



Published in final edited form as:

AIDS Care. 2016 July ; 28(7): 825–833. doi:10.1080/09540121.2016.1139043.

Evaluating Mental Health Difficulties and Associated Outcomes Among HIV-Positive Adolescents in Tanzania

Dorothy E. Dow^{*,1,2,4}, Elizabeth L. Turner^{3,4}, Aisa M. Shayo², Blandina Mmbaga², Coleen K. Cunningham^{1,4}, and Karen O'Donnell^{5,6}

¹ Duke University Medical Center, Division of Pediatric Infectious Diseases, Durham, NC, USA

² Kilimanjaro Christian Medical Centre, Moshi, Tanzania

³ Duke University, Department of Biostatistics and Bioinformatics, Durham, NC, USA

⁴ Duke University, Duke Global Health Institute, Durham, NC, USA

⁵ Duke University, Center for Health Policy and Inequalities Research, Durham, NC, USA

⁶Duke University Medical Center, Center for Child and Family Health, Durham, NC, USA

Abstract

AIDS-related mortality among HIV-positive adolescents has risen by 50% despite the scale up of anti-retroviral therapy (ART). ART mal adherence likely plays a role in the increase of AIDS related deaths among adolescents and has been shown to be associated with psychosocial and mental health difficulties. Addressing the specific mental health needs of HIV-positive adolescents is critical to ending the HIV epidemic. This cross-sectional study prospectively enrolled HIV-positive adolescents (12-24 years) in Moshi, Tanzania. A structured questionnaire was administered that included questions about home, school, adherence, and measures of stigma (Berger Stigma Scale) and mental health. Mental health measures included depression (PHQ-9), emotional/behavioral difficulties (SDQ), and traumatic experiences/post-traumatic stress symptoms (UCLA-PTSD-RI). Mental health difficulties were prevalent among HIV-positive adolescents and were associated with incomplete adherence and stigma. Resources are needed to reduce HIV stigma and address mental health among HIV-positive adolescents in low-resource settings. This will improve not only mental health, but may also improve ART adherence and virologic suppression, improving overall health of the individual and reducing the risk of HIV transmission to others.

Introduction

An estimated 2.1 million youth between the ages of 10-19 years are living with HIV. Nearly two-thirds of these youth reside in Eastern and Southern Africa, with 8% living in Tanzania (UNICEF, 2013). AIDS-related deaths among youth have increased by 50% between 2005 and 2012, in sharp contrast to the overall 30% decline in global AIDS-related deaths over the same time period (UNICEF, 2013; WHO, 2013a). The causes of poor outcomes in youth

*corresponding author: Dorothy.dow@duke.edu.

are likely multifactorial, but one major contributor is incomplete adherence to antiretroviral therapy (ART) (Bygrave et al., 2012; Dow, Shayo, Cunningham, & Reddy, 2014; Memiah et al., 2014; Mills et al., 2006). Incomplete adherence among adolescents is due to a number of biologic and psychosocial factors (Lall, Lim, Khairuddin, & Kamarulzaman, 2015), but prior studies indicate that mental health difficulties negatively affect adherence (Memiah et al., 2014; Wagner et al., 2011). Therefore, strategies to improve mental health among HIV-positive adolescents may improve adherence and subsequently HIV outcomes among this vulnerable population.

The World Health Organization conceptualizes mental health in children as, “having a positive sense of identity, the ability to manage thoughts, emotions, as well as to build social relationships, and the aptitude to learn and to acquire an education, ultimately enabling their full active participation in society” (WHO, 2013b). Initial symptoms of mental health difficulties often begin in adolescence (Patel, Flisher, Hetrick, & McGorry, 2007). Suicide is the third leading cause of death in the adolescent age group, and approximately 10-20% globally suffer from a disabling mental illness (Kieling et al., 2011; Klasen & Crombag, 2012). HIV-positive youth may face even greater mental health challenges as many experience high levels of stress related to parental loss; a lack of family and social support; inability to pay school fees; food insecurity; difficulties related to body image with stunted growth, skin disfigurement, and delayed puberty; HIV/AIDS related stigma; and exposure to violence and substance abuse (Bernays, Jarrett, Kranzer, & Ferrand, 2014; Mavhu et al., 2013). Further, adolescents with HIV may experience higher rates of depression, anxiety, and traumatic experiences than their uninfected peers (T. Betancourt et al., 2014; Kamau, Kuria, Mathai, Atwoli, & Kangethe, 2012; Seth et al., 2014). Despite these statistics, mental health research and services are scarce for HIV-positive youth, especially in low-resource settings (Klasen & Crombag, 2012; Patel, Flisher, Nikapota, & Malhotra, 2008; Thapar, Collishaw, Pine, & Thapar, 2012).

The present study was designed to measure the prevalence and severity of mental health difficulties among HIV-positive adolescents at Kilimanjaro Christian Medical Centre (KCMC) in Moshi, Tanzania and to identify the relationships between mental health difficulties, stigma, ART adherence, and CD4 cell count. Before conducting the study, it was hypothesized that 20% of HIV-positive youth would experience mental health difficulties, and that stigma, incomplete ART adherence, and low CD4 count would be associated with mental health difficulties.

Methods

Study Design and Measures

We conducted a cross-sectional study that prospectively enrolled HIV-positive youth between 12 and 24 years of age who knew their HIV status, were living with family, and who were attending a monthly HIV youth-focused clinic called “Teen Club”. The study was introduced to youth attending Teen Club on two occasions. Between December 2013 and May 2014, a structured questionnaire was administered to study participants, which included questions regarding demographics, home life, school life, hobbies, life goals, HIV-disclosure, ART adherence, stigma and mental health as described below.

Adherence was measured qualitatively by self-report in two ways: (1) dichotomously, by asking the participant, “Have you missed any doses of your medication in the last two weeks, yes or no?” and (2) categorically “Think about the past week (7 days); on average, how often did you miss a dose of medication?” Response options included, “(1) once a day; (2) more than once a week, but not every day; (3) once a week; or (4) I don't miss my medicine”. A participant response of yes to the first question or a response other than “I don't miss my medication,” to the second question was defined as incomplete adherence.

Stigma and mental health difficulties were measured using adapted scales. Both internal and external stigma were evaluated using 10 relevant questions from the Berger HIV Stigma Scale (Berger & Research in Nursing and Health). There were four internal stigma questions (16 point maximum) reflecting personal stigma such as, “I feel I am not as good of a person as others because I have HIV,” and six external stigma questions (24 point maximum) reflecting perceived stigma from others such as, “People I know would not want someone with HIV around their children.” Responses were on a 4-point scale: 1) strongly disagree; 2) disagree; 3) agree; 4) strongly agree (total score range 10 - 40) with a higher number signifying worse stigma.

Mental health assessments included three separate measures to provide a broad description of mental health difficulties by identifying depressive symptoms, emotional and behavior symptoms, and trauma related symptoms. Measures were reported on a continuous scale. Numeric thresholds based on the referenced scale and expert opinion were also described for study comparison.

The patient health questionnaire (PHQ-9) was chosen to evaluate depressive symptoms as it has been considered a reliable screening tool studied among adult populations in Kenya (Monahan et al., 2009), Ethiopia (Gelaye et al., 2013), South Africa (Cholera et al., 2014), and HIV-positive patients in Uganda (Akena, Joska, Obuku, & Stein, 2013). It is also a recommended screening tool for depression in the adolescent population (Thapar et al., 2012). A threshold score of 10 or greater (range 0 - 27) has been demonstrated to reflect depression in validation studies (Cholera et al., 2014; Gelaye et al., 2013) with test re-test reliability (intra class correlation coefficient [ICC]) of 0.92 and cronbach alpha of 0.85 in Ethiopia (Gelaye et al., 2013) and ICC of 0.59, cronbach alpha of 0.78 in Kenya (Monahan et al., 2009).

The Strengths and Difficulties Questionnaire (SDQ) has been widely used to evaluate emotional and behavioral difficulties among youth in multiple countries including sub-Saharan Africa (Sharp et al., 2014; Youthinmind, 2009), and among HIV-positive adolescents in Zambia (Menon, Glazebrook, Campain, & Ngoma, 2007). A threshold score of 17 or greater (range 0-40) is considered predictive of mental health difficulties (Youthinmind, 2009). This questionnaire had reasonable reliability (cronbach alpha, 0.73) and retest stability (ICC) of 0.62 after 4-6 months in a British cohort (Goodman, 2001) and a cronbach alpha of 0.51 among a Zambian cohort (Menon et al., 2007).

The University of California Los Angeles (UCLA) post-traumatic stress disorder (PTSD) Exposure Screener was used to identify traumatic experiences. The UCLA PTSD-Reaction

Index (PTSD-RI) was used to evaluate post-traumatic stress symptoms related to the traumatic experience. This tool has been widely used in low-resource countries and has been translated and validated for use in Zambia with good reliability (cronbach alpha 0.90) among children who experienced sexual abuse (Murray et al., 2011) and in youth from neighboring Kenya after the 2007 election riots (Harder, Mutiso, Khasakhala, Burke, & Ndeti, 2012). Our study used a modified 4-point response scale: (0) none; (1) little; (2) much of the time; or (3) most of the time, by removing the fifth option “some of the time” because it was difficult to obtain a valid translation that distinguished this category in the Swahili language (range 0 - 51).

The structured questionnaire and mental health measures were translated to Swahili and back translated to English. Two focus groups were held to ensure the translated questions were well understood. Four trained, native Swahili speaking, female research assistants aged 25 to 40 years administered the questionnaires. A three-day training session introduced the structured questionnaire and mental health assessments with interactive role-play sessions to ensure research assistants were comfortable with the questions and potential responses. Questionnaires were hand-scored by one data entry person and a computer algorithm was developed for verification. Two different people entered complete survey data for double data entry and discrepancies were reviewed for accuracy. Average time to complete the structured questionnaire and mental health measures was approximately 50 minutes.

HIV measures

In Tanzania, standard of care for evaluating ART treatment response is by CD4 cell count every six months. HIV-RNA is not routinely available. The participants' most recent CD4 result within six months of the questionnaire (either before or after, whichever was closer in time) and current ART regimen at the time of questionnaire were extracted from the clinical file. CD4 was categorized according to clinically meaningful cut-offs.

Ethical review and informed consent

Written informed consent was provided by participants 18 years or older, or by a parent or guardian for youth less than 18 years of age. Youth under 18 years also provided assent. The Duke University Medical Center Institutional Review Board, the KCMC Research Ethics Committee, and the Tanzanian National Institute Medical Review approved the study protocol.

Statistical Analyses

Descriptive statistics were used to summarize demographic, mental health, and HIV measures. The mental health measures were all skewed count distributions. To appropriately account for the distributional form, and to allow for overdispersion, univariable negative binomial regression was used to estimate the association of six variables of interest that were identified *a priori* (age, gender, if in school, stigma, incomplete adherence, and CD4) and each of the three key mental health measures (PHQ, SDQ, UCLA PTSD-RI). The measure of association obtained from the negative binomial model is commonly referred to as a rate ratio. Because our study was cross-sectional, it is more appropriate to refer to these measures as mean ratios (MR), and is what we will use throughout. Models were compared

to the more parsimonious Poisson regression models using the likelihood ratio test for the scale parameter, in all cases, the negative binomial models were preferred.

A multivariable model incorporated all six *a priori* variables to evaluate which had the strongest effect on each mental health measure when simultaneously accounting for all the other variables in the model. The functional form of age and stigma were assessed by comparing the continuous and categorical forms of each variable using the likelihood ratio test. The continuous form with a linear effect was preferred for both variables. Stata 13.1 (StataCorp, 2013) was used for statistical analyses.

Results

Participants

One hundred and eighty-two participants enrolled in the study, representing approximately 90% of youth who attend the HIV youth clinic. Three participants were ineligible due to living in an orphanage. The average age (standard deviation) of participants was 17.2 (2.9) years and just over half (54%) were female. Fewer than half (45%) of the youth lived with a biological parent and 28% were double orphans (Table 1). Most youth were still attending school (76%). However, 18% were neither in school nor working and, of these, 27% were less than 17 years of age and 73% were female. Despite their medical and psychosocial problems, the majority of youth did have career aspirations such as becoming a doctor (23%), teacher (9%), accountant (7%), lawyer (7%), engineer (5%), nurse (4%), and many additional professions. Most participants stated they would like to marry and would like to have children (87%). The majority of youth (91%) felt they would accomplish their goals.

Many youth experienced stigma. Examples of internal stigma included, nine percent of youth who felt they “are not as good a person as others because they have HIV” and, 17% reported, “Having HIV makes me feel unclean”. A majority of youth experienced external stigma with 42% reporting that, “People I know would treat someone with HIV as an outcast”, and 39% reporting that “People I know think that a person with HIV is disgusting”.

Mental Health

The median (25th, 75th percentiles) PHQ score was 3 (0-6) with 12.1% scoring 10 or greater (Table 2). Based on univariable negative binomial regression, mean PHQ score increased 12% for every one-year increase in age (MR: 1.12, 95% CI 1.05 – 1.18, $p < 0.001$) and 62% for females as compared to males (MR: 1.62, 95% CI 1.15 – 2.28; $p = 0.006$) (Table 3). Likewise, the mean PHQ score for those not in school was 65% higher as compared to those in school (MR: 1.65, 95% CI 1.12 – 2.43; $p = 0.01$) and for each one point increase in stigma, mean PHQ score was increased 9% (MR: 1.09, 95% CI 1.06 -1.13; $p < 0.001$). In multivariable regression, incomplete adherence also became significant with a 52% increase in mean PHQ as compared to those who self-report excellent adherence (MR: 1.52, 95% CI 1.07 – 2.18; $p = 0.020$)

Emotional and behavioral threshold scores (SDQ 17) were reported among 13.7% of study participants (Table 2). Both univariable and multivariable negative binomial regression

demonstrated that increased stigma and incomplete adherence were both associated with increased mean SDQ score (Table 3).

Post-traumatic stress threshold scores (UCLA-PTSD-RI = 18) were reported among 10% of study youth. The most common traumatic events were experiencing or witnessing physical abuse, witnessing the death of a relative, and experiencing a traumatic or painful medical procedure (Table 4). Sexual abuse in the form of rape or molestation was not commonly self-reported. Univariable and multivariable negative binomial regressions showed that stigma and incomplete adherence were associated with increased mean UCLA PTSD-RI score; those with incomplete adherence had a 50% increased mean trauma score as compared to those who self-reported excellent adherence in multivariable analysis (MR: 1.51, 95%CI 1.14 – 2.02; $p=0.005$).

HIV measures

ART regimen, immunologic surveillance, and self-reported adherence are provided in Table 1. Overall, 34% of youth were receiving second-line therapy. Nearly half of youth had a CD4 cell count greater than or equal to 500 cells/ μ L. CD4 was not significantly associated with any mental health measures. A quarter of youth (24%) reported incomplete adherence, which was associated with all three mental health measures (Table 3).

Discussion

This study is among the first to evaluate mental health difficulties and their associations with stigma and adherence in HIV-positive adolescents in Africa. The study did not seek to confirm a mental health diagnosis, rather to measure the prevalence of symptoms suggesting mental health difficulties. Evaluating mental health in the Tanzanian setting is challenging as most mental health tools are based upon Western constructs. Several investigators have attempted to validate measures in resource-limited settings among HIV-affected orphan populations (Makame, Ani, & Grantham-McGregor, 2002; Traube, Dukay, Kaaya, Reyes, & Mellins, 2010) or children traumatized by war (T. S. Betancourt, Meyers-Ohki, Charrow, & Hansen, 2012; Jordans, Komproe, Ventevogel, Tol, & de Jong, 2008; Kohrt et al., 2011); however, few studies have attempted to validate mental health measures in sub-Saharan Africa (Lowenthal et al., 2011; Mutumba, Resnicow, et al., 2015)

Comparing this study to other studies evaluating depression in African youth, a study from rural Nigeria used the PHQ-9 to screen youth 12-17 years of age in secondary school and demonstrated 21% had symptoms of moderate depression using a threshold score = 10 (Fatiregun & Kumapayi, 2014). A study from Kenya found major depressive disorder among 17.8% of HIV-infected children and adolescents between 6-18 years of age using the Mini International Neuropsychiatric Interview for Children and Adolescents (MINI kid), though threshold criteria were not well defined (Kamau et al., 2012). The present study had 12.1% of participants who scored = 10 on the PHQ9, in line with global estimates of 10-20% (Gore et al., 2011; Kieling et al., 2011; Klasen & Crombag, 2012).

Emotional and behavioral difficulties have been assessed in three HIV-positive African cohorts. In Zambia, 29% of HIV-positive adolescents age 11-15 years were found to have

emotional and peer-related problems based on the SDQ, although the majority of youth were not disclosed to their HIV status (Menon et al., 2007). In Uganda, the World Health Organization Self-Report Questionnaire-25 was used to evaluate psychological distress among HIV-positive youth between 10-18 years of age (cutoff >6) with a prevalence of 51%. In the same cohort, 17% of youth reported a suicide attempt within the previous 12 months (Musisi & Kinyanda, 2009). Youth in the Ugandan study were disclosed, though the majority had WHO stage three or four clinical disease and none were receiving antiretroviral therapy (Musisi & Kinyanda, 2009). Finally, the pediatric symptom checklist (PSC) was used in Botswana to evaluate emotional and behavioral problems of HIV-positive youth age 6-16 years (cut off >20) with 17% meeting criteria for difficulties (Lowenthal et al., 2012). In the present study, the median (25th, 75th percentiles) SDQ score was 9 (6-13), and 14% of youth scored 17 or greater. The differences in questionnaire, HIV disclosure, treatment, and age group make cross study and cross-country comparisons challenging.

Investigators have also evaluated post-traumatic stress among HIV-positive youth. A US based study of primarily behaviorally HIV-infected adolescents was conducted using the Traumatic Events Screening Inventory (TESI) and the Post Traumatic Stress Disorder Checklist-Civilian version (PCL-C) (Radcliffe et al., 2007). All thirty of the participants in that study experienced at least one traumatic event, the most common being the news of their HIV diagnosis, having someone close to them seriously ill or injured, being a victim of physical abuse, or witnessing domestic violence (Radcliffe et al., 2007). Though the traumatic events listed were similar to those in the current study, the rate of post-traumatic stress symptoms was 57%, much higher than the estimated 10% reported here. This difference may be due to the differing modes of acquiring HIV infection, behavioral versus perinatal, as well as a cultural difference in how traumatic stress may be experienced and understood.

Stigma is known to affect mental health (Breet, Kagee, & Seedat, 2014; Lall et al., 2015; Mutumba, Bauermeister, et al., 2015; Mutumba & Harper, 2015) and was highly associated with each mental health measure in this study. HIV-positive adults and adolescents perceiving high levels of stigma tend to have less social support (Breet et al., 2014) and to exhibit mental health difficulties with increased levels of incomplete ART adherence (Denison, Koole, et al., 2015; Mavhu et al., 2013). A study among adolescent AIDS-orphans in South Africa also demonstrated increased stigma was associated with worse psychological outcomes (Cluver, Gardner, & Operario, 2008). Peer support and group therapy addressing these important issues have demonstrated improvement in both mental health (Richardson et al., 2014) and ART adherence (Denison, Banda, et al., 2015; Mills et al., 2014).

Incomplete adherence has been attributed to mental health difficulties among HIV-positive youth (Lowenthal et al., 2012). Depression is often studied (Chandwani et al., 2012; Memiah et al., 2014; Murphy et al., 2005; Murphy, Wilson, Durako, Muenz, & Belzer, 2001), but emotional and behavioral symptoms (Musisi & Kinyanda, 2009), and childhood traumas have also been shown to be important factors in ART adherence (Whetten et al., 2013). Both univariable and multivariable regression of self-reported incomplete adherence were

significantly associated with each mental health measure, providing more evidence that resources must be allocated to address mental health among vulnerable HIV-positive youth.

Limitations

The cross-sectional study design limits determination of causality. Adherence and mental health symptoms are dynamic; however, for this study, data were self-reported and at only one time point. The mental health questionnaires were based upon western constructs, though validity has been shown in neighboring countries in similar populations, none specific to HIV-positive adolescents in Tanzania. Interpersonal skills of interviewers could introduce interviewer bias as well as reporting and desirability bias based on the rapport and response of the participants. To mitigate this, all interviewers were trained together on the structured questionnaire.

Conclusion

The prevalence of mental health difficulties among adolescents attending this HIV-youth clinic is significant. Depression, emotional and behavioral difficulties, and traumatic events in childhood were common, affecting mental health and ART adherence. The combination of incomplete ART adherence coupled with emerging sexual debut creates the ‘perfect storm’ for the development and spread of resistant HIV. Addressing mental health needs in the primary HIV-care setting may improve not only mental health, but also ART adherence and virologic suppression, affording better individual health outcomes while also acting as secondary prevention among sexually active youth.

Acknowledgements

The authors would like to thank the clinical staff and patients at the Kilimanjaro Christian Medical Centre Child Centered Family Care Clinic, and especially Eunice Chibanda and Elizabeth Amos for their dedication in interviewing and listening to the youth participating in the study. To Hedwiga Mrema, Elissiana Ndossa, and Gabriel Karia for their hard work in consenting, enrolling, providing medical records and phlebotomy during this ongoing project. A sincere thank you to the HIV-positive youth who gave their time and provided candid responses to the many difficult questions surrounding traumatic experiences and the mental health questionnaires.

Funding

This research was supported by the Duke University Center for AIDS Research (CFAR), an NIH funded program (P30 AI064518), the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD) training grant to the Division of Infectious Diseases, Department of Pediatrics, Duke University Medical Center (T32 HD060558) and by NIH Research Training Grant R25 TW009337 and IRSDA K01 TW-009985 funded by the Fogarty International Center and the National Institute of Mental Health.

References

- Akena D, Joska J, Obuku EA, Stein DJ. Sensitivity and specificity of clinician administered screening instruments in detecting depression among HIV-positive individuals in Uganda. *AIDS Care*. 2013; 25(10):1245–1252. doi: 10.1080/09540121.2013.764385. [PubMed: 23398282]
- Berger B, Ferrans CE, Lashley FR. Measuring stigma in people with HIV: Psychometric assessment of the HIV stigma scale. *Research in Nursing and Health*. 2001; 24:518–529. [PubMed: 11746080]
- Bernays S, Jarrett P, Kranzer K, Ferrand RA. Children growing up with HIV infection: the responsibility of success. *Lancet*. 2014; 383(9925):1355–1357. doi: 10.1016/S0140-6736(13)62328-4. [PubMed: 24529338]

- Betancourt TS, Meyers-Ohki SE, Charrow A, Hansen N. Research Review: Mental health and resilience in HIV/AIDS-affected children: a review of the literature and recommendations for future research. *J Child Psychol Psychiatry*. 2012 doi: 10.1111/j.1469-7610.2012.02613.x.
- Betancourt T, Scorza P, Kanyanganzi F, Fawzi MC, Sezibera V, Cyamatare F, Kayitshonga Y. HIV and child mental health: a case-control study in Rwanda. *Pediatrics*. 2014; 134(2):e464–472. doi: 10.1542/peds.2013-2734. [PubMed: 25049342]
- Breet E, Kagee A, Seedat S. HIV-related stigma and symptoms of post-traumatic stress disorder and depression in HIV-infected individuals: does social support play a mediating or moderating role? *AIDS Care*. 2014; 26(8):947–951. doi: 10.1080/09540121.2014.901486. [PubMed: 24666226]
- Bygrave H, Mtangirwa J, Ncube K, Ford N, Kranzer K, Munyaradzi D. Antiretroviral therapy outcomes among adolescents and youth in rural Zimbabwe. *PLoS One*. 2012; 7(12):e52856. doi: 10.1371/journal.pone.0052856. [PubMed: 23285204]
- Chandwani S, Koenig LJ, Sill AM, Abramowitz S, Conner LC, D'Angelo L. Predictors of antiretroviral medication adherence among a diverse cohort of adolescents with HIV. *J Adolesc Health*. 2012; 51(3):242–251. doi: 10.1016/j.jadohealth.2011.12.013. [PubMed: 22921134]
- Cholera R, Gaynes BN, Pence BW, Bassett J, Qangule N, Macphail C, Miller WC. Validity of the Patient Health Questionnaire-9 to screen for depression in a high-HIV burden primary healthcare clinic in Johannesburg, South Africa. *J Affect Disord*. 2014; 167:160–166. doi: 10.1016/j.jad.2014.06.003. [PubMed: 24972364]
- Cluver LD, Gardner F, Operario D. Effects of stigma on the mental health of adolescents orphaned by AIDS. *J Adolesc Health*. 2008; 42(4):410–417. doi: 10.1016/j.jadohealth.2007.09.022. [PubMed: 18346667]
- Denison JA, Banda H, Dennis AC, Packer C, Nyambe N, Stalter RM, McCarraher DR. The sky is the limit”: adhering to antiretroviral therapy and HIV self-management from the perspectives of adolescents living with HIV and their adult caregivers. *J Int AIDS Soc*. 2015; 18(1):19358. doi: 10.7448/IAS.18.1.19358. [PubMed: 25591915]
- Denison JA, Koole O, Tsui S, Menten J, Torpey K, van Praag E, Bangsberg DR. Incomplete adherence among treatment-experienced adults on antiretroviral therapy in Tanzania, Uganda and Zambia. *AIDS*. 2015; 29(3):361–371. doi: 10.1097/QAD.0000000000000543. [PubMed: 25686684]
- Dow DE, Shayo AM, Cunningham CK, Reddy EA. Durability of antiretroviral therapy and predictors of virologic failure among perinatally HIV-infected children in Tanzania: a four-year follow-up. *BMC Infect Dis*. 2014; 14:567. doi: 10.1186/s12879-014-0567-3. [PubMed: 25373425]
- Fatiregun AA, Kumapayi TE. Prevalence and correlates of depressive symptoms among in-school adolescents in a rural district in southwest Nigeria. *J Adolesc*. 2014; 37(2):197–203. doi: 10.1016/j.adolescence.2013.12.003. [PubMed: 24439625]
- Gelaye B, Williams MA, Lemma S, Deyessa N, Bahretibeb Y, Shibre T, Andrew Zhou XH. Validity of the Patient Health Questionnaire-9 for depression screening and diagnosis in East Africa. *Psychiatry Res*. 2013; 210(2):653–661. doi: 10.1016/j.psychres.2013.07.015. [PubMed: 23972787]
- Goodman R. Psychometric properties of the strengths and difficulties questionnaire. *J Am Acad Child Adolesc Psychiatry*. 2001; 40(11):1337–1345. doi: 10.1097/00004583-200111000-00015. [PubMed: 11699809]
- Gore FM, Bloem PJ, Patton GC, Ferguson J, Joseph V, Coffey C, Mathers CD. Global burden of disease in young people aged 10-24 years: a systematic analysis. *Lancet*. 2011; 377(9783):2093–2102. doi: 10.1016/S0140-6736(11)60512-6. [PubMed: 21652063]
- Harder VS, Mutiso VN, Khasakhala LI, Burke HM, Ndeti DM. Multiple traumas, postelection violence, and posttraumatic stress among impoverished Kenyan youth. *J Trauma Stress*. 2012; 25(1):64–70. doi: 10.1002/jts.21660. [PubMed: 22354509]
- Jordans MJ, Komproe IH, Ventevogel P, Tol WA, de Jong JT. Development and validation of the child psychosocial distress screener in Burundi. *Am J Orthopsychiatry*. 2008; 78(3):290–299. doi: 10.1037/a0014216. [PubMed: 19123748]
- Kamau JW, Kuria W, Mathai M, Atwoli L, Kangethe R. Psychiatric morbidity among HIV-infected children and adolescents in a resource-poor Kenyan urban community. *AIDS Care*. 2012; 24(7):836–842. doi: 10.1080/09540121.2011.644234. [PubMed: 22292795]

- Kieling C, Baker-Henningham H, Belfer M, Conti G, Ertem I, Omigbodun O, Rahman A. Child and adolescent mental health worldwide: evidence for action. *Lancet*. 2011; 378(9801):1515–1525. doi: 10.1016/S0140-6736(11)60827-1. [PubMed: 22008427]
- Klasen H, Crombag AC. What works where? A systematic review of child and adolescent mental health interventions for low and middle income countries. *Soc Psychiatry Psychiatr Epidemiol*. 2012 doi: 10.1007/s00127-012-0566-x.
- Kohrt BA, Jordans MJ, Tol WA, Luitel NP, Maharjan SM, Upadhaya N. Validation of cross-cultural child mental health and psychosocial research instruments: adapting the Depression Self-Rating Scale and Child PTSD Symptom Scale in Nepal. *BMC Psychiatry*. 2011; 11(1):127. doi: 1471-244X-11-127 [pii] 10.1186/1471-244X-11-127. [PubMed: 21816045]
- Lall P, Lim SH, Khairuddin N, Kamarulzaman A. Review: An urgent need for research on factors impacting adherence to and retention in care among HIV-positive youth and adolescents from key populations. *J Int AIDS Soc*. 2015; 18(2 Suppl 1):19393. doi: 10.7448/IAS.18.2.19393. [PubMed: 25724503]
- Lowenthal E, Lawler K, Harari N, Moamogwe L, Masunge J, Masedi M, Gross R. Rapid psychosocial function screening test identified treatment failure in HIV+ African youth. *AIDS Care*. 2012; 24(6):722–727. doi: 10.1080/09540121.2011.644233. [PubMed: 22292411]
- Lowenthal E, Lawler K, Harari N, Moamogwe L, Masunge J, Masedi M, Gross R. Validation of the Pediatric Symptom Checklist in HIV-infected Batswana. *J Child Adolesc Ment Health*. 2011; 23(1):17–28. doi: 10.2989/17280583.2011.594245. [PubMed: 22685483]
- Makame V, Ani C, Grantham-McGregor S. Psychological well-being of orphans in Dar El Salaam, Tanzania. *Acta Paediatr*. 2002; 91(4):459–465. [PubMed: 12061364]
- Mavhu W, Berwick J, Chirawu P, Makamba M, Copas A, Dirawo J, Cowan FM. Enhancing psychosocial support for HIV positive adolescents in Harare, Zimbabwe. *PLoS One*. 2013; 8(7):e70254. doi: 10.1371/journal.pone.0070254. [PubMed: 23894625]
- Memiah P, Shumba C, Etienne-Mesubi M, Agbor S, Hossain MB, Komba P, Biadgilign S. The effect of depressive symptoms and CD4 count on adherence to highly active antiretroviral therapy in sub-Saharan Africa. *J Int Assoc Provid AIDS Care*. 2014; 13(4):346–352.
- Menon A, Glazebrook C, Campain N, Ngoma M. Mental health and disclosure of HIV status in Zambian adolescents with HIV infection: implications for peer-support programs. *J Acquir Immune Defic Syndr*. 2007; 46(3):349–354. doi: 10.1097/QAI.0b013e3181565df0. [PubMed: 17721397]
- Mills EJ, Lester R, Thorlund K, Lorenzi M, Muldoon K, Kanters S, Nachega JB. Interventions to promote adherence to antiretroviral therapy in Africa: a network meta-analysis. *Lancet HIV*. 2014; 1(3):e104–111. doi: 10.1016/S2352-3018(14)00003-4. [PubMed: 26424119]
- Mills EJ, Nachega JB, Buchan I, Orbinski J, Attaran A, Singh S, Bangsberg DR. Adherence to antiretroviral therapy in sub-Saharan Africa and North America: a meta-analysis. *JAMA*. 2006; 296(6):679–690. doi: 10.1001/jama.296.6.679. [PubMed: 16896111]
- Monahan PO, Shacham E, Reece M, Kroenke K, Ong'or WO, Omollo O, Ojwang C. Validity/reliability of PHQ-9 and PHQ-2 depression scales among adults living with HIV/AIDS in western Kenya. *J Gen Intern Med*. 2009; 24(2):189–197. doi: 10.1007/s11606-008-0846-z. [PubMed: 19031037]
- Murphy DA, Belzer M, Durako SJ, Sarr M, Wilson CM, Muenz LR, Adolescent Medicine HIV, Aids Research Network. Longitudinal antiretroviral adherence among adolescents infected with human immunodeficiency virus. *Arch Pediatr Adolesc Med*. 2005; 159(8):764–770. doi: 10.1001/archpedi.159.8.764. [PubMed: 16061785]
- Murphy DA, Wilson CM, Durako SJ, Muenz LR, Belzer M. Antiretroviral medication adherence among the REACH HIV-infected adolescent cohort in the USA. *AIDS Care*. 2001; 13(1):27–40. doi: 10.1080/09540120020018161 Q52AHH0TMEUU6UKE [pii]. [PubMed: 11177463]
- Murray LK, Bass J, Chomba E, Imasiku M, Thea D, Semrau K, Bolton P. Validation of the UCLA Child Post traumatic stress disorder-reaction index in Zambia. *Int J Ment Health Syst*. 2011; 5(1):24. doi: 10.1186/1752-4458-5-24. [PubMed: 21943178]
- Musisi S, Kinyanda E. Emotional and behavioural disorders in HIV seropositive adolescents in urban Uganda. *East Afr Med J*. 2009; 86(1):16–24. [PubMed: 19530544]

- Mutumba M, Bauermeister JA, Musiime V, Byaruhanga J, Francis K, Snow RC, Tsai AC. Psychosocial challenges and strategies for coping with HIV among adolescents in Uganda: a qualitative study. *AIDS Patient Care STDS*. 2015; 29(2):86–94. doi: 10.1089/apc.2014.0222. [PubMed: 25607900]
- Mutumba M, Harper GW. Mental health and support among young key populations: an ecological approach to understanding and intervention. *J Int AIDS Soc*. 2015; 18(2 Suppl 1):19429. doi: 10.7448/IAS.18.2.19429. [PubMed: 25724505]
- Mutumba M, Resnicow K, Bauermeister JA, Harper GW, Musiime V, Snow RC, Lepkowski JM. Development of a psychosocial distress measure for Ugandan adolescents living with HIV. *AIDS Behav*. 2015; 19(2):380–392. doi: 10.1007/s10461-014-0973-y. [PubMed: 25577026]
- Patel V, Flisher AJ, Hetrick S, McGorry P. Mental health of young people: a global public-health challenge. *Lancet*. 2007; 369(9569):1302–1313. doi: 10.1016/S0140-6736(07)60368-7. [PubMed: 17434406]
- Patel V, Flisher AJ, Nikapota A, Malhotra S. Promoting child and adolescent mental health in low and middle income countries. *J Child Psychol Psychiatry*. 2008; 49(3):313–334. doi: 10.1111/j.1469-7610.2007.01824.x. [PubMed: 18093112]
- Radcliffe J, Fleisher CL, Hawkins LA, Tanney M, Kassam-Adams N, Ambrose C, Rudy BJ. Posttraumatic stress and trauma history in adolescents and young adults with HIV. *AIDS Patient Care STDS*. 2007; 21(7):501–508. doi: 10.1089/apc.2006.0144. [PubMed: 17651031]
- Richardson LP, Ludman E, McCauley E, Lindenbaum J, Larison C, Zhou C, Katon W. Collaborative care for adolescents with depression in primary care: a randomized clinical trial. *JAMA*. 2014; 312(8):809–816. doi: 10.1001/jama.2014.9259. [PubMed: 25157724]
- Seth P, Kidder D, Pals S, Parent J, Mbatia R, Chesang K, Bachanas P. Psychosocial functioning and depressive symptoms among HIV-positive persons receiving care and treatment in Kenya, Namibia, and Tanzania. *Prev Sci*. 2014; 15(3):318–328. doi: 10.1007/s11121-013-0420-8. [PubMed: 23868419]
- Sharp C, Venta A, Marais L, Skinner D, Lenka M, Serekoane J. First evaluation of a population-based screen to detect emotional-behavior disorders in orphaned children in Sub-Saharan Africa. *AIDS Behav*. 2014; 18(6):1174–1185. doi: 10.1007/s10461-014-0739-6. [PubMed: 24623068]
- StataCorp. *Stata Statistical Software: Release 13*. StataCorp LP; College Station, TX: 2013.
- Thapar A, Collishaw S, Pine DS, Thapar AK. Depression in adolescence. *Lancet*. 2012; 379(9820):1056–1067. doi: 10.1016/S0140-6736(11)60871-4. [PubMed: 22305766]
- Traube D, Dukay V, Kaaya S, Reyes H, Mellins C. Cross-cultural adaptation of the Child Depression Inventory for use in Tanzania with children affected by HIV. *Vulnerable Child Youth Stud*. 2010; 5(2):174–187. doi: 10.1080/17450121003668343. [PubMed: 20808733]
- UNICEF. *Towards an AIDS-Free Generation – Children and AIDS: Sixth Stocktaking Report*. New York: 2013.
- Wagner GJ, Goggin K, Remien RH, Rosen MI, Simoni J, Bangsberg DR, Investigators, Mach. A closer look at depression and its relationship to HIV antiretroviral adherence. *Ann Behav Med*. 2011; 42(3):352–360. doi: 10.1007/s12160-011-9295-8. [PubMed: 21818528]
- Whetten K, Shirey K, Pence BW, Yao J, Thielman N, Whetten R, Team, Chat Research. Trauma history and depression predict incomplete adherence to antiretroviral therapies in a low income country. *PLoS One*. 2013; 8(10):e74771. doi: 10.1371/journal.pone.0074771. [PubMed: 24124455]
- WHO. *HIV and adolescents: guidance for HIV testing and counselling and care for adolescents living with HIV*. Geneva: 2013a.
- WHO. [October 12, 2015] *Mental Health Action Plan 2013-2020*. 2013b. http://www.who.int/mental_health/action_plan_2013/en/
- Youthinmind. 2009. <http://www.sdqinfo.com/py/sdqinfo/b0.py> [2 February, 2015]

Table 1

Demographic and HIV Measures of HIV-Positive Adolescents

	Total (n=182)
Demographic – n (%)[§]	
Age (years)- mean (SD)	17.2 (2.9)
Gender	
Female	99 (54.4%)
Orphan Status	
Parents alive	44 (24.2%)
Single Orphan	88 (48.3%)
Double Orphan	50 (27.5%)
Caregiver	
Biologic Parent	82 (45.1%)
Aunt or Uncle	45 (24.7%)
Grandparent	37 (20.3%)
Sibling	12 (6.6%)
Other	6 (3.3%)
Social (categories not mutually exclusive)	
In School	138 (75.8%)
Working outside the home	16 (8.8%)
Neither in school, nor working	33 (18.1%)
HIV measures – n (%)[§]	
ART Regimen	
First Line (NNRTI)	105 (57.7%)
Second Line (PI)	62 (34.1%)
TMP/SMX (no ART)	15 (8.2%)
Self-reported non-adherence [*]	
Past two weeks	32 (17.9%)
Past week	35 (19.2%)
Incomplete adherence	43 (23.6%)
CD4 (cells/ μ L) – median (IQR) ^{**}	493 (311–693)
CD4 by WHO criteria (cells/ μ L)	
500	89 (48.9%)
350 – 499	40 (22.0%)
200 – 349	32 (17.6%)
<200	21 (11.5%)

Notes: SD, standard deviation; ART, antiretroviral regimen; NNRTI, non-nucleoside reverse transcriptase inhibitor; PI, protease inhibitor; TMP/SMX, trimethoprim/sulfamethoxazole, not yet qualifying for ART.

[§]Unless otherwise stated

* Based on dichotomous question for past two weeks and categorical question for past week, with overall incomplete adherence any reported non-adherence by either self-report.

** IQR: interquartile range, corresponding to the 25th and 75th percentiles.

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 2

Summary of participants who met the symptomatic threshold for stigma and the three different mental health measures stratified by age.

Measure	Mean (SD) / Median (IQR) *
Stigma --	
Internal – (range 4-16)	6.3 (2.4) / 6 (4-8)
External – (range 6-24)	13.7 (3.9) / 13 (12-17)
Overall – (range 10-40)	20 (5.2) / 20 (16-23)
Mental Health Measures--	
PHQ-9	
Range (0-27)	4.1 (4.5) / 3 (0-6)
Score 10 – N (%)	22 (12.1%)
SDQ	
Range (0-40)	9.9 (5.6) / 9 (6-13)
Score 17 – N (%)	25 (13.7%)
UCLA-PTSD-RI	
Range (0-51)	8.2(7.6)/6 (3-12)
Score 18* - N (%)	19 (10.4%)

Abbreviations include: SD: standard deviation; PHQ-9: Patient Health Questionnaire; SI: Suicidal Ideation; SDQ: Strengths and Difficulties Questionnaire; Trauma: UCLA-Post traumatic Stress Response Index; ART: Antiretroviral Regimen; NNRTI: non-nucleoside reverse transcriptase inhibitor; PI: protease inhibitor; TMP/SMX: trimethoprim/sulfamethoxazole, not yet qualifying for ART

* Unless otherwise stated, IQR: interquartile range, corresponding to the 25th and 75th percentiles; UCLA-PTSD-RI is based on a modified 4-point scale.

Table 3

Univariable and multivariable analysis of mental health difficulties related to six variables of interest

Category	Mean Ratio	95% Confidence Interval	P Value	Mean Ratio	95% Confidence Interval	P Value
	Univariable Analysis			Multivariable Analysis		
PHQ-9						
Age (per one year)	1.12	1.05 – 1.18	<0.001	1.08	1.03 – 1.14	0.004
Gender (female)	1.62	1.15 – 2.28	0.01	1.52	1.11 – 2.09	0.01
Not in school	1.65	1.12 – 2.43	0.01	1.29	0.89 – 1.89	0.18
Stigma (per one point)	1.09	1.06 – 1.13	<0.001	1.08	1.04 – 1.11	<0.001
Incomplete Adherence	1.36	0.91 – 2.05	0.14	1.52	1.07 – 2.18	0.02
CD4 (>500 cells/uL)	(Ref)		0.34	(Ref)		0.44
350-499	1.18	0.76 – 1.83		1.38	0.92 – 2.07	
200-349	0.93	0.58 – 1.51		1.14	0.73 – 1.77	
<200	1.52	0.88 – 2.64		1.23	0.76 – 1.99	
SDQ						
Age (per one year)	1.02	0.99 – 1.05	0.24	0.99	0.97 – 1.03	0.78
Gender (female)	1.12	0.94 – 1.31	0.23	1.08	0.92 – 1.27	0.36
Not in school	1.23	1.02 – 1.46	0.03	1.18	0.96 – 1.44	0.12
Stigma (per one point)	1.03	1.02 – 1.05	<0.001	1.03	1.01 – 1.05	<0.001
Incomplete Adherence	1.34	1.11 – 1.62	0.002	1.38	1.15 – 1.65	0.001
CD4 (>500 cells/uL)	(Ref)		0.69	(Ref)		0.95
350-499	1.03	0.83 – 1.27		1.03	0.84 – 1.27	
200-349	0.91	0.72 – 1.15		0.98	0.78 – 1.23	
<200	1.04	0.79 – 1.36		0.95	0.74 – 1.23	
Trauma						
Age (per one year)	1.03	0.98 – 1.08	0.24	0.99	0.95 – 1.04	0.84
Gender (female)	1.33	1.02 – 1.74	0.04	1.220	0.95 – 1.57	0.12
Not in school	1.20	0.88 – 1.63	0.26	1.04	0.76 – 1.42	0.82
Stigma (per one point)	1.08	1.05 – 1.11	<0.001	1.08	1.06 – 1.11	<0.001
Incomplete Adherence	1.38	1.01 – 1.89	0.04	1.51	1.14 – 2.02	0.005
CD4 (>500 cells/uL)	(Ref)		0.32	(Ref)		0.65
350-499	1.15	0.82 – 1.62		1.14	0.83 – 1.56	
200-349	0.99	0.68 – 1.43		1.04	0.73 – 1.48	
<200	1.52	0.99 – 2.33		1.25	0.85 – 1.85	

Table 4

Traumatic events endorsed by all participants and for those who met criteria for overall mental health difficulties and traumatic stress symptoms.

Traumatic Event	Total (n=182)
Any traumatic event	167 (91.8%)
Physical Abuse	
Self (beaten)	101 (55.5%)
Witnessed abuse of other person	127 (69.8%)
Witnessed death	
Violent	36 (19.8%)
Illness	85 (46.7%)
Of Sibling	17 (9.3%)
Experienced a painful or scary medical treatment	64 (35.2%)
Traumatic Motor Vehicle Accident	24 (13.2%)
Sexual Abuse	
Experienced rape	3 (1.6%)
Witnessed rape	11 (6.0%)
Was molested	4 (2.2%)

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript