwandan and Senegalese samples.

In accordance with studies showing an association between chronic disease and depression ((Binagwaho *et al.* 2021; Dessauvagie *et al.* 2020; Too et al. 2021), elevated rates of depression were found in youth with chronic illness in all three countries. The risk of depression was also significantly higher among children and adolescents exposed to adverse life events such as death of a family member, physical or sexual abuse, or being a refugee, in all countries. Exposure to adverse events such as these have consistently been identified as risk factors for depression (Beck *et al.* 2021; Jorns-Presentati *et al.* 2021; Oldehinkel *et al.* 2015; Rao and Chen 2009; Thapar *et al.* 2012).

The prevalence rates are similar to global prevalence rates and a study done in Ethiopia (Belfer 2008; Girma *et al.* 2021; Racine *et al.* 2021) Although lower than those found in other African countries (e.g., Uganda (21 %), Nigeria (21,2 %), these studies based their findings on self-report measures which are known to provide higher estimates; (Fatiregun and Kumapayi 2014; Nalugya-Sserunjogi *et al.* 2016). We found that older children/ adolescents were more likely to be at risk of depression than were younger children.

https://doi.org/10.1017/gmh.2025.10022 Published online by Cambridge University Press

Numerous studies have confirmed this finding of adolescents being more at risk than children, possibly due to the emotional, psychological and physical changes that they undergo during this developmental period (Belfer, 2008; Costello et al., 2011.; Jorns-Presentati *et al.* 2021; Oldehinkel et al., 2015; Racine et al., 2021).

Girls had a higher rate of depression than boys in the Senegalese sample. Female sex has commonly been found to be a risk factor for depression including in LMIC such as Ethiopia, India, and Uganda (Beck *et al.* 2021; Girma *et al.* 2021; Nalugya-Sserunjogi *et al.* 2016; Patten *et al.* 2006; Racine *et al.* 2021; Riecher-Rössler 2017; Too et al., 2021; Trivedi *et al.* 2016). However, this was not so in both the South African and Rwandan sample. This may be explained by the younger age of participants as while similar rates of depression have been found during childhood, females are at increased risk during and after adolescence (Alsaad *et al.* 2022; Hyde *et al.* 2008).

Depression has been associated with a number of long-term psycho-social outcomes. These include a lower likelihood of entering post-secondary education, poor performance at school, an increased risk of leaving secondary school, and substance abuse (Beck *et al.* 2021; Cairns *et al.* 2014; Clayborne *et al.* 2019; Dunn and Goodyer 2006; Gunnell *et al.* 2016; Maras *et al.* 2015; Olisaeloka *et al.* 2024; Lund *et al.* 2010; Ward-Smith *et al.* 2024). We similarly found that those who indicated that they disliked school and those who considered dropping out of school were more likely to be depressed and, in the South African sample, close to half of those who smoked cannabis were depressed.

https://doi.org/10.1017/gmh.2025.10022 Published online by Cambridge University Press

Recent reviews and meta-analyses of cannabis use in SSA adolescents have reported rates of 4 to 8% (Asante and Atorkey 2023; Belete *et al.* 2023). A 2007 review of cannabis use in South Africa reported a current self-reported rate of 5 -10% among adolescents (Peltzer and Ramlagan 2007). Although the rate of cannabis use in this sample was lower, almost half of those who did use met criteria for depression. Systematic reviews and a meta-analysis determined that cannabis use in adolescence is associated with both higher levels of and predictive of depression, with some reporting that the links between heavy cannabis use during adolescence and poorer academic success and educational attainment are thought to be associated with lower academic motivation (Cairns *et al.* 2014; Pacheco-Colón *et al.* 2019).

The findings should be viewed in light of the study's limitations. Firstly, samples from each country were largely convenience-based, and so cannot be considered representative of the populations they were drawn from. Secondly, we unfortunately did not capture data on frequency and length of substance use; this would be important to include in future studies. Thirdly we unintentionally omitted capturing of language that the CDST was administered in; this could have provided useful information regarding cut-off scores in each of the languages. Despite this, strengths of this study include that the validation process and assessment of predictors remain substantially robust, and that the CDST is developed in Africa and is a free, open access rapid assessment tool for depression. Additionally, anecdotally, the researchers who administered the CDST found it easy to use in all three countries. Thus, the CDST can allow for early diagnosis, as a first step towards access to treatment, for depression management in Rwanda, Senegal and South Africa.

https://doi.org/10.1017/gmh.2025.10022 Published online by Cambridge University Press

Conclusion

This study demonstrates the validity of the CDST in Rwanda, Senegal and South Africa. If found to be valid and reliable in other African settings it may be used to enhance the capacity of community-based health-care providers to identify and refer youth with depression. Additionally, given the association between cannabis use and depression, as well as cannabis use and poorer school performance/ considerations of dropping out of school, the use of the CDST and similar tools may open up possibilities for health care professionals and community health workers to evaluate and treat these associated difficulties and conditions. Accurate and early identification of symptoms, that take socio-economic and cultural differences into account, can facilitate referral for appropriate treatment and improve long-term well-being (Patton *et al.* 2016).

Acknowledgements:

Investigation: Maryke Hewett, Bulelwa Zibi, Irene Mbanga, Letticia Hintsho, Alexandra Kreuz Goldberg, Lynn Aupais, Dedri Hamman, Erin Jill Hector, Siphokazi Mnconywa, Emily van der Westehuizen, Anusha Lachman

Methodology: Maryke Hewett; Formal Analysis: Martin Kidd

Author Contribution Statement:

Sharain Suliman: Formal Analysis, Investigation, Methodology, Project Administration, Supervision, Writing – original draft, Writing – review & editing

Jenny Bloom: Methodology, Project Administration, Supervision, Writing – review & editing

Naeem Dalal: Writing – review & editing

Eric Remera: Data Curation, Formal Analysis, Project Administration, Supervision, Writing – review & editing

Raissa Muvunyi: Data Curation, Formal Analysis, Project Administration, Supervision, Writing – review & editing

https://doi.org/10.1017/gmh.2025.10022 Published online by Cambridge University Press

Mohammed Abdulaziz: Funding Acquisition, Project Administration, Writing – review & editing

Adelard Kakunze: Funding Acquisition, Project Administration, Writing – review & editing

Ismahan Soukeyna Diop: Investigation, Writing – review & editing

Djena Fafa Cisse: Investigation, Writing – review & editing

Awa Der Dieye: Investigation, Writing – review & editing

Britt McKinnon: Formal Analysis, Methodology, Supervision, Writing – review & editing

Mohamadou Sall: Conceptualization, Funding Acquisition, Methodology, Project Administration, Resources, Supervision, Writing – review & editing

Agnes Binagwaho: Conceptualization, Funding Acquisition, Methodology, Project Administration, Resources, Supervision, Writing – review & editing

Soraya Seedat: Conceptualization, Funding Acquisition, Methodology, Project Administration, Resources, Supervision, Writing – review & editing

Financial support: This work was supported by the Non-communicable diseases (NCDs), Injuries and Mental health Program, Africa Centres for Disease Control and Prevention (Africa CDC)

Data availability statement: The data that support the findings of this study are available from the corresponding author, [SS], upon reasonable request.

Conflicts of Interest: None

Ethics statement: Ethics approvals were obtained prior to the start of the research: Rwanda-Rwanda National Ethics Committee (ref: No.406/RNEC/2019) and the Institutional Review Board of University of Global Health Equity; Senegal- Cheikh Anta Diop University (ref: 00000209/MSAS/CNERS/SP); South Africa- Stellenbosch University Faculty of Medicine and Health Sciences (HREC ref: N21/10/111).

https://doi.org/10.1017/gmh.2025.10022 Published online by Cambridge University Press

Reference List

Alsaad AJ, Azhar Y and Nasser Y Al (2022) Depression In Children. *StatPearls*. https://www.ncbi.nlm.nih.gov/books/NBK534797/ (accessed 22 May 2023)

Asante KO and Atorkey P (2023) Cannabis and amphetamine use among school-going adolescents in sub-Saharan Africa: a multi-country analysis of prevalence and associated factors. *BMC Psychiatry* 23(1), 1–13. https://doi.org/10.1186/S12888-023-05283-W/TABLES/2.

Awad MSA, Alrahim MMAA, Awadelkareem RAM, Khalafallah Elhaj MA and Abdelrahman Ibrahim MM (2024) Assessment of displaced Sudanese school-age children's mental health at Ad-Damar, River Nile, Sudan, 2024: a descriptive cross-sectional study. *BMC Public Health* **24**(1). https://doi.org/10.1186/S12889-024-21043-1.

Barendse MEA, Flannery J, Cavanagh C, Aristizabal M, Becker SP, Berger E, Breaux R, Campione-Barr N, Church JA, Crone EA, Dahl RE, Dennis-Tiwary TA, Dvorsky MR, Dziura SL, van de Groep S, Ho TC, Killoren SE, Langberg JM, Larguinho TL, Magis-Weinberg L, Michalska KJ, Mullins JL, Nadel H, Porter BM, Prinstein MJ, Redcay E, Rose AJ, Rote WM, Roy AK, Sweijen SW, Telzer EH, Teresi GI, Thomas AG and Pfeifer JH (2023) Longitudinal Change in Adolescent Depression and Anxiety Symptoms from before to during the COVID-19 Pandemic. *Journal of Research on Adolescence* **33**(1), 74–91. https://doi.org/10.1111/JORA.12781.

Beck A, LeBlanc JC, Morissette K, Hamel C, Skidmore B, Colquhoun H, Lang E, Moore A, Riva JJ, Thombs BD, Patten S, Bragg H, Colman I, Goldfield GS, Nicholls SG, Pajer K, Potter BK, Meeder R, Vasa P, Hutton B, Shea BJ, Graham E, Little J, Moher D and Stevens A (2021) Screening for depression in children and adolescents: a protocol for a systematic review update. *Systematic Reviews* **10**(1). https://doi.org/10.1186/S13643-020-01568-3.

Belete H, Mekonen T, Espinosa DC, Fentie A, Connor J, Chan G, Hides L, Hall W and Leung J (2023) Cannabis use in sub-Saharan Africa: A systematic review and meta-analysis. https://doi.org/10.1111/add.16170**.**

Belfer ML (2008) Child and adolescent mental disorders: the magnitude of the problem across the globe. *Journal of Child Psychology and Psychiatry, and Allied Disciplines* **49**(3), 226–236. https://doi.org/10.1111/J.1469-7610.2007.01855.X.

Betancourt T, Scorza Pamela, Meyers-Ohki S, Mushashi C, Kayiteshonga Y, Binagwaho A, Stulac S and Beardslee WR (2012) Validating the Center for Epidemiological Studies Depression Scale for Children in Rwanda. *J Am Acad Child Adolescent Psychiatry* 1284–1292.

Binagwaho A, Fawzi MCS, Agbonyitor M, Nsanzimana S, Karema C, Remera E, Mutabazi V, Shyirambere C, Cyamatare P, Nutt C, Wagner C, Condo J, Misago N and Kayiteshonga Y (2016) Validating the Children's Depression Inventory in the context of Rwanda. *BMC Pediatrics* **16**(1), 1–7. https://doi.org/10.1186/S12887-016-0565-2/FIGURES/1.

Binagwaho A, Remera E, Bayingana AU, Gishoma D, Scott KW, Goosman M, Campbell E, Agbonyitor M, Kayiteshonga Y and Nsanzimana S (2021b) Addressing the mental health needs of children affected by HIV in Rwanda: validation of a rapid depression screening tool for children 7-14 years old. *BMC Pediatrics* **21**(1). https://doi.org/10.1186/S12887-020-02475-1.

Boyes ME, Cluver LD, Meinck F, Casale M and Newnham E (2019) Mental health in South African adolescents living with HIV: correlates of internalising and externalising symptoms. *AIDS Care* **31**(1), 95–104. https://doi.org/10.1080/09540121.2018.1524121.

https://doi.org/10.1017/gmh.2025.10022 Published online by Cambridge University Press

Cairns KE, Yap MBH, Pilkington PD and Jorm AF (2014) Risk and protective factors for depression that adolescents can modify: a systematic review and meta-analysis of longitudinal studies. *Journal of Affective Disorders* **169**, 61–75. https://doi.org/10.1016/J.JAD.2014.08.006.

Clarke D, Australia KC-MJ of and 2009 undefined (2009.) Depression, anxiety and their relationship with chronic diseases: a review of the epidemiology, risk and treatment evidence. *Wiley Online Library*. https://onlinelibrary.wiley.com/doi/abs/10.5694/j.1326-5377.2009.tb02471.x (accessed 2 June 2023)

Clayborne ZM, Varin M and Colman I (2019) Systematic Review and Meta-Analysis: Adolescent Depression and Long-Term Psychosocial Outcomes. *Journal of the American Academy of Child & Adolescent Psychiatry* **58**(1), 72–79. https://doi.org/10.1016/J.JAAC.2018.07.896.

Collings SJ and Valjee SR (2024) A Multi-Mediation Analysis of the Association between Adverse Childhood Experiences and Non-Suicidal Self-Injury among South African Adolescents. *International Journal of Environmental Research and Public Health* **21**(9). https://doi.org/10.3390/IJERPH21091221.

Copeland WE, Alaie I, Jonsson U and Shanahan L (2021) Associations of Childhood and Adolescent Depression With Adult Psychiatric and Functional Outcomes. *Journal of the American Academy of Child and Adolescent Psychiatry* **60**(5), 604–611. https://doi.org/10.1016/j.jaac.2020.07.895.

Costello EJ, Copeland W and Angold A (n.d.) Trends in psychopathology across the adolescent years: What changes when children become adolescents, and when adolescents become adults? https://doi.org/10.1111/j.1469-7610.2011.02446.x.

Daly M (2022a) Prevalence of Depression Among Adolescents in the U.S. From 2009 to 2019: Analysis of Trends by Sex, Race/Ethnicity, and Income. *Journal of Adolescent Health* **70**(3), 496–499. https://doi.org/10.1016/j.jadohealth.2021.08.026.

Daly M (2022b) Prevalence of Depression Among Adolescents in the U.S. From 2009 to 2019: Analysis of Trends by Sex, Race/Ethnicity, and Income. *Journal of Adolescent Health* **70**(3), 496–499. https://doi.org/10.1016/j.jadohealth.2021.08.026.

Davidson B, Okpechi I, McCulloch M and Wearne N (2017) Adolescent nephrology: An emerging frontier for kidney care in sub-Saharan Africa. *Nephrology (Carlton, Vic.)* **22**(12), 933–939. https://doi.org/10.1111/NEP.13135.

De Vries PJ, Davids EL, Mathews C and Aarø LE (2018) Measuring adolescent mental health around the globe: psychometric properties of the self-report Strengths and Difficulties Questionnaire in South Africa, and comparison with UK, Australian and Chinese data. *Epidemiology and Psychiatric Sciences* **27**(4), 369–380. https://doi.org/10.1017/S2045796016001207.

Dessauvagie AS, Jörns-Presentati A, Napp A-K, Stein DJ, Jonker D, Breet E, Charles W, Swart RL, Lahti M, Suliman S, Jansen R, van den Heuvel LL, Seedat S and Groen G (2020) The prevalence of mental health problems in sub-Saharan adolescents living with HIV: a systematic review. *Global Mental Health (Cambridge, England)* **7**. https://doi.org/10.1017/GMH.2020.18.

Dunn V and Goodyer IM (2006) Longitudinal investigation into childhood- and adolescence-onset depression: psychiatric outcome in early adulthood. *The British Journal of Psychiatry : The Journal of Mental Science* **188**(MAR.), 216–222. https://doi.org/10.1192/BJP.188.3.216.

https://doi.org/10.1017/gmh.2025.10022 Published online by Cambridge University Press

Fatiregun AA and Kumapayi TE (2014) Prevalence and correlates of depressive symptoms among in-school adolescents in a rural district in southwest Nigeria. *Journal of Adolescence* **37**(2), 197–203. https://doi.org/10.1016/J.ADOLESCENCE.2013.12.003.

Girma S, Tsehay M, Mamaru A and Abera M (2021) Depression and its determinants among adolescents in Jimma town, Southwest Ethiopia. *PLoS ONE* **16**(5). https://doi.org/10.1371/JOURNAL.PONE.0250927.

Gunnell KE, Flament MF, Buchholz A, Henderson KA, Obeid N, Schubert N and Goldfield GS (2016) Examining the bidirectional relationship between physical activity, screen time, and symptoms of anxiety and depression over time during adolescence. https://doi.org/10.1016/j.ypmed.2016.04.002.

Harrison A, Mtukushe B, Kuo C, Wilson-Barthes M, Davidson B, Sher R, Galárraga O and Hoare J (2023) Better Together: acceptability, feasibility and preliminary impact of chronic illness peer support groups for South African adolescents and young adults. *Journal of the International AIDS Society* **26**(Suppl 4), e26148. https://doi.org/10.1002/JIA2.26148.

Hosmer DW and Lemeshow S (2000) Applied Logistic Regression. *Applied Logistic Regression*. https://doi.org/10.1002/0471722146.

Hyde JS, Mezulis AH and Abramson LY (2008) The ABCs of depression: integrating affective, biological, and cognitive models to explain the emergence of the gender difference in depression. *Psychological Review* **115**(2), 291–313. https://doi.org/10.1037/0033-295X.115.2.291.

Jakobsson CE, Johnson NE, Ochuku B, Baseke R, Wong E, Musyimi CW, Ndetei DM and Venturo-Conerly KE (2024) Meta-Analysis: Prevalence of Youth Mental Disorders in Sub-Saharan Africa. *Cambridge Prisms: Global Mental Health* **11**, e109. https://doi.org/10.1017/GMH.2024.82.

Johnson D, Dupuis G, Piche J, Clayborne Z and Colman I (2018) Adult mental health outcomes of adolescent depression: A systematic review. *Depression and Anxiety* **35**(8), 700–716. https://doi.org/10.1002/DA.22777.

Jorns-Presentati A, Napp AK, Dessauvagie AS, Stein DJ, Jonker D, Breet E, Charles W, Swart RL, Lahti M, Suliman S, Jansen R, Van Den Heuvel LL, Seedat S and Groen G (2021) The prevalence of mental health problems in sub-Saharan adolescents: A systematic review. *PLOS ONE* **16**(5), e0251689. https://doi.org/10.1371/JOURNAL.PONE.0251689.

Juhász LZ, Kemény K, Linka E, Sántha J and Bartkó G (2003) [The use of RBANS test (Repeatable Battery for the Assessment of Neuropsychological Status) in neurocognitive testing of patients suffering from schizophrenia and dementia]. *Ideggyogyaszati Szemle* **56**(9–10), 303–8. http://www.ncbi.nlm.nih.gov/pubmed/14608951 (accessed 10 May 2018)

Liang S and Zeng Q (2021) Factors Affecting Children's Mental Health During the Coronavirus Disease 2019 Pandemic. *JAMA Pediatrics* **175**(3), 319–320. https://doi.org/10.1001/JAMAPEDIATRICS.2020.4933.

Loades ME, Chatburn E, Higson-Sweeney N, Reynolds S, Shafran R, Brigden A, Linney C, McManus MN, Borwick C and Crawley E (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. *Journal of the American Academy of Child & Adolescent Psychiatry* **59**(11), 1218-1239.e3. https://doi.org/10.1016/J.JAAC.2020.05.009.

Lund C, Breen A, Flisher AJ, Kakuma R, Corrigall J, Joska JA, Swartz L and Patel V (2010) Poverty and common mental disorders in low and middle income countries:

https://doi.org/10.1017/gmh.2025.10022 Published online by Cambridge University Press

A systematic review. *Social Science & Medicine* **71**(3), 517–528. https://doi.org/10.1016/J.SOCSCIMED.2010.04.027.

Mangione CM, Barry MJ, Nicholson WK, Cabana M, Chelmow D, Coker TR, Davidson KW, Davis EM, Donahue KE, Jaén CR, Kubik M, Li L, Ogedegbe G, Pbert L, Ruiz JM, Silverstein M, Stevermer J and Wong JB (2022) Screening for Depression and Suicide Risk in Children and Adolescents: US Preventive Services Task Force Recommendation Statement. *JAMA* **328**(15), 1534–1542. https://doi.org/10.1001/JAMA.2022.16946.

Maras D, Flament MF, Murray M, Buchholz A, Henderson KA, Obeid N and Goldfield GS (2015) Screen time is associated with depression and anxiety in Canadian youth. *Preventive Medicine* **73**, 133–138. https://doi.org/10.1016/J.YPMED.2015.01.029.

Matovu JKB, Kabwama SN, Ssekamatte T, Ssenkusu J and Wanyenze RK (2021) COVID-19 Awareness, Adoption of COVID-19 Preventive Measures, and Effects of COVID-19 Lockdown Among Adolescent Boys and Young Men in Kampala, Uganda. *Journal of Community Health* **46**(4), 842–853. https://doi.org/10.1007/S10900-021-00961-W.

Mojtabai R, Olfson M and Han B (2016) National trends in the prevalence and treatment of depression in adolescents and young adults. *Pediatrics* **138**(6). https://doi.org/10.1542/PEDS.2016-1878/-/DCSUPPLEMENTAL.

Morojele N, Myers B, Townsend L, Lombard C, Plüddemann A and Carney T (2013) Survey on substance use, risk behaviour and mental health among grade 8-10 learners in Western Cape provincial schools, 2011 | Health and Education Resource Centre. https://healtheducationresources.unesco.org/library/documents/survey-substance-use-risk-behaviour-and-mental-health-among-grade-8-10-learners (accessed 28 March 2025)

Nalugya-Sserunjogi J, Zari Rukundo G, Ovuga E, Kiwuwa SM, Musisi S and Nakimuli-Mpungu E (2016) Prevalence and factors associated with depression symptoms among school-going adolescents in Central Uganda. *Child and Adolescent Psychiatry and Mental Health* **10**, 39. https://doi.org/10.1186/s13034-016-0133-4.

O'Brien D, Harvey K, Howse J, Reardon T and Creswell C (2016) Barriers to managing child and adolescent mental health problems: a systematic review of primary care practitioners' perceptions. *British Journal of General Practice* **66**(651), e693–e707. https://doi.org/10.3399/BJGP16X687061.

Oldehinkel AJ, Rosmalen JGM, Buitelaar JK, Hoek HW, Ormel J, Raven D, Reijneveld SA, Veenstra R, Verhulst FC, Vollebergh WAM and Hartman CA (2015) Cohort Profile Update: the TRacking Adolescents' Individual Lives Survey (TRAILS). *International Journal of Epidemiology* **44**(1), 76–76n. https://doi.org/10.1093/IJE/DYU225.

Olisaeloka L, Udokanma E and Ashraf A (2024) Psychosocial interventions for depression among young people in Sub-Saharan Africa: a systematic review and meta-analysis. *International Journal of Mental Health Systems* **18**(1), 1–27. https://doi.org/10.1186/S13033-024-00642-W/FIGURES/6.

Owen JP, Baig B, Abbo C and Baheretibeb Y (2016) Child and adolescent mental health in sub-Saharan Africa: a perspective from clinicians and researchers. *BJPsych International* **13**(2), 45. https://doi.org/10.1192/S2056474000001136.

Pacheco-Colón I, Ramirez AR and Gonzalez R (2019) Effects of Adolescent Cannabis Use on Motivation and Depression: A Systematic Review. *Current Addiction Reports* **6**(4), 532. https://doi.org/10.1007/S40429-019-00274-Y.

Partap U, Nyundo A, Manu A, Regan M, Ismail A, Chukwu A, Dessie Y, Njau T, Kaaya SF and Fawzi WW (2023) Depressive symptoms among adolescents in six sub-Saharan

https://doi.org/10.1017/gmh.2025.10022 Published online by Cambridge University Press

African countries: A pooled analysis of associated factors. *Preventive Medicine Reports* **36**, 102499. https://doi.org/10.1016/J.PMEDR.2023.102499.

Patten SB, Li Wang J, Williams JV, Currie S, Beck CA, Maxwell CJ and el-Guebaly N (2006) *Descriptive Epidemiology of Major Depression in Canada Can J Psychiatry*, Vol. 51.

Patton GC, Sawyer SM, Santelli JS, Ross DA, Afifi R, Allen NB, Arora M, Azzopardi P, Baldwin W, Bonell C, Kakuma R, Kennedy E, Mahon J, McGovern T, Mokdad AH, Patel V, Petroni S, Reavley N, Taiwo K, Waldfogel J, Wickremarathne D, Barroso C, Bhutta Z, Fatusi AO, Mattoo A, Diers J, Fang J, Ferguson J, Ssewamala F and Viner RM (2016) Our future: a Lancet commission on adolescent health and wellbeing. *Lancet (London, England)* **387**(10036), 2423–2478. https://doi.org/10.1016/S0140-6736(16)00579-1.

Peltzer K and Ramlagan S (2007) Cannabis use trends in South Africa. *South African Journal of Psychiatry* **13**(4), 6. https://doi.org/10.4102/SAJPSYCHIATRY.V13I4.33.

Pluddemann A, Flisher AJ, Mathews C, Carney T and Lombard C (2008) Adolescent methamphetamine use and sexual risk behaviour in secondary school students in Cape Town, South Africa. *Drug and Alcohol Review* **27**(6), 687–692. https://doi.org/10.1080/09595230802245253.

Racine N, McArthur BA, Cooke JE, Eirich R, Zhu J and Madigan S (2021) Global Prevalence of Depressive and Anxiety Symptoms in Children and Adolescents During COVID-19: A Meta-analysis. *JAMA Pediatrics* **175**(11), 1142–1150. https://doi.org/10.1001/JAMAPEDIATRICS.2021.2482.

Radez J, Reardon T, Creswell C, Lawrence PJ, Evdoka-Burton G and Waite P (2021) Why do children and adolescents (not) seek and access professional help for their mental health problems? A systematic review of quantitative and qualitative studies. *European Child and Adolescent Psychiatry* **30**(2), 183–211. https://doi.org/10.1007/S00787-019-01469-4/FIGURES/5.

Rao U and Chen LA (2009) Characteristics, correlates, and outcomes of childhood and adolescent depressive disorders. *Dialogues in Clinical Neuroscience* **11**(1), 45. https://doi.org/10.31887/DCNS.2009.11.1/URAO.

Riecher-Rössler A (2017) Sex and gender differences in mental disorders. *The Lancet Psychiatry* **4**(1), 8–9. https://doi.org/10.1016/S2215-0366(16)30348-0.

Saade S, Lamarche AP, Khalaf T, Makke S and Legg A (2023) What barriers could impede access to mental health services for children and adolescents in Africa? A scoping review. *BMC Health Services Research* **23**(1), 348. https://doi.org/10.1186/S12913-023-09294-X/TABLES/1.

Thapar A, Collishaw S, Pine DS and Thapar AK (2012) Seminar Child & Adolescent Psychiatry Section, Department of Psychological Medicine and Neurology (Prof A Thapar FRCPsych, S Collishaw DPhil, A K Thapar Depression in adolescence. *Lancet* **379**, 1056–67. https://doi.org/10.1016/S0140.

Too EK, Abubakar A, Nasambu C, Koot HM, Cuijpers P, Newton CR, Nyongesa MK (2021). Prevalence and factors associated with common mental disorders in young people living with HIV in sub-Saharan Africa: a systematic review. *Journal of the International AIDS Society*, 24 (2) e25705. doi: 10.1002/jia2.25705. PMID: 34164931; PMCID: PMC8222842.

Trivedi D, Dhakappa N, Ghildiyal P, Deekonda S, Subramaniam S, Iyer JS and Kotiyan MS (2016) Depression among adolescent students in South India: How serious is the issue? *Indian Journal of Psychiatry* **58**(3), 349. https://doi.org/10.4103/0019-5545.191997.

https://doi.org/10.1017/gmh.2025.10022 Published online by Cambridge University Press

UNICEF (2021) *65 per cent of young people with mental health related issues did not seek help – UNICEF*. Retrieved from https://www.unicef.org/southafrica/press-releases/65-cent-young-people-mental-health-related-issues-did-not-seek-help-unicef

Wang D, Chukwu A, Millogo O, Assefa N, James C, Young T, Lankoande B, Workneh F, Hemler EC, Korte ML, Mattei J, Soura AB, Sie A, Oduola A, Berhane Y and Fawzi WW (2021) The COVID-19 Pandemic and Adolescents' Experience in Sub-Saharan Africa: A Cross-Country Study Using a Telephone Survey. *The American Journal of Tropical Medicine and Hygiene* **105**(2), 331–341. https://doi.org/10.4269/AJTMH.20-1620.

Wang S, Chen L, Ran H, Che Y, Fang D, Sun H, Peng J, Liang X and Xiao Y (2022) Depression and anxiety among children and adolescents pre and post COVID-19: A comparative meta-analysis. *Frontiers in Psychiatry* **13**. https://doi.org/10.3389/FPSYT.2022.917552/FULL.

Ward-Smith C, Sorsdahl K and van der Westhuizen C (2024) An investigation into symptoms of depression and anxiety and emotion regulation among older adolescents from low-income settings in South Africa. *Comprehensive Psychiatry* **132**, 152476. https://doi.org/10.1016/J.COMPPSYCH.2024.152476.

WHO (2021a) Global Health Estimates. https://www.who.int/data/global-health-estimates (accessed 12 May 2023)

WHO (2021b) Mental health of adolescents. https://www.who.int/news-room/fact-sheets/detail/adolescent-mental-health (accessed 19 May 2023)

WHO | Regional Office for Africa (2021) Access to mental health and psychosocial support services remains unequal for children and adolescents in Africa, alert UNICEF & WHO |. https://www.afro.who.int/news/access-mental-health-and-psychosocial-support-services-remains-unequal-children-and (accessed 23 May 2023)

https://doi.org/10.1017/gmh.2025.10022 Published online by Cambridge University Press

1 Table 1: Sociodemographic characteristics of the samples: Rwanda, South Africa and Senegal

2

	Rwanda				Senegal				South Africa			
	n	**Percent**	**Prevalence of depression**	**95% CI**	**n**	**Percent**	**Prevalence of depression**	**95% CI**	**n**	**Percent**	**Prevalence of depression**	**95% CI**
Overall	**336**		**14.3**	**[10.9,18.5]**	**345**		**16.8**	**[13.2,21.2]**	**315**		**9.2**	**[6.5,13.0]**
Age group												
7-9	85	25.3	5.9	[2.5,13.4]	110	31.90	16.4	[10.5,24.5]	67	21.3	1.5	[0.2,9.9]
10-12	113	33.6	13.3	[8.1,20.9]	130	37.70	16.2	[10.8,23.5]	98	31.2	3.1	[1.0,9.1]
13-14/15/16	138	41.1	20.3	[14.4,27.9]	105	30.40	18.1	[11.8,26.7]	149	47.5	16.8	[11.6,23.7]
Sex												
Male	172	51.2	14.5	[10.0,20.7]	212	61.40	13.2	[9.3,18.5]	151	3.8	7.9	[4.6,13.5]
Female	164	48.8	14	[9.5,20.3]	133	38.60	27.8	[16.2,30.5]	164	96.2	11.0	[7.0,16.8]
Parents are alive												
Both parents alive					296	85.90	15.9	[12.1,20.5]				
At least one parent deceased					49	14.10	22.4	[12.9,36.2]				
Is your mom alive?												
Yes									285	90.8	8.4	[5.7,12.3]
no									29	9.2	20.7	[9.6,39.2]
Is your dad alive?												
Yes									247	80.2	8.5	[5.6,12.7]
no									61	19.8	14.8	[7.8,26.1]
What is your parents'												

https://doi.org/10.1017/gmh.2025.10022 Published online by Cambridge University Press

marital situation?												
Married									57	19.4	14.0	[7.1,25.7]
Divorced									12	4.1	16.7	[4.2,47.9
Never married/single									201	68.4	7.0	[4.2,11.4]
Widow(ed)									24	8.2	8.3	[2.1,28.1]
Child live with both parents												
yes	296	88.1	13.2	[9.8,17.6]								
no	39	11.6	23.1	[12.4,38.8]								
Place of residence												
Urban					273	79.10	13.9	[10.3,18.6]	306	96.1	9.8	[6.5,13.1]
Rural					72	20.90	27.8	[18.6,39.2]	9	3.9	0	[0]
Region												
Dakar					171	49.60	9.4	[5.8,14.8]				
Matam					29	8.40	44.8	[28.0,62.9]				
Saint Louis					63	18.30	7.9	[3.3,17.8]				
Ziguinchor					82	23.80	29.3	[20.4,40.0]				
Number of meals per day												
One					16	4.60	25.0	[9.7,51.0]				
Two					39	11.30	17.9	[8.8,33.2]				
Three or more					290	84.10	16.2	[12.4,20.9]				
Religion of the child												
Christian									256	82.3	10.2	[7.0,14.5]
Muslim									21	6.8	4.8	[0.7,27.4]
None/others									28	10.9	7.1	[1.8,24.6]
Child live in boarding school												
no	255	76.8	17.3	[13.1,22.4]					241	76.8	9.1	[5.9,12.3]
yes	71	21.1	2.8	[0.7,10.6]					73	23.2	11.0	[7.5,14.5]
Current education level												

https://doi.org/10.1017/gmh.2025.10022 Published online by Cambridge University Press

Primary	266	79.1	14.3	[10.6,19.1]	182	52.80	20.3	[15.1,26.8]	215	68.7	4.7	[2.5,8.5]
Secondary	70	20.8	14.3	[7.8,24.6]	73	21.20	16.4	[9.6,26.8]	98	31.3	20.4	[13.5,29.6]
Daara (Islamic school)					69	20.00	7.2	[3.0,16.3]				
No formal education					21	6.10	19.0	[7.3,41.3]				
Ever repeated school year												
no	151	44.9	18.5	[13.1,25.6]								
yes	101	30.1	15.8	[9.9,24.4]								
Are you often absent from school?												
yes	120	35.7	26.7	[19.5,35.3]					36	27.8	8.3	[2.7,23.0]
no	131	39.0	9.2	[5.3,15.5]					278	72.2	9.7	[6.7,13.8]
Considered dropping out of school												
yes	23	6.8	43.5	[25.1,63.8]					18	5.8	27.8	[22.8,32.8]
no	228	67.9	14.9	[10.8,20.2]					295	94.2	8.1	[5.1,11.1]
Population type												
Students					76	22.0	13.2	[7.2,22.8]				
Vulnerable children (street-involved, refugee/displaced, impoverished					118	34.20	16.1	[10.5,23.9]				
Street-involved					55	45.10	9.1	[1.5,16.7]				
Refugee					24	19.70	29.2	[11.0,47.4]				
Displaced					22	18.00	27.3	[8.7,45.8]				
Impoverished					21	17.20	9.5	[-3.0,22.1]				
Children with chronic disease					151	43.80	19.2	[13.7,26.3]				
Ever exposed to DSM-5 trauma									84	26.7	11.9	[5.6,18.4] [81.6, 94.4]

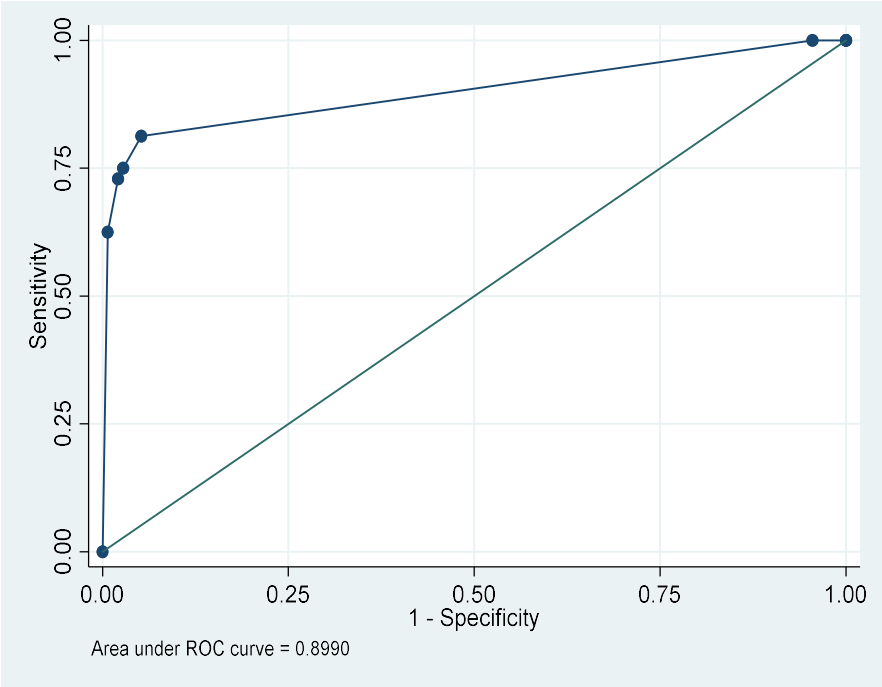
https://doi.org/10.1017/gmh.2025.10022 Published online by Cambridge University Press

Recent frightening event									50	15.8	22	[17.4,26.6] 69.9,86.1
HIV+, Diabetic +, or had COVID									9	2.9	33.3	[28.1,38.5] 57.8, 76.2

1

https://doi.org/10.1017/gmh.2025.10022 Published online by Cambridge University Press

1 **Figures 1-3**



2

3 *Figure 1: Receiver operating curve of the CDST for Rwanda*

4

https://doi.org/10.1017/gmh.2025.10022 Published online by Cambridge University Press

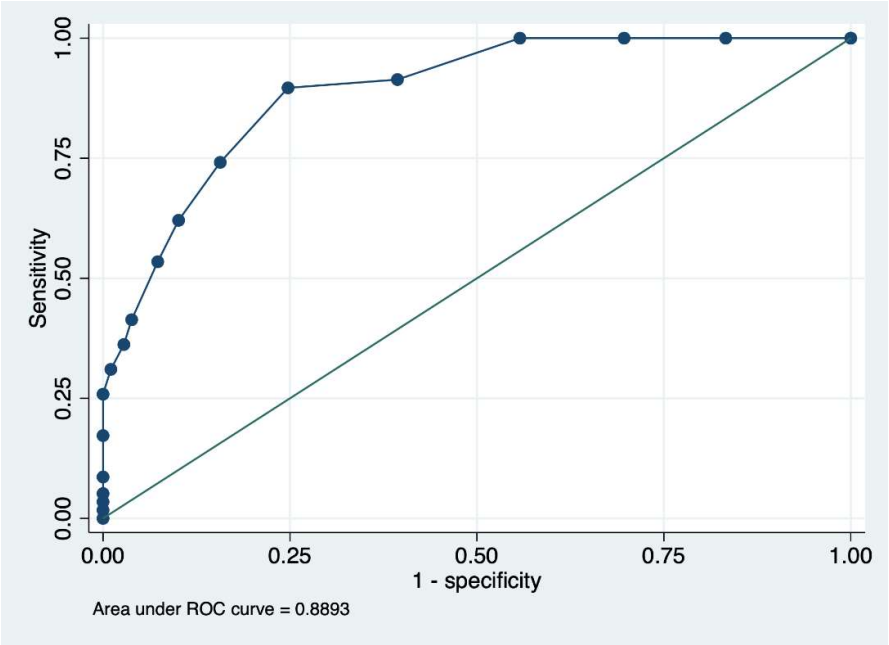


Figure 2:Receiver operating curve of the CDST for Senegal

https://doi.org/10.1017/gmh.2025.10022 Published online by Cambridge University Press

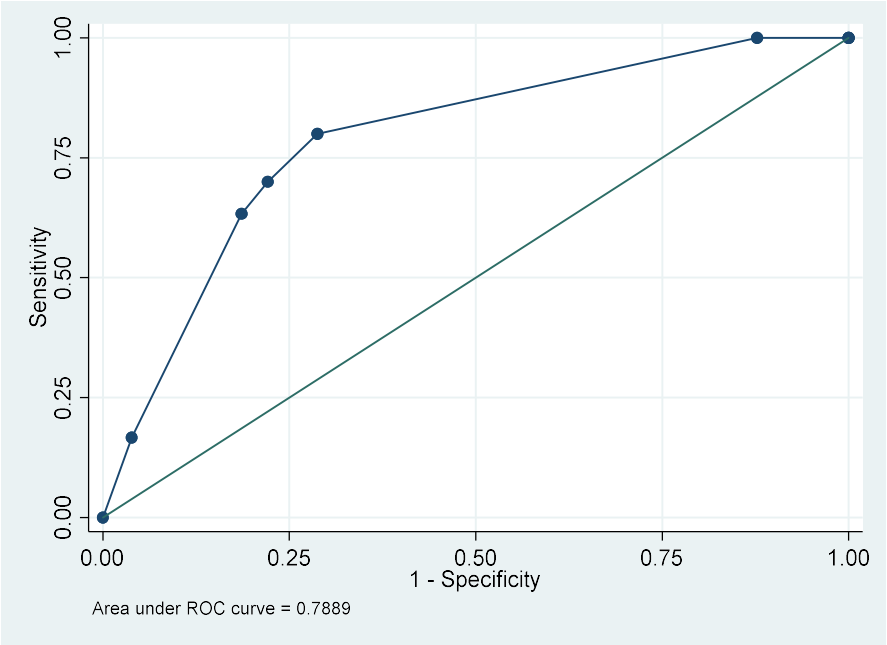


Figure 3: Receiver operating curve of the CDST for South Africa

https://doi.org/10.1017/gmh.2025.10022 Published online by Cambridge University Press