

The prevalence of mental health problems in sub-Saharan adolescents living with HIV: a systematic review

Other Review

Cite this article: Dessaunavie AS et al (2020). The prevalence of mental health problems in sub-Saharan adolescents living with HIV: a systematic review. *Global Mental Health* 7, e29, 1–13. <https://doi.org/10.1017/gmh.2020.18>

Received: 12 February 2020

Revised: 17 August 2020

Accepted: 8 September 2020

Key words:

Adolescents; epidemiology; Mental health; HIV/AIDS; sub-Saharan Africa

Author for correspondence:

Prof. Dr. Gunter Groen,

E-mail: gunter.groen@haw-hamburg.de

A.S. Dessaunavie¹, A. Jörns-Presentati¹, A.-K. Napp¹, D.J. Stein², D. Jonker³, E. Breet³, W. Charles³, R. L. Swart³, M. Lahti⁴, S. Suliman⁵, R. Jansen⁶, L.L. van den Heuvel⁵, S. Seedat⁵ and G. Groen¹ 

¹Department of Social Work, Faculty of Business and Social Sciences, Hamburg University of Applied Sciences, Germany; ²SAMRC Unit on Risk & Resilience in Mental Disorders, Department of Psychiatry and Neuroscience Institute, University of Cape Town, South Africa; ³Department of Psychiatry and Mental Health, University of Cape Town, South Africa; ⁴Faculty of Health and Well-being, Turku University of Applied Sciences, Finland; ⁵Department of Psychiatry, Faculty of Medicine and Health Sciences, Stellenbosch University, South Africa and ⁶School of Nursing, University of the Free State, South Africa

Abstract

Despite the progress made in HIV treatment and prevention, HIV remains a major cause of adolescent morbidity and mortality in sub-Saharan Africa. As perinatally infected children increasingly survive into adulthood, the quality of life and mental health of this population has increased in importance. This review provides a synthesis of the prevalence of mental health problems in this population and explores associated factors. A systematic database search (Medline, PsycINFO, Scopus) with an additional hand search was conducted. Peer-reviewed studies on adolescents (aged 10–19), published between 2008 and 2019, assessing mental health symptoms or psychiatric disorders, either by standardized questionnaires or by diagnostic interviews, were included. The search identified 1461 articles, of which 301 were eligible for full-text analysis. Fourteen of these, concerning HIV-positive adolescents, met the inclusion criteria and were critically appraised. Mental health problems were highly prevalent among this group, with around 25% scoring positive for any psychiatric disorder and 30–50% showing emotional or behavioral difficulties or significant psychological distress. Associated factors found by regression analysis were older age, not being in school, impaired family functioning, HIV-related stigma and bullying, and poverty. Social support and parental competence were protective factors. Mental health problems among HIV-positive adolescents are highly prevalent and should be addressed as part of regular HIV care.

Introduction

In sub-Saharan Africa, HIV is a major cause of adolescent morbidity and mortality. Of the 1.6 million adolescents living with HIV globally, around 1.1 million reside in Eastern and Southern Africa and another 430 000 in West and Central Africa (UNICEF, 2019). Approximately 35 000 adolescents died of HIV in both regions, and nearly 190 000, the majority of them adolescent girls, got newly infected in 2017 (UNICEF, 2018a; 2018b). HIV is associated with adolescent mental health problems in both, high- and low-income settings (Mellins and Malee, 2013; Vreeman et al., 2017), with social exclusion and HIV-related stigma playing an important role (Boyes et al., 2019). Mental health problems among HIV-positive adolescents have been linked to poor adherence to antiretroviral treatment (ART) and a higher risk of substance abuse and sexual risk behaviors, leading to less favorable health outcomes and a higher risk of HIV transmission (Mellins and Malee, 2013; Dow et al., 2016; Vreeman et al., 2017).

In the African context, data on adolescent mental health is scarce and capacities for mental health care are limited, as is the case in many low-income settings (Fisher and Cabral de Mello, 2011; Erskine et al., 2017; WHO, 2018; UNICEF, 2018c). Regarding the mental health of HIV-positive adolescents in sub-Saharan Africa, numerous studies have been published in recent years (Kamau et al., 2012; Louw et al., 2016; Lwidiko et al., 2018; Hoare et al., 2019; West et al., 2019). To our knowledge, there is no recent review which specifically summarizes epidemiological data from different sub-Saharan settings and reports on the quality of these studies. A recent review by Vreeman et al. (2017) included studies from both high-income and low-income settings and included a broad age range (aged < 10 and up to 24). Another review on mental health problems of perinatally infected HIV-positive youth predominantly included studies from the United States (Mellins and Malee, 2013). With our review, we sought to close this gap by summarizing the existing evidence on the prevalence

© The Author(s), 2020. Published by Cambridge University Press. This is an Open Access article, distributed under the terms of the Creative Commons Attribution licence (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted re-use, distribution, and reproduction in any medium, provided the original work is properly cited.

of mental health problems among HIV-positive adolescents (aged 10–19) in sub-Saharan Africa. Additionally, we explored associated sociodemographic, health-related, and community factors, as documented in the included studies.

Methods

This study formed part of an overarching systematic review that explores the prevalence of mental health problems in general adolescent populations in sub-Saharan Africa as well as in risk groups (HIV/AIDS, poverty, or exposure to trauma). The systematic review aims at updating the findings from the review of Cortina *et al.* (2012) on child mental health in sub-Saharan Africa that included studies up to 2008. It was registered with the PROSPERO International prospective register of systematic reviews at the National Institute for Health Research (PROSPERO 2018 CRD42018112853) and will be published in separate subsections. Due to the number of retrieved studies, we decided to publish the results of the systematic review in subsections, with this section focusing on the prevalence of mental health problems specifically among HIV-positive adolescents, who constitute one of our a priori risk groups.

The systematic review was undertaken by the MEGA project team. MEGA is an international collaborative project for mental health promotion among adolescents in South Africa and Zambia (Lahti *et al.*, 2020; MEGA 2020). The project aims to build capacity for adolescent mental health among health care workers in primary care settings by training the trainers in higher education institutions in both countries.

Search strategy

An extensive database search was conducted in PubMed, Scopus, and PsycINFO in June and November 2018, covering a 10-year period. Additional studies were retrieved from Google Scholar, from reference lists and citations of the included studies or through contact with other researchers. A second search was conducted in January 2020 to include articles that were published since our search in 2018. Only peer-reviewed studies reporting prevalence data and published in English were included.

The COCOPOP scheme was used to define inclusion and exclusion criteria for the database search (Joanna Briggs Institute, 2017)

- *Context:* sub-Saharan Africa, defined according to the World Bank Country and Lending Groups (World Bank, n.d.).
- *Condition:* mental health problems or clinical diagnoses, as assessed by standardized questionnaires or diagnostic interviews.
- *Population:* adolescents aged 10–19, residing in sub-Saharan Africa.

Exclusion criteria were:

- publications on populations with a broader age range than 10–19 that do not report separate prevalence data for adolescents between 10 and 19;
- psychiatric clinical populations (publications on clinical populations from HIV care were included);
- lack of prevalence data;
- non-standardized or incomplete instruments, not regularly used in mental health research;
- reviews, validation studies, or qualitative studies.

The following search terms were used: child*, youth, adolesc*; sub-Saharan, Africa, South Africa, Zambia; prevalence, incidence, epidemiol*; psychiat*, mental, depress*, ADHD, anxiety (see supplementary material, Table 2). The database search revealed 1374 articles. In total, 65 additional articles were found through Google Scholar, further 22 through reference lists, citations, and contact with other researchers. After the removal of duplicates, 1070 records were left for the screening of title and abstract. After exclusion of articles on clinical psychiatric populations or youth beyond the age range of 10–19 and articles with a wrong publication type or date, 301 articles were eligible for full-text assessment.

The exclusion of articles was done according to the PICO-based taxonomy (Edinger and Cohen, 2013). All articles were independently evaluated by two researchers. Fourteen articles focusing on the prevalence of mental health problems among HIV-positive adolescents were included in this sub-review (Fig. 1). Six articles regarding HIV-affected adolescents or adolescents from high-prevalence communities (antenatal HIV-prevalence >30%) were included in the second systematic review (to be published separately; see supplementary material, Table 3).

Data extraction and analysis

The following scheme was used for data extraction: publication year, land/region, study design, sample origin, sampling method, sample size, distribution males/females, age range, risk factors, instruments, informant, data collection process, prevalence of psychological symptoms or mental disorder, and additional findings. Due to the broad heterogeneity of instruments and cut-offs used to assess mental health problems across studies, a meta-analysis was not performed. Instead, data were analyzed and presented in a descriptive, narrative overview. Results from statistical analyses of associated factors were also included in the analysis. Only factors reaching a significance level of $p = 0.05$ or less were considered as being significantly associated.

Quality assessment of the studies was based on the Joanna Briggs Institute (JBI) Critical Appraisal Checklist for Studies Reporting Prevalence Data (Munn *et al.*, 2015). This was extended to cultural appropriateness (see supplementary material, Table 4).

Results

Fourteen studies from eight different countries were included. All of the studies except one were conducted in Eastern and Southern Africa, most of them in countries with a high burden of the HIV epidemic. Study designs were mainly cross-sectional, there were two case-control studies and one mixed-methods study of which only the quantitative findings are reported here (see supplementary material, Table 4). In eight of the studies, screening scales were used to assess mental health symptoms or behavior (Table 2). Four studies reported a disorder prevalence, assessed by either diagnostic interviews or symptom count score. Two studies (Musisi and Kinyanda, 2009; Woollett *et al.*, 2017) used both. Because Woollett *et al.*, indicated that cut-offs were set to identify symptomatic adolescents and not used for diagnostic purposes, the results are reported in the section on symptom prevalence. Most of the studies assessed point prevalence. Exceptions are marked in Table 4, supplementary material.

Sample sizes ranged between 82 and 1339 (Table 2). For four of the studies, only a subsample could be included in the review (Menon *et al.*, 2009; Ng *et al.*, 2015; Bankole *et al.*, 2017;

Table 1. Sociodemographic and health-related factors of the study participants

Study	Age range (years) and gender	Social environment	HIV-related health status and treatment
Ashaba et al. (2018)	13-17 m:f = 41:59	22% orphans, 65% with HIV-positive caregiver 27% lived with both parents	All on ART (mean duration 8.5 yrs.) All knew their HIV status
Bankole et al. (2017)	8-16 (only ALHIV aged 11-16 included) m:f = 41:59	^b 32% single orphans, 22.7% double orphans 17.3% with academic failure	^b 89% on HAART 64% with advanced clinical disease ^a
Gentz et al. (2017)	12-18 m:f = 48:52	37.4% had both parents alive 17.2% lost both parents 32.3% reported one or more days without enough food per week 49.5% lived in informal housing	All on ART (mean duration 7 yrs.) All knew their HIV status 3.9% with advanced immunosuppression ^a
Kemigisha et al. (2019)	10-19 m:f = 38:62	36.6% single orphans, 15.5% double orphans 82.4% primary school students 0.9% without formal education 15.2% lived in temporary housing	95.2% on ART (median duration 5 years) 3.4% with advanced clinical disease ^a
Kim et al. (2015)	12-18 m:f = 44:56	19.9% had both parents as primary caregivers 31.3% not enrolled in school or primary school not completed	93.6% on ART 81.3% knew their HIV status 71.3% with advanced clinical disease ^a 31.9% with advanced immunosuppression ^a
Kinyanda et al. (2019)	5-17 (only ALHIV aged 12-17 included) m:f = 48:52	42% single orphans 19.8% double orphans 20.2% lived with both parents	94.6% on ART 16.5% with advanced immunosuppression ^a
Lyambai and Mwape (2018)	11-17 m:f = 42:58	63.5% lived with a single parent 25% lived with other relatives 11% lived with both parents	All on ART treatment 64% unaware of their HIV status
Menon et al. (2009)	11-15 m:f = 46:54	26.8% had their mother as a primary caregiver	73.2% were on ART 58.3% did not know their HIV status 42.5% reported health problems
Musisi and Kinyanda (2009)	10-18 m:f = 44:56	53.7% double orphans 2.4% had both parents alive 75.6% enrolled in school	All knew their HIV status 60.9% with advanced clinical disease ^a
Ng et al. (2015)	10-17 m:f = 49:51	^b 52% raised by a single caregiver 29% orphaned 90% were attending school	Not given
Okawa et al. (2018)	15-19 m:f = 42:58	64.7% orphans, 24.7% double orphans 17.9% did not complete basic education	94.2% on ART (mean duration 6 yrs.)
Smith Fawzi et al. (2016)	10-17 m:f = 50:50	29% with mother as head of the household 29% with father as head of the household 93% attending school, 74% with lack of basic necessities during the past 6 months	All on ART
Vreeman et al. (2015)	10-14 m:f = 46:54	50% lost both parents 99% were enrolled at school 34% had difficulties in attending	All on HAART (mean duration 4.4 yrs.) 43% knew their HIV status 37% with advanced clinical disease ^a
Woollett et al. (2017)	13-19 m:f = 46:54	73% orphaned 98% attending school	88% on ART 89% knew their HIV status

^aadvanced immunosuppression = CD4 count < 350/mm³, advanced clinical disease = WHO stage 3 or 4^bapplies to the whole study group

Kinyanda et al., 2019). Most samples included older (15–19) and younger (10–14) adolescents. Exceptions were the study by Vreeman et al., and Menon et al., who focused on younger adolescents and Okawa et al., who focused on older adolescents (Menon et al., 2009; Vreeman et al., 2015; Okawa et al., 2018). Females and males were almost equally distributed, with females being slightly overrepresented (58–62%) in five of the studies. The characteristics of the study samples are shown in Table 1.

Prevalence of psychological symptoms

Four studies reported *emotional and behavioral difficulties*, assessed by the Strengths and Difficulties Questionnaire (SDQ) (Menon et al., 2009; Vreeman et al., 2015; Gentz et al., 2017; Lyambai and Mwape, 2018). The lowest prevalence was reported by Vreeman et al., from a sample of younger adolescents ($n = 285$; age 10–14) enrolled in a disclosure intervention trial in Kenya

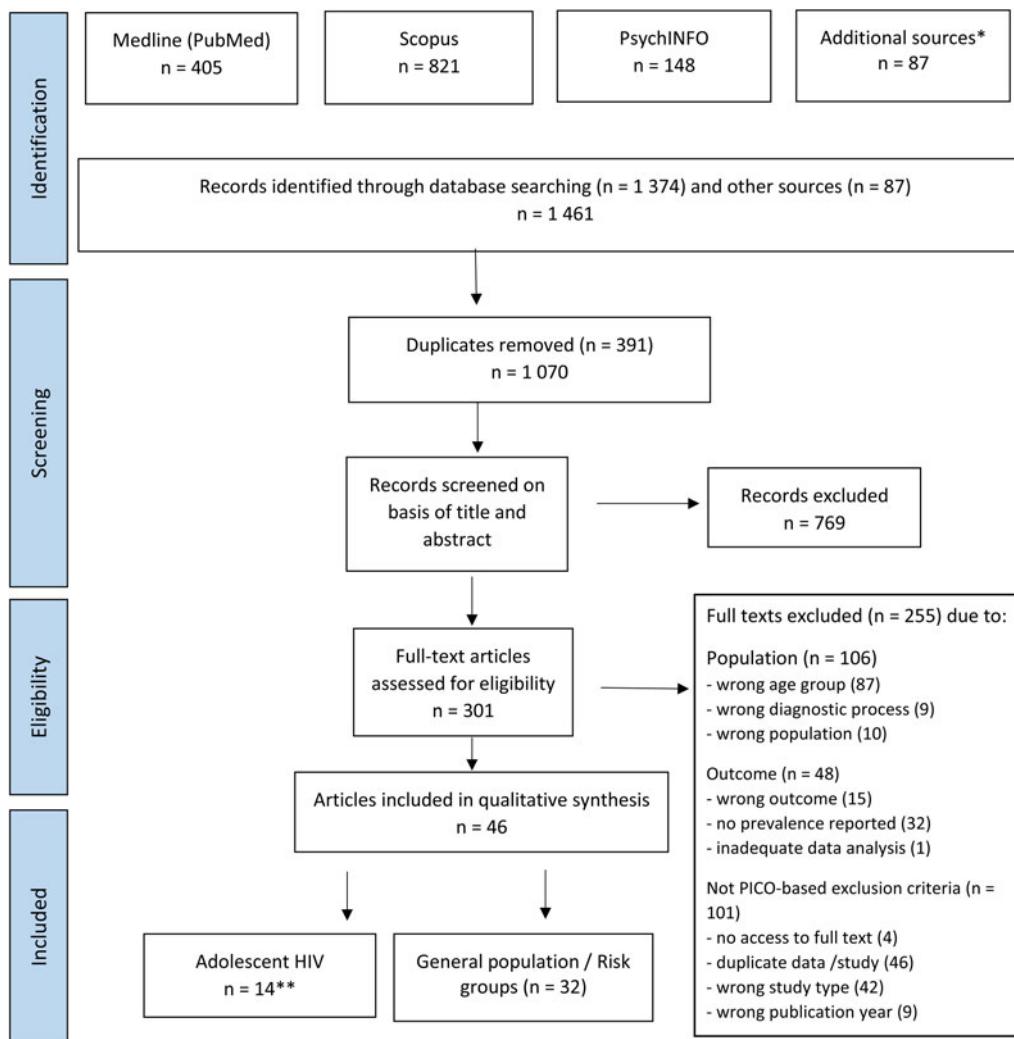


Fig. 1. PRISMA Flow-chart. *65 articles found from Google Scholar, 22 from reference lists, citations or author contact. **found from PubMed (1), PsychINFO (4), Scopus (3), Google Scholar (6), through reference lists (2), recommendation by other researchers (3); four articles were found in more than one source.

(Vreeman *et al.*, 2015): 9% scored in the borderline range and 5% in the clinical range. Two other studies, conducted in Zambia ($n = 99$; age 12–18) and Namibia ($n = 127$; age 11–15), reported a prevalence of 28.5% and 29.1% for emotional and behavioral problems (borderline and clinical range) (Menon *et al.*, 2009; Gentz *et al.*, 2017). Another study from Zambia ($n = 103$; age 11–17) reported on the percentage that scored in the clinical range (29.2%) (Lyambai and Mwape, 2018). Menon *et al.*, compared a sample of HIV-positive adolescents ($n = 127$) to a sample of school children ($n = 420$) (Menon *et al.*, 2009) and found a comparable prevalence of emotional and behavioral problems (29.1 v. 27.8%). Three studies also reported results for the different subscales of the SDQ (Menon *et al.*, 2009; Gentz *et al.*, 2017; Lyambai and Mwape, 2018): In the sample from Namibia (Gentz *et al.*, 2017), emotional problems were more prevalent (22%) than conduct problems (12.2%), peer problems (10.9%) or hyperactivity/inattention (4%). The two other studies, both from Zambia, found a higher frequency of peer problems (46.9% and 41.8%, respectively), compared to emotional or conduct problems (Menon *et al.*, 2009; Lyambai and Mwape, 2018). Peer problems were also frequent in the sample of unaffected school children that was used as a control group

(34.4%). Lyambai and Mwape compared self-rated results to parent-rated results and found that parents reported fewer problems in each of the categories (Lyambai and Mwape, 2018) and this was most prominent for peer problems.

Musisi and Kinyanda (2009) made use of the Self-Reporting Questionnaire 25 (SRQ-25) to assess *significant psychological distress* among a sample of HIV-positive adolescents ($n = 82$; age 10–18) from Uganda and reported a prevalence of 51%.

Symptoms of depression were assessed in five of the studies (Vreeman *et al.*, 2015; Smith Fawzi *et al.*, 2016; Woollett *et al.*, 2017; Okawa *et al.*, 2018; Kemigisha *et al.*, 2019). In a sample from Zambia ($n = 190$; age 15–19), 25.3% of adolescents had high scores of depressive symptoms, according to the short form of the Center for Epidemiologic Studies Depression Scale (CES-D) (Okawa *et al.*, 2018). Of the total, 69% of symptomatic adolescents were female and 31% were male. A similar prevalence (26%) was reported in a study from Rwanda ($n = 193$; age 10–17) that used the Center for Epidemiologic Studies Depression Scale for Children (CES-DC) (Smith Fawzi *et al.*, 2016). In a younger sample from western Kenya ($n = 285$; age 10–14), 19% of adolescents scored positive for depression, according to the Patient Health Questionnaire (PHQ-9). However, 15% showed minimal,

Table 2. Overview of the studies included

	Setting	Sample size	Instruments and informant/s	Mental health outcome
<i>Assessment of psychiatric disorder with diagnostic interview or symptom count score</i>				
Ashaba et al. (2018)	South-Western Uganda HIV clinic attached to Mbarara Regional Referral Hospital and University of Science and Technology	n = 224	MINI International Neuropsychiatric Interview for children and adolescents ^a	Major depressive disorder: 16% Suicidality (past month): 14% (4% low, 6% medium, 4% high risk)
Bankole et al. (2017)	South Nigeria Pediatric Outpatient Clinic of the University of Calabar Teaching Hospital (UCTH)	n = 150 (75 ALHIV, 75 controls; only 31 ALHIV included)	MINI International Neuropsychiatric Interview for children and adolescents ^a	Depressive disorder: 41.9%
Kim et al. (2015)	Malawi two large HIV clinics: one in South-Eastern Malawi, one in Lilongwe	n = 562	Children's Depression Rating Scale, Revised (CDRS-R) ^a	Depressive disorder: 18.9%
Kinyanda et al. (2019)	Uganda 5 HIV clinics in Central and South-Western Uganda	n = 1 339 (patients and caregivers; only 479 ALHIV included)	Child and Adolescent Symptom Inventory-5 (CASI-5) ^b , caregiver-reported Youth's Inventory-4R (YI-4R) ^b , self-reported	Any psychiatric disorder: 23.8% Any behavioral disorder: 12.4% Any emotional disorder: 18.2% Major depressive disorder: 5.2% Any anxiety disorder: 14.7% ADHD: 6.4% (either caregiver- or self-report)
<i>Assessment of psychological symptoms or behavior with screening scales</i>				
Gentz et al. (2017)	Namibia Pediatric ARV Clinic of a State Hospital in Katutura, Windhoek	n = 99	SDQ, self-reported ^b	Emotional and behavioral difficulties (past 6 months): 12.2% scored in the abnormal range, 16.3% in the borderline range
Kemigisha et al. (2019)	South-Western Uganda Mbarara Municipal Council Health Center IV and Mbarara Regional Referral Hospital (MRRH)	n = 336	Center for Epidemiologic Studies Depression Scale for Children (CES-DC) ^a	Depressive symptoms: 45.8% (42.5% in males; 47.8% in females) Age 10–14: 37.4% Age 15–19: 62.3% Suicidal ideation (past 6 months): 7.7%
Lyambai and Mwape (2018)	Zambia Choma General Hospital, a second level referring hospital	n = 103	SDQ, self- and parent-reported ^a	Emotional and behavioral difficulties (past 6 months): 29.2% (self-reported) v. 34.3% (parent-reported) scored in the abnormal range
Menon et al. (2009)	Zambia University Teaching Hospital Lusaka 5 other clinics in the district 5 basic schools (grade 5–9)	n = 547 (127 ALHIV, 420 controls; only ALHIV included)	SDQ, self-reported ^a	Emotional and behavioral difficulties (past 6 months): 29.1% (ALHIV) v. 27.8% (controls) scored in the abnormal and borderline range
Ng et al. (2015)	Rwanda catchment area of two district hospitals, rural Rwanda	n = 683 (218 ALHIV, 228 adolescents with an HIV-positive caregiver, 237 unaffected adolescents; only ALHIV included)	Youth Self-Report (YSR), internalizing subscale ^b	Suicidal ideation and behavior (6 months): 21.1% in ALHIV Suicidal behavior (6 months): 21% in HIV-positive and HIV-affected adolescents v. 13% in unaffected adolescents
Okawa et al. (2018)	Zambia University Teaching Hospital in Lusaka	n = 190	Center for Epidemiologic Studies Depression Scale (CES-D) ^a , short form	Depressive symptoms: 25.3%
Smith Fawzi et al. (2016)	Rwanda catchment area of two district hospitals, rural Rwanda	n = 193 (subsample from Ng et al.)	Center for Epidemiologic Studies Depression Scale for Children (CES-DC) ^b	Depressive symptoms: 26%

(Continued)

Table 2. (Continued.)

	Setting	Sample size	Instruments and informant/s	Mental health outcome
Vreeman et al. (2015)	Western Kenya 8 healthcare facilities for HIV treatment	n = 285	SDQ, self-reported ^a Patient Health Questionnaire (PHQ-9) ^a	Emotional and behavioral difficulties (past 6 months): 5% scored in the abnormal range and 4% in the borderline range Depressive symptoms: 19% (15% minimal, 3% minor, 2% moderate/severe symptoms)
<i>Combined use of screening scales and diagnostic interviews</i>				
Musisi and Kinyanya (2009)	Uganda Child and Adolescent Clinic, specialized in HIV care, in Kampala	n = 82	SRQ-25 ^a psychiatric interview	Significant psychological distress (past 30 days): 51.2% Depressive disorder: 40.8% Anxiety disorder: 45.6% Somatization: 18% Suicide attempts (12 months): 17.1% Suicide attempts (lifetime): 19.5%
Woollett et al. (2017)	South Africa 5 pediatric ARV clinics serving adolescents in Johannesburg	n = 343	Child Depression Inventory (CDI) ^a , short version Revised Children's Manifest Anxiety Scale (RCMAS) ^a Child PTSD Checklist ^a MINI International Neuropsychiatric Interview ^a , suicidality subscale	Symptomatic for Depression: 14% Anxiety: 25% PTSD: 5% Symptomatic for any disorder: 27% Suicidal ideation (past month): 24% Suicidal behavior (past month): 5%

ALHIV = adolescents living with HIV

^ainstrument previously used or validated in other African settings (Chipimo and Fylkesnes, 2010; Chishanga et al., 2011; Betancourt et al., 2012; Boyes et al., 2012; Boyes and Cluver, 2013; Cholera et al., 2014; Kim et al., 2014),

^bpilot study conducted or local validation of instruments (Betancourt et al., 2012; Mpango et al., 2017)

3% minor, and 2% moderate or severe symptoms (Vreeman et al., 2015). In a sample from deprived urban neighborhoods of Johannesburg, South Africa, 14% of adolescents ($n = 343$; median age 16) showed symptoms of depression, according to the Child Depression Inventory (CDI) (Woollett et al., 2017).

Anxiety and posttraumatic stress disorder (PTSD) were only reported from the South African sample (Woollett et al., 2017). Assessment with the Revised Children's Manifest Anxiety Scale (RCMAS) and the Child PTSD Checklist revealed that 25% of adolescents had symptoms of anxiety and 5% had symptoms of PTSD. Furthermore, 27% of participants were symptomatic for either depression, anxiety, or PTSD. Female adolescents had significantly higher scores of depression, anxiety, or PTSD, compared to male adolescents.

Three studies assessed *suicidality*: In the sample of Woollett et al., 24% reported suicidal ideation and 5% suicide attempts during the previous month. Ng et al. (2015) reported on suicidal ideation and behavior from Rwanda, using the Youth Self-Report (YSR), internalizing subscale. In their matched case-control study ($n = 683$; age 10–17), 21% of HIV-positive adolescents reported suicidal behavior (including self-harm) during the previous 6 months, compared to 13% of unaffected adolescents. Kemigisha et al. (2019) reported a lower prevalence of suicidal ideation (7.7%) from a sample in western Uganda ($n = 336$; age 10–19). In total, 69.2% of adolescents reporting suicidal ideation were female and 30.8% were male. Furthermore, 81% of adolescents reporting suicidality also scored positive for depression.

Prevalence of mental disorders

The prevalence of mental disorders was assessed by structured or semi-structured diagnostic interviews [MINI International Neuropsychiatric Interview, Children's Depression Rating Scale-Revised (CDRS-R)] in three studies (Kim et al., 2015; Bankole et al., 2017; Ashaba et al., 2018). Another study used symptom count scores from the Child and Adolescent Symptom Inventory-5 (CASI-5) and the Youth's Inventory-4R (YI-4R) (Kinyanya et al., 2019). Musisi and Kinyanya (2009) assessed mental disorders in an ICD-10-based, diagnostic psychiatric interview, not further specified.

An overall prevalence of *any psychiatric disorder* was reported from a sample of perinatally infected adolescents in Uganda ($n = 479$; age 12–17) (Kinyanya et al., 2019). Based on symptom count scores (either caregiver- or self-report), 23.8% of adolescents scored positive for a psychiatric disorder, with 18.2% scoring positive for any *emotional disorder* and 12.4% for any *behavioral disorder*. The level of comorbidity between emotional and behavioral disorders was 38.6% and 22.5%, respectively. ADHD was the most prevalent behavioral disorder (6.4%) and anxiety disorders were the most prevalent type of emotional disorders (14.7%). The prevalence of major depressive disorder was 5.2%. Prevalence according to self-report alone were much lower (ADHD 3.1%, anxiety 10.1%, major depressive disorder 0.2%).

The prevalence of *depressive disorder* was 18.9% in a large sample ($n = 562$; age 12–18) from Malawi (Kim et al., 2015). A comparable prevalence (16%) was found in a sample from rural

Table 3. Mental health outcomes and correlations found by bivariate analysis

	Mental health variable	Positive correlation with	Negative correlation with	No significant correlation
Ashaba (2018)	Major depressive disorder	Stigma, bullying, duration on ART		Age, gender, orphanhood, HIV status of the caregiver
	Suicidality	Stigma, bullying		Age, gender, orphanhood, HIV status of the caregiver, duration on ART
Bankole (2017)	Depression	Older age, academic failure, living with relatives, orphanhood, more than one hospitalization		Gender, WHO clinical stage, CD4 count, HAART
Gentz (2017)	Emotional and behavioral difficulties (SDQ)	Days without food, missed ARV doses, having disclosed HIV status to others, stigma, negative self-image, public attitude	Support through caregiver and friends, child-specific assets	HIV-related health variables (CD4 count, viral load, time on ART), age of disclosure, time since disclosure
Kemigisha (2019)	Depression	Older age, time to clinic > 30 min, sexual risk behavior, having disclosed HIV status to others	Taking taxi/motorcycle for transport to the clinic	Gender, parental death, WHO clinical stage, adherence
Kim (2015)	Depression	Fewer years of schooling, change in caregiver, experience of forced sex or abuse, being bullied, dissatisfaction with physical appearance, older age at disclosure, worse immunological state, being malnourished	Mother/father as caregiver	Family income, location of home, time to clinic, failed school term, hospital admissions (past year), being on ART, history of TB treatment, WHO clinical stage
Kinyanda (2019)	Emotional disorders	Older age, higher caregiver education		Gender, urban/rural study site, type of caregiver, orphanhood, education level, SES, CD4 count, being on ART
	Behavioral disorders	Older age, male gender		Urban/rural study site, type of caregiver, orphanhood, education level, SES, CD4 count, being on ART, caregiver education
Lyambai and Mwape (2018)	Number of mental health difficulties (SDQ)	Higher level of stigma		
Menon (2009)	Emotional and behavioral difficulties (SDQ)	Self-reported health problems		Taking ARV
Ng (2015)	Suicidal ideation and behavior	Older age, single caregiver, not being in school, child depression, child conduct problems, caregiver mental health problems, severe physical punishment, child-reported HIV-stigma	Good parenting, community support	Gender
	Suicidal behavior only	Positive HIV status, HIV status of the caregiver	Higher SES	
Musisi and Kinyanda (2009)	Psychological distress	Older age, being out of school, not being able to play sports at school, HIV status of the caregiver		Academic performance
Okawa (2018)	Depression	Experience of HIV-associated stigma	Good relationship with family, friends, health care workers	Age, gender, education level, parental survival, basic HIV knowledge
Woollett (2017)	Depression, anxiety or PTSD	Days hungry, peer violence, having been inappropriately touched, hit or attacked, female gender, feeling to belong	Knowledge of HIV status, feeling able to control the future, having dreams for the future, having a safe place in the community	Age, looking after younger children or sick family members, lost someone close, not talked about loss, having been hospitalized, having disclosed HIV status, time since the disclosure

Table 4. Sociodemographic, family, and community factors associated with mental health found by multiple logistic or hierarchical regression

	Associated with	Study	Type and strength of correlation (p-value)
Sociodemographic factors			
Older age	Depression	Kim (2015)	Positive (0.004)
	Emotional and behavioral disorder	Kinyanda (2019)	Positive (< 0.01 and 0.007)
Female gender	Suicidality	Ashaba (2018)	Positive (0.03)
Male gender	Behavioral disorder	Kinyanda (2019)	Positive (0.01)
Child assets	Total difficulties (SDQ)	Gentz (2017)	Negative (0.027)
Not in school	Depression	Kim (2015)	Positive (0.005)
Higher caregiver education	Emotional disorder	Kinyanda (2019)	Positive (0.03)
HIV-related factors			
Duration on ART	Depression	Ashaba (2018)	Positive (0.02)
Travel time to clinic (> 30 min)	Depression	Kemigisha (2019)	Positive (0.041)
Unsatisfactory relationship with health worker	Depression	Okawa (2018)	Positive (< 0.01)
Family factors			
Good parenting	Suicidal ideation and behavior	Ng (2015)	Negative (0.03; 0.001)
Child mental health symptoms	Suicidal ideation and behavior	Ng (2015)	Positive (0.001; 0.03)
Caregiver mental health symptoms	Suicidal ideation	Ng (2015)	Positive (0.03)
Unsatisfactory relationship with family	Depression	Okawa (2018)	Positive (< 0.01)
Community factors			
Bullying	Depression	Ashaba (2018)	Positive (0.04)
	Suicidality	Ashaba (2018)	Positive (0.02)
Being bullied for taking medications	Depression	Kim (2015)	Positive (< 0.0001)
Stigma	Total difficulties (SDQ)	Gentz (2017)	Positive (0.011)
	Emotional symptoms (SDQ)	Gentz (2017)	Positive (0.02)
	Suicidality	Ashaba (2018)	Positive (0.02)
	Depression	Okawa (2018)	Positive (0.01)

Uganda ($n = 224$; age 13–17) (Ashaba et al., 2018) and 14% of the sample reported suicidality in the previous month, with 4% having a high suicide risk.

In a sample from Nigeria ($n = 31$; age 11–16), 41.9% were diagnosed with depression, with the highest prevalence (83.3%) found in the 14–16 years age group (Bankole et al., 2017). For their whole study group (aged 6–16), Bankole et al., showed that depression and suicidality were more prevalent among ALHIV, compared to controls. An older study from Uganda ($n = 82$; age 10–18) found a depression prevalence of 40.8% (Musisi and Kinyanda, 2009). In the same sample, 45.6% of adolescents were diagnosed with an anxiety disorder, 18% with somatization disorder, and 1.2% with bipolar disorder (mania). Furthermore, 19.5% reported ever having made a suicide attempt and 17.1% had attempted suicide within the past 12 months.

Associations with sociodemographic, health-related and community factors

Twelve studies assessed correlations between mental health and explanatory factors, either by chi-square or t-test (Table 3) or by regression analysis (Table 4).

Findings on associated factors from bivariate analyses were often contradictory (Table 3). This applied to most of the sociodemographic variables (age, gender, socioeconomic status, education level/academic performance, orphanhood, HIV status of the caregiver). For health-related variables, WHO clinical stage, CD4 count, or being on ART were not associated with mental health problems in most studies, while self-reported health problems, being out of school, and not being able to play sports in school were. Disclosure of HIV or time since the disclosure was not associated with mental health problems, whereas two studies found an association between having disclosed HIV status to others and poor mental health. Findings on mental health and ART adherence were also contradictory.

Bullying and stigma were consistently associated with poor mental health outcomes. Poverty (days hungry or non-availability of child assets) and the experience of violence or abuse were associated with poor mental health. Social support through community, family, or friends, and good parenting were associated with better mental health outcomes in several studies. Individual-level factors such as feeling able to control the future and having dreams for the future were likewise associated with better mental health.

Factors identified by logistic regression are shown in [Table 4](#). Apart from sociodemographic and HIV-related factors, family factors (good parenting, relationship with family, child and caregiver mental health) were identified as important predictors of mental health. With regard to community-level factors, bullying and stigma predicted poor mental health outcomes.

Two other studies explored the factors associated with non-adherence, using mental health as an independent variable in logistic regression ([Smith Fawzi et al., 2016](#); [Okawa et al., 2018](#)). [Smith Fawzi et al.](#), found a significant association between conduct problems and non-adherence and also, though weaker, between self-reported depression and non-adherence. [Okawa et al.](#), did not find a significant association between depressive symptoms and non-adherence.

Discussion

The vast majority of adolescents living with HIV reside in sub-Saharan Africa. To date, there has not been a specific review of the burden of mental health problems for this high-risk population in this region of the world. We summarized the relevant evidence for this high-risk group as part of a systematic review on mental health problems among sub-Saharan adolescents based on peer-reviewed studies published between 2008 and 2019. Collectively, the studies indicated a high prevalence of mental health problems, with 24–27% of adolescents scoring positive for any psychiatric disorder and 30–50% showing emotional or behavioral difficulties or significant psychological distress. Based on regression analyses, older age, not being in school, poverty, and bullying and stigma predicted mental health problems. Social support and parental competence were protective.

The high prevalence of mental health problems among HIV-positive adolescents found in this review aligns with previous research on HIV-positive adolescents in both, high- and low-income settings ([Mellins and Malee, 2013](#); [Vreeman et al., 2017](#)). The prevalence of emotional and behavioral problems, depression, and anxiety was in the same range as the prevalence reported by Mellins and Malee from the USA, while ADHD was much more common in the US studies. Case-control studies indicated a higher prevalence of suicidality and depression among HIV-positive adolescents, compared to controls ([Ng et al., 2015](#); [Bankole et al., 2017](#)), while the prevalence of emotional and behavioral problems did not differ between the two groups ([Menon et al., 2009](#)).

Associations with sociodemographic, health-related, and community factors

Sociodemographic factors associated with mental health problems in regression analyses were older age, poverty, not being in school, and higher caregiver education. Unsatisfactory relationships with health workers, longer travel time to clinic, and duration on ART were health-related factors associated with poor mental health. Stigma and bullying were strong community-level predictors for mental health problems. Factors associated with better mental health outcomes included social support and good parenting.

The factors described above are not much different from the risk factors known for mental health problems in general adolescent populations ([Patel et al., 2007](#); [Fisher and Cabral de Mello, 2011](#); [Kieling et al., 2011](#); [WHO, 2012](#); [WHO, 2013a](#)). This raises the question of whether it is the HIV infection itself or rather environmental and family factors that pose a risk to mental health ([Mellins and Malee, 2013](#); [Vreeman et al., 2017](#)). As the majority

of HIV-positive adolescents in sub-Saharan Africa were perinatally infected, they also have to cope with the consequences of familial AIDS: bereavement, caring for ill family members with AIDS, stigma and discrimination, poverty, lack of social support and guidance and diminished educational opportunities ([Lowenthal et al., 2014](#)). A study from Kenya on vertically infected and HIV-affected adolescents found similar depression scores in both groups, with orphanhood, poverty, and caregiver depression being associated factors ([Abubakar et al., 2017](#)). [Ng et al. \(2015\)](#) found similar rates of suicidality among HIV-positive and HIV-affected adolescents and correlations with caregiver's mental health. The relevance of caregiver health and child-caregiver relationship for mental health outcomes in this population is known from previous research ([Bhana et al., 2016](#); [Louw et al., 2016](#); [Boyes et al., 2019](#)).

HIV disclosure and adherence to ART

The disclosure of HIV was not identified as a predictive factor for mental health in regression models. The bivariate analysis suggested no adverse effects of disclosure, but associations between mental health problems and disclosure of HIV status to others. WHO strongly recommends timely disclosure ([WHO, 2013b](#)). Studies from this review found that knowledge of HIV status was associated with better mental health ([Woollett et al., 2017](#)), while older age at disclosure was associated with mental health problems ([Kim et al., 2015](#)). [Ramos et al.](#) showed that HIV-positive youth (aged 11–24) who had to figure out their HIV status on their own were more likely to show mental health symptoms and internal stigma, compared to youth who were disclosed to ([Ramos et al., 2018](#)). Incomplete adherence to ART was also more likely among youth not disclosed to.

Findings on mental health as an independent factor for ART adherence were contradictory ([Smith Fawzi et al., 2016](#); [Okawa et al., 2018](#)). Other studies reported a positive association between poor mental health and non-adherence ([Dow et al., 2016](#); [Vreeman et al., 2017](#)) or virologic failure ([Lowenthal et al., 2012](#)). A systematic review of the factors associated with adherence to ART in LMIC did not identify mental health as one of the most prominent factors for adherence ([Hudelson and Cluver, 2015](#)). A large study from the Eastern Cape, South Africa, found that perinatally infected adolescents were more likely to be adherent, compared to behaviorally infected adolescents ([Sherr et al., 2018](#)). Simultaneously, behaviorally infected adolescents showed higher scores of depression, anxiety, and suicidality and were more likely to report internalized stigma and substance use. None of the studies included in this review explored the mode of infection as a predictive factor for mental health and/or adherence. The study of Sherr *et al.*, suggests that the mode of infection might be an important factor for both mental health outcomes and retention in care and that it also has an influence on how adolescents are treated by health care workers.

Implications for HIV care

Given the high prevalence of mental health problems among HIV-positive adolescents, identifying and addressing these problems is crucial. Screening for mental health problems and integrating mental health care into regular HIV services is highly recommended ([Musisi and Kinyanda, 2009](#); [Kim et al., 2015](#); [Bankole et al., 2017](#); [Gentz et al., 2017](#); [Woollett et al., 2017](#); [Lyambai and Mwape, 2018](#); [Okawa et al., 2018](#)).

Lyambai and Mwape (2018) conducted qualitative interviews among nurses working at an ART clinic. Mental health literacy among health care workers was low and there was no dedicated mental health service for HIV-positive adolescents available. HIV-positive adolescents face multiple challenges in the context of HIV: daily adherence to medications, coping with the diagnosis, coping with an AIDS-ill caregiver and/or bereavement, coping with stigma and discrimination from peers, disclosure to potential partners, and negotiating safer sex (Lowenthal *et al.*, 2014; Bryant and Beard, 2016). For many adolescents, the transition from pediatric services to adult HIV care is critical, with a high risk of discontinuation of treatment at this point (Lowenthal *et al.*, 2014; Bryant and Beard, 2016; Vreeman *et al.*, 2017). Addressing their psychosocial needs and well-being is crucial to keeping adolescents in care.

There are multiple approaches for improving the mental health of HIV-positive adolescents, e.g. enhancement of self-regulation skills and coping strategies (Bhana *et al.*, 2016; Mutumba *et al.*, 2017), and strengthening resources for social support (Casale *et al.*, 2019). As HIV likely affects the whole family, there is a need for evidence-based family interventions, the VUKA family program being one promising example (Bhana *et al.*, 2014; Mellins *et al.*, 2014). Addressing stigma is another important issue. To inform mental health promotion and program planning, it is crucial to understand the psychosocial challenges HIV-positive adolescents face (Petersen *et al.*, 2010; Ashaba *et al.*, 2019a).

Differences in methodology and prevalence between the studies

As different samples are exposed to a different set of risk and protective factors, differences in prevalence are comprehensible (Fisher *et al.*, 2011; Kieling *et al.*, 2011). Apart from community and family factors, the percentage of adolescents receiving ART, differences in HIV-related physical health, and the quality of HIV care will have an impact on the prevalence of mental health problems (Okawa *et al.*, 2018; Boyes *et al.*, 2019).

Two studies on younger adolescents reported a low prevalence of emotional and behavioral problems, almost comparable to the general adolescent population (Menon *et al.*, 2009; Vreeman *et al.*, 2015). This may be due to the fact that the prevalence of mental health problems among children and adolescents rises with age (de Girolamo *et al.*, 2012; WHO, 2017).

Differences between self- and caregiver-report were described in two of the studies (Lyambai and Mwape, 2018; Kinyanda *et al.*, 2019). van den Heuvel *et al.* (2019) explored agreement and discrepancies between caregiver- and self-reported results from the sample of Kinyanda *et al.*, and only found a modest correlation between the two. A low inter-informant agreement was also reported by Doku and Minnis (2016) from a sample of HIV-affected children and their caregivers. Thus, the prevalence of mental health problems may vary according to the type of informant.

Reviews on child and adolescent mental health found that studies that used screening instruments reported higher rates of mental health problems, compared to studies that used diagnostic interviews (Fisher *et al.*, 2011; Cortina *et al.*, 2012). This is also true for most of the studies in this review. Only two studies with very small sample sizes that employed diagnostic interviews reported exceptionally high rates of depressive disorder (Musisi and Kinyanda, 2009; Bankole *et al.*, 2017).

Limitations

Most of the studies used self-reporting screening instruments. As screening instruments can merely identify symptomatic people or people with a probable psychiatric disorder, results from screening instruments are not equivalent to disorder prevalence. Using screening instruments can result in an overestimation of disorder prevalence, as could be shown for depression screening among people living with HIV in sub-Saharan Africa (Tsai, 2014). Particularly when used in settings with a low expected prevalence, there is a considerable risk of misclassification (Kagee *et al.*, 2013; Stockings *et al.*, 2015).

Self-reported results are prone to reporting bias and may be influenced by social desirability, so results have to be interpreted with caution. Where sensitive issues are concerned, there is a considerable risk of underreporting. Most studies used convenience sampling which has an impact on the representativeness of the data. As the vast majority of studies were cross-sectional, no causal relationships can be derived from the results. Most of the studies did not use control groups, which makes it difficult to differentiate between HIV-related mental health risks and risks that adolescents share with their peers from the same community.

The majority of standardized screening instruments and diagnostic interviews in use in the field of child and adolescent mental health today were developed in high-income settings. Questions developed and tested in high-income settings may be inappropriate when used in a low-resource setting, which can lead to an over- or underestimation of prevalence (Sweetland *et al.*, 2014; Owen *et al.*, 2016). For many of the standardized instruments used today, there are no clinical cut-offs validated for Africa (de Vries *et al.*, 2018; Hoosen *et al.*, 2018). Only a few screening instruments were either developed with HIV-positive or HIV-affected adolescents in sub-Saharan Africa or were validated and adapted for use within this population (Betancourt *et al.*, 2011; Ng *et al.*, 2014; Mutumba *et al.*, 2015; Ashaba *et al.*, 2019b). The majority of these instruments have not been used on a larger scale. The inclusion of studies that used locally developed instruments and also of qualitative studies could have led to a more precise understanding of the mental health issues in the HIV-positive adolescent population. To achieve better comparability of the data, we focused on prevalence rates that were determined using standardized measures only. By only including studies reporting point prevalence data, we cannot draw any conclusions on the trajectories of adolescents living with HIV. This is a crucial topic for future research. For children orphaned by AIDS, Cluver *et al.* (2012) have shown that mental health problems worsened over time. This may also be true for HIV-positive adolescents.

The number of databases that were searched was limited due to time and capacity restrictions, though the most important ones were included. Because we focused on peer-reviewed articles only, EMBASE and conference websites were not searched. The inclusion of studies in other languages than English may have led to additional findings. Because of our focus on adolescents aged 10–19, publications employing a broader age than 10–19, reporting prevalence data for children and adolescents or for adolescents and young people up to the age of 24 may have been missed. Due to publication bias, studies that found a high prevalence of mental health problems may be overrepresented. As the review was conducted within an adolescent mental health promotion project in South Africa and Zambia, both countries were included in the search terms which might have led to an

overrepresentation of studies from these two countries. Furthermore, the results presented here are a subsection of a larger systematic review and the comparability of the findings to the general sub-Saharan adolescent population, as well as other high-risk groups, can only be commented on once the other sections of the review have been published. Lastly, the review was limited to the period 2008 and 2019 and so studies published before and after this period, which may be informative, were excluded.

Conclusion

This review updates and synthesizes evidence on the prevalence of mental health problems among HIV-positive adolescent populations in sub-Saharan Africa. Mental health problems are highly prevalent in this population and need to be addressed within regular HIV care settings. Poor mental health can be associated with non-adherence to ART and with other risk behaviors, leading to poorer physical outcomes and a higher risk of HIV transmission. Health care professionals working with HIV-positive adolescents should be enabled to recognize mental health problems and respond to them in an appropriate, non-discriminatory way to ensure the best possible outcomes.

Supplementary material. The supplementary material for this article can be found at <https://doi.org/10.1017/gmh.2020.18>.

Acknowledgements. This review is part of the MEGA project 'Building capacity by implementing mhGAP mobile intervention in SADC countries' which was supported by the Erasmus+ Programme of the European Union (Capacity Building 585827-EPP-1-2017-1-FL-EPPKA2-CBHE-JP).

The work by Leigh van den Heuvel reported herein was made possible through funding by the South African Medical Research Council through its Division of Research Capacity Development under the SAMRC Clinician Researcher M.D. PhD Scholarships Programme from funding received from the South African National Treasury. The content hereof is the sole responsibility of the authors and do not necessarily represent the official views of the SAMRC or the funders.

Sharain Suliman received post-doctoral support from the South African Research Chairs Initiative in PTSD funded by the Department of Science and Technology and the National Research Foundation and a SAMRC Self-Initiated Research Grant.

Conflict of interest. None.

References

- Ashabak A, Van de Vijver FJR, Hassan AS, Fischer R, Nyongesa MK, Kabunda B, Berkley JA, Stein A, and Newton CR (2017) Cumulative psychosocial risk is a salient predictor of depressive symptoms among vertically HIV-infected and HIV-affected adolescents at the Kenyan coast. *Annals of Global Health* **83**, 743–752.
- Ashaba S, Cooper-Vince C, Maling S, Rukundo GZ, Akena D, and Tsai AC (2018) Internalized HIV stigma, bullying, major depressive disorder, and high-risk suicidality among HIV-positive adolescents in rural Uganda. *Global Mental Health* **5**, e22.
- Ashaba S, Cooper-Vince C, Vořechovská D, Maling S, Rukundo GZ, Akena D, and Tsai AC (2019b) Development and validation of a 20-item screening scale to detect major depressive disorder among adolescents with HIV in rural Uganda: A mixed-methods study. *SSM Population Health* **7**, e100332.
- Ashaba S, Cooper-Vince CE, Vořechovská D, Rukundo GZ, Maling S, Akena D, and Tsai AC (2019a) Community beliefs, HIV stigma, and depression among adolescents living with HIV in rural Uganda. *African Journal of AIDS Research* **18**, 169–180.
- Bankole KO, Bakare MO, Edet BE, Igwe MN, Ewa AU, Bankole IA, and Olose EE (2017) Psychological complications associated with HIV/AIDS infection among children in South-South Nigeria, sub-Saharan Africa. *Cogent Medicine* **4**, e372869.
- Betancourt TS, Rubin-Smith JE, Beardslee WR, Stulac SN, Fayida I, and Safren S (2011) Understanding locally, culturally, and contextually relevant mental health problems among Rwandan children and adolescents affected by HIV/AIDS. *AIDS Care* **23**, 401–412.
- Betancourt T, Scorz P, 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. *Journal of the American Academy of Child and Adolescent Psychiatry* **51**, 1284–1292.
- Bhana A, Mellins CA, Petersen I, Alicea S, Myeza N, Holst H, Abrams E, John S, Chhagan M, Nestadt DF, Leu CS, and McKay M (2014) The VUKA family program: piloting a family-based psychosocial intervention to promote health and mental health among HIV infected early adolescents in South Africa. *AIDS Care* **26**, 1–11.
- Bhana A, Mellins CA, Small L, Nestadt DF, Leu CS, Petersen I, Machanyangwa S, and McKay M (2016) Resilience in perinatal HIV + adolescents in South Africa. *AIDS Care* **28**, 49–59.
- Boyes ME, and Cluver LD (2013) Performance of the revised children's manifest anxiety scale in a sample of children and adolescents from poor urban communities in Cape Town. *European Journal of Psychological Assessment* **29**, 113–120.
- Boyes ME, Cluver LD, and Gardner F (2012) Psychometric properties of the child PTSD checklist in a community sample of South African children and adolescents. *PLoS ONE* **7**, e46905.
- 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**, 95–104.
- Bryant M, and Beard J (2016) Orphans and vulnerable children affected by human immunodeficiency virus in Sub-Saharan Africa. *Pediatric Clinics of North America* **63**, 131–147.
- Casale M, Boyes M, Pantelic M, Toska E, and Cluver L (2019) Suicidal thoughts and behaviour among South African adolescents living with HIV: Can social support buffer the impact of stigma? *Journal of Affective Disorders* **245**, 82–90.
- Chipimo PJ, and Fylkesnes K (2010) Comparative validity of screening instruments for mental distress in Zambia. *Clinical Practice and Epidemiology in Mental Health* **6**, 4–15.
- Chishinga N, Kinyanda E, Weiss HA, Patel V, Ayles H, and Seedat S (2011) Validation of brief screening tools for depressive and alcohol use disorders among TB and HIV patients in primary care in Zambia. *BMC Psychiatry* **11**, e75.
- Cholera R, Gaynes BN, Pence BW, Bassett J, Qangule N, Macphail C, Bernhardt S, Pettifor A, and Miller WC (2014) Validity of the patient health questionnaire-9 to screen for depression in a high-HIV burden primary healthcare clinic in Johannesburg, South Africa. *Journal of Affective Disorders* **167**, 160–166.
- Cluver LD, Orkin M, Gardner F, and Boyes ME (2012) Persisting mental health problems among AIDS-orphaned children in South Africa. *Journal of Child Psychology and Psychiatry* **53**, 363–370.
- Cortina MA, Sodha A, Fazel M, and Ramchandani PG (2012) Prevalence of child mental health problems in sub-Saharan Africa: a systematic review. *Archives of Pediatric & Adolescent Medicine* **166**, 276–281.
- de Girolamo G, Dagani J, Purcell R, Cocchi A, and McGorry PD (2012) Age of onset of mental disorders and use of mental health services: needs, opportunities and obstacles. *Epidemiology and Psychiatric Sciences* **21**, 47–57.
- de Vries PJ, Davids EL, Mathews C, and Aaro 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**, 369–380.
- Doku PN, and Minnis H (2016) Multi-informant perspective on psychological distress among Ghanaian orphans and vulnerable children within the context of HIV/AIDS. *Psychology, Health and Medicine* **46**, 2329–2336.
- Dow DE, Turner EL, Shayo AM, Mmbaga B, Cunningham CK, and O'Donnell K (2016) Evaluating mental health difficulties and associated

- outcomes among HIV-positive adolescents in Tanzania. *AIDS Care* **28**, 825–833.
- Edinger T, and Cohen AM** (2013) A large-scale analysis of the reasons given for excluding articles that are retrieved by literature search during systematic review. *AMIA Annual Symposium Proceedings* **2013**, 379–387.
- Erskine HE, Baxter AJ, Patton G, Moffitt TE, Patel V, Whiteford HA, and Scott JG** (2017) The global coverage of prevalence data for mental disorders in children and adolescents. *Epidemiology and Psychiatric Sciences* **26**, 395–402.
- Fisher JR, and Cabral de Mello M** (2011) Using the World Health Organization's 4S-framework to strengthen national strategies, policies and services to address mental health problems in adolescents in resource-constrained settings. *International Journal of Mental Health Systems* **5**, e23.
- Fisher J, Cabral de Mello M, Izutsu T, Vijayakumar L, Belfer M and Omigbodun O** (2011) Adolescent mental health in resource-constrained settings: A review of the evidence of the nature, prevalence and determinants of common mental health problems and their management in primary health care. *International Journal of Social Psychiatry* **57**(Suppl. 1), 9–116.
- Gentz SG, Romano IC, Martinez-Arias R, and Ruiz-Casares M** (2017) Predictors of mental health problems in adolescents living with HIV in Namibia. *Child and Adolescent Mental Health* **22**, 179–185.
- Hoare J, Phillips N, Brittain K, Myer L, Zar HJ, and Stein DJ** (2019) Mental health and functional competence in the Cape Town adolescent antiretroviral cohort. *Journal of Acquired Immune Deficiency Syndromes* **81**, e109–e116.
- Hoosen N, Davids EL, de Vries PJ, and Shung-King M** (2018) The strengths and difficulties questionnaire (SDQ) in Africa: A scoping review of its application and validation. *Child and Adolescent Psychiatry and Mental Health* **12**, 6.
- Hudelson C, and Cluver L** (2015) Factors associated with adherence to antiretroviral therapy among adolescents living with HIV/AIDS in low- and middle-income countries: a systematic review. *AIDS Care* **27**, 805–816.
- Joanna Briggs Institute** (2017). Checklist for prevalence studies. (https://joannabriggs.org/sites/default/files/2019-05/JBI_Critical_Appraisal-Checklist_for_Prevalence_Studies2017_0.pdf) Accessed 20 May 2020.
- Kagee A, Tsai AC, Lund C, and Tomlinson M** (2013) Screening for common mental disorders in low resource settings: Reasons for caution and a way forward. *International Health* **5**, 11–14.
- Kamau JW, Kuria W, Mathai M, Atwoli L, and Kangethe R** (2012) Psychiatric morbidity among HIV-infected children and adolescents in a resource-poor Kenyan urban community. *AIDS Care* **24**, 836–842.
- Kemigisha E, Zanoni B, Bruce K, Menjivar R, Kadengye D, Atwine D, and Rukundo GZ** (2019) Prevalence of depressive symptoms and associated factors among adolescents living with HIV/AIDS in South Western Uganda. *AIDS Care* **31**, 1297–1303.
- Kieling C, Baker-Henningham H, Belfer M, Conti G, Ertem I, Omigbodun O, Rohde LA, Srinath S, Ulkuuer N, and Rahman A** (2011) Child and adolescent mental health worldwide: evidence for action. *Lancet (London, England)* **378**, 1515–1525.
- Kim MH, Mazenga AC, Devandra A, Ahmed S, Kazembe PN, Yu X, Nguyen C, and Sharp C** (2014) Prevalence of depression and validation of the Beck depression inventory-II and the children's depression inventory-short amongst HIV-positive adolescents in Malawi. *Journal of the International AIDS Society* **17**, e18965.
- Kim MH, Mazenga AC, Yu X, Devandra A, Nguyen C, Ahmed S, Kazembe PN, and Sharp C** (2015) Factors associated with depression among adolescents living with HIV in Malawi. *BMC Psychiatry* **15**, e264.
- Kinyanda E, Salisbury TT, Levin J, Nakasujja N, Mpango RS, Abbo C, Seedat S, Araya R, Musisi S, Gadow KD, and Patel V** (2019) Rates, types and co-occurrence of emotional and behavioural disorders among perinatally HIV-infected youth in Uganda: the CHAKA study. *Social Psychiatry and Psychiatric Epidemiology* **54**, 415–425.
- Lahti M, Groen G, Mwape L, Korhonen J, Breet E, Chapima F, Coetzee M, Ellilä H, Jansen R, Jonker D, Jörns-Presentati A, Mbanga I, Mukwato P, Mundenda J, Mutagubya J, van Rensburg-Bonthuisen EJ, Seedat S, Stein DJ, Suliman S, Sukwa T, Turunen TJ, Valtins K, van den Heuvel L, Wahila R, and Grobler G** (2020) Design and development process of a youth depression screening m-health application for primary health care workers in South Africa and Zambia: An overview of the MEGA project. *Issues in Mental Health Nursing* **41**, 24–30.
- Louw KA, Ipser J, Phillips N, and Hoare J** (2016) Correlates of emotional and behavioural problems in children with perinatally acquired HIV in Cape Town, South Africa. *AIDS Care* **28**, 842–850.
- Lowenthal ED, Bakeera-Kitaka S, Marukutira T, Chapman J, Goldrath K, and Ferrand RA** (2014) Perinatally acquired HIV infection in adolescents from sub-Saharan Africa: A review of emerging challenges. *Lancet Infectious Diseases* **14**, 627–639.
- Lowenthal E, Lawler K, Harari N, Moamogwe L, Masunge J, Masedi M, Matome B, Seloilwe E and Gross R** (2012) Rapid psychosocial function screening test identified treatment failure in HIV + African youth. *AIDS Care* **24**, 722–727. <https://doi.org/10.1080/0950121.2011.644233>.
- Lwidiko A, Kibusi SM, Nyundo A, and Mpando BCT** (2018) Association between HIV status and depressive symptoms among children and adolescents in the Southern highlands zone, Tanzania: A case-control study. *PLoS One* **13**, e0193145.
- Lyambai K, and Mwape L** (2018) Mental health problems experienced by HIV positive adolescents; A case of Choma District, Zambia. *Open Journal of Psychiatry* **8**, 97–114.
- MEGA** (2020). (<https://mega.turkuamk.fi/>) Accessed 7 May 2020.
- Mellins CA, and Malee KM** (2013) Understanding the mental health of youth living with perinatal HIV infection: Lessons learned and current challenges. *Journal of the International AIDS Society* **16**, e18593.
- Mellins CA, Nestadt D, Bhana A, Petersen I, Abrams EJ, Alicea S, Holst H, Myzea N, John S, Small L, and McKay M** (2014) Adapting evidence-based interventions to meet the needs of adolescents growing up with HIV in South Africa: The VUKA case example. *Global Social Welfare: Research Policy and Practice* **1**, 97–110.
- Menon A, Glazebrook C, and Ngoma MS** (2009) Mental health of HIV positive adolescents in Zambia. *Medical Journal of Zambia* **36**, 151–156.
- Mpango RS, Kinyanda E, Rukundo GZ, Gadow KD, and Patel V** (2017) Cross-cultural adaptation of the child and adolescent symptom inventory-5 (CASI-5) for use in central and south-western Uganda: The CHAKA project. *Tropical Doctor* **47**, 347–354.
- Munn Z, Moola S, Lisy K, Riitano D, and Tufanaru C** (2015) Methodological guidance for systematic reviews of observational epidemiological studies reporting prevalence and incidence data. *International Journal of Evidence-based Healthcare* **13**, 147–153.
- Musisi S, and Kinyanda E** (2009) Emotional and behavioural disorders in HIV seropositive adolescents in urban Uganda. *East African Medical Journal* **86**, 16–24.
- Mutumba M, Bauermeister JA, Harper GW, Musiime V, Lepkowski J, Resnicow K, and Snow RC** (2017) Psychological distress among Ugandan adolescents living with HIV: Examining stressors and the buffering role of general and religious coping strategies. *Global Public Health* **12**, 1479–1491.
- Mutumba M, Resnicow K, Bauermeister JA, Harper GW, Musiime V, Snow RC, and Lepkowski JM** (2015) Development of a psychosocial distress measure for Ugandan adolescents living with HIV. *AIDS and Behavior* **19**, 380–392.
- Ng LC, Kanyanganzi F, Munyanah M, Mushashi C, and Betancourt TS** (2014) Developing and validating the youth conduct problems scale-Rwanda: A mixed methods approach. *PLoS One* **9**, e100549.
- Ng LC, Kirk CM, Kanyanganzi F, Fawzi MCS, Sezibera V, Shema E, Bizimana JI, Cyamatate FR, and Betancourt TS** (2015) Risk and protective factors for suicidal ideation and behaviour in Rwandan children. *The British Journal of Psychiatry* **207**, 262–268.
- Okawa S, Kabaghe SM, Mwiya M, Kikuchi K, Jimba M, Kankasa C, and Ishikawa N** (2018) Psychological well-being and adherence to antiretroviral therapy among adolescents living with HIV in Zambia. *AIDS Care* **30**, 634–642.
- 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**, 45–47.
- Patel V, Flisher AJ, Hetrick S, and McGorry P** (2007) Mental health of young people: A global public-health challenge. *Lancet (London, England)* **369**, 1302–1313.

- Petersen I, Bhana A, Myeza N, Alicea S, John S, Holst H, McKay M, and Mellins C (2010) Psychosocial challenges and protective influences for socio-emotional coping of HIV + adolescents in South Africa: A qualitative investigation. *AIDS Care* **22**, 970–978.
- Ramos JV, Mmbaga BT, Turner EL, Rugalabamu LL, Luhanga S, Cunningham CK, and Dow DE (2018) Modality of primary HIV disclosure and association with mental health, stigma, and antiretroviral therapy adherence in Tanzanian youth living with HIV. *AIDS Patient Care and STDs* **32**, 31–37.
- Sherr L, Cluver LD, Toska E, and He E (2018) Differing psychological vulnerabilities among behaviourally and perinatally HIV infected adolescents in South Africa - implications for targeted health service provision. *AIDS Care* **30**, 92–101.
- Smith Fawzi MC, Ng L, Kanyanganzi F, Kirk C, Bizimana J, Cyamatare F, Mushashi C, Kim T, Kayiteshonga Y, Binagwaho A, and Betancourt TS (2016) Mental health and antiretroviral adherence among youth living with HIV in Rwanda. *Pediatrics* **138**, e20153235.
- Stockings E, Degenhardt L, Lee YY, Mihalopoulos C, Liu A, Hobbs M, and Patton G (2015) Symptom screening scales for detecting major depressive disorder in children and adolescents: A systematic review and meta-analysis of reliability, validity and diagnostic utility. *Journal of Affective Disorders* **174**, 447–463.
- Sweetland AC, Belkin GS, and Verdeli H (2014) Measuring depression and anxiety in sub-Saharan Africa. *Depression and Anxiety* **31**, 223–232.
- Tsai AC (2014) Reliability and validity of depression assessment among persons with HIV in sub-Saharan Africa: Systematic review and meta-analysis. *Journal of Acquired Immune Deficiency Syndromes* **66**, 503–511.
- UNICEF (2018a). Children, HIV and AIDS. Regional snapshot: West and Central Africa. (<https://data.unicef.org/wp-content/uploads/2018/11/WCAR-regional-snapshot-2018.pdf>) Accessed 7 May 2020.
- UNICEF (2018b). Children, HIV and AIDS. Regional snapshot: Eastern and Southern Africa. (<https://data.unicef.org/wp-content/uploads/2018/11/ESAR-Regional-snapshot-2018.pdf>) Accessed 7 May 2020.
- UNICEF (2018c) Adolescents, overview. (<https://data.unicef.org/topic/adolescents/overview/>) Accessed 10 June 2019.
- UNICEF (2019). Adolescent HIV prevention (<https://data.unicef.org/topic/hiv-aids/adolescents-young-people/>) Accessed 7 May 2020.
- van den Heuvel LL, Levin J, Mpango RS, Gadow KD, Patel V, Nachega JB, Seedat S, and Kinyanda E (2019) Agreement and discrepancy on emotional and behavioral problems between caregivers and HIV infected children and adolescents from Uganda. *Frontiers in Psychiatry* **10**, e460.
- Vreeman RC, McCoy BM, and Lee S (2017) Mental health challenges among adolescents living with HIV. *Journal of the International AIDS Society* **20**, 21497.
- Vreeman RC, Scanlon ML, Marete I, Mwangi A, Inui TS, McAtee CI, and Nyandiko WM (2015) Characteristics of HIV-infected adolescents enrolled in a disclosure intervention trial in western Kenya. *AIDS Care* **27**(Suppl 1), 6–17.
- West N, Schwartz S, Mudavanhu M, Hanrahan C, France H, Nel J, Mutunga L, Bernhardt S, Bassett J, and Van Rie A (2019) Mental health in South African adolescents living with HIV. *AIDS Care* **31**, 117–124.
- Woollett N, Cluver L, Bandeira M, and Brahmhatt H (2017) Identifying risks for mental health problems in HIV positive adolescents accessing HIV treatment in Johannesburg. *Journal of Child & Adolescent Mental Health* **29**, 11–26.
- World Bank.** World Bank Country and Lending Groups – World Bank Data Help Desk. (<https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups>) Accessed 3 May 2019.
- World Health Organization** (2012) *Adolescent mental health: mapping actions of nongovernmental organizations and other international development organizations*. Geneva: WHO Press, World Health Organization.
- World Health Organization** (2013a) *Mental Health Action Plan 2013–2020*. Geneva: World Health Organization.
- World Health Organization** (2013b). *HIV and Adolescents: Guidance for HIV Testing and Counselling and Care for Adolescents Living with HIV: Recommendations for A Public Health Approach and Considerations for Policy-Makers and Managers*. Geneva: WHO Press, World Health Organization.
- World Health Organization** (2017) *Global Accelerated Action for the Health of Adolescents (AA-HA!): Guidance to Support Country Implementation*. Geneva: World Health Organization.
- World Health Organization** (2018). *Mental Health Atlas 2017*. Geneva: World Health Organization.