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Factor structure, reliability, and validity of the 10-item HIV stigma scale for adolescents and youth living with HIV in rural, southwestern Uganda

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Abstract

Background: HIV stigma undermines HIV treatment outcomes for adolescents and young adults living with HIV. However, there are few stigma measures that are appropriate for this age and the Ugandan cultural context.

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Author contributions: SA was responsible for conceptualizing the study including development of the methodology, secured funding, provided leadership, and wrote the original draft and oversaw revisions of the manuscript. PT was responsible for data collection and revised the final manuscript. CB was responsible for daily project administration and supervision of research and revised the final version of the manuscript. DN, AC, and JMK reviewed and edited the final version of the manuscript. SM supervised and guided the data collection procedures, and reviewed the final version of the manuscript. BCZ guided the data analysis process, and revised the final version of the manuscript. ACT provided leadership and guidance during conceptualization of the study, data analysis, and contributed to the original draft and revised the final version of the manuscript.

Declarations

Conflicts of interest: ACT reports receiving a financial honorarium from Elsevier for his work as Co-Editor in Chief of the Elsevier-owned journal *SSM - Mental Health*. BCZ is a consultant for Accordant Health. The rest of the co-authors have no conflict of interest to declare.

Ethics approval: The study was approved by the Research Ethics Committee of the Mbarara University of Science and Technology (#20/08–19) and the Partners Human Research Committee (#2019P003451). The study also received clearance from the Uganda National Council for Science and Technology (#HS512ES)

Consent to participate: All Participants provided written informed assent and /or consent to participate in the study.

Consent for publication: Participants consented to having their data published.

Methods: Between October and December 2021, we administered the 10-item stigma scale for adolescents living with HIV (ALHIV-SS) to 300 adolescents and young adults (aged 15–24 years) with perinatally-acquired HIV in Mbarara, Uganda.

Results: Exploratory factor analysis of the ALHIV-SS revealed three factors corresponding to internalized, anticipated, and enacted forms of stigma. The ALHIV-SS was internally consistent overall (Cronbach's $\alpha=0.78$) and for each of the subscales: internalized stigma, 0.76; enacted stigma, 0.68; and anticipated stigma, 0.57. The ALHIV-SS was strongly correlated with depression (Spearman's $\rho=0.44$; $p<0.001$). Mean stigma scores were also higher among study participants who had thoughts of self-harm (6.5 vs. 3.0, $t=5.7$, $P<0.001$), those who reported sometimes forgetting to take their ART (4.0 vs. 2.8, $t=3.3$, $P=0.001$), and among those who reported any days in the past 2 weeks on which they took no ART (3.9 vs. 3.2, $t=1.59$, $P=0.11$).

Conclusions: Taken together, the findings suggest that the 10-item ALHIV-SS is a valid, reliable, and coherent measure of HIV stigma among adolescents and young adults living with perinatally acquired HIV in Uganda.

BACKGROUND

There are nearly 2 million adolescents between the ages of 10 and 19 living with HIV worldwide; 88% live in sub-Saharan Africa (1). The number of adolescents and young adults living with HIV (AYLHIV) is increasing because of the widespread availability of antiretroviral treatment (ART), which has improved the survival of children born with HIV and enabled them to grow into adolescence and young adulthood (2). Furthermore, adolescents and young adults are at high risk of acquiring HIV, with around 360,000 new infections reported among adolescents and young adults aged 15–24 years in sub-Saharan Africa in 2023 (3, 4). There are 1.4 million people living with HIV in Uganda, the site of the study described in this manuscript, and 150,000 of these are adolescents and young adults aged 15–19 years (5). HIV treatment outcomes remain suboptimal in this age group and are characterized by relatively high rates of virologic failure, disengagement from care, loss to follow up, and morbidity and mortality (6–8).

HIV stigma remains one of the major barriers to HIV care among AYLHIV, undermining ART adherence and retention in care (9, 10), and access and enrollment into HIV care (11, 12). Stigma is often worse among AYLHIV. The high value placed on peer relationships at this stage of development often drives efforts to keep HIV status concealed to avoid being treated differently by peers (13). HIV stigma among adolescents has been linked to poor mental health outcomes including depression and suicidality, both of which hamper treatment outcomes (14, 15).

Despite the detrimental effects of HIV stigma on HIV care among adolescents, there are few scales to measure HIV stigma that are appropriate for this age group and the cultural contexts of countries in sub-Saharan Africa (16). Many of the earliest HIV stigma scales for adolescents, typically administered to general population samples, assessed negative attitudes towards people with HIV or desires for social distance (17–21). Other scales for adolescents living with HIV have assessed single dimensions of stigma, such as internalized stigma (22) or courtesy stigma (23). Vreeman, Scanlon, Tu, et al. (24) developed the 24-item

Stigma in AIDS Family Inventory to assess perceived and enacted stigma among children and their caregivers developed the 24-item Stigma in AIDS Family Inventory to assess perceived and enacted stigma among children and their caregivers. Pantelic, Boyes, Cluver and Thabeng (25) developed the 10-item stigma scale for adolescents living with HIV (ALHIV-SS) in South Africa as a shortened and adapted version of a scale used for assessing anticipated, internalized and enacted stigma in the U.S. (26, 27). Wanjala, Ssewanyana, Mwangala, et al. (28) validated the HSS-12 among adolescents living with HIV in the age range of 12–17 years in Kenya. Although the HSS-12 assesses multiple dimensions of HIV stigma (29) the validation by Wanjala, Ssewanyana, Mwangala, et al. (28) excluded young adults living with HIV. The ALHIV-SS has not been validated for use in countries elsewhere in sub-Saharan Africa. We therefore assessed the reliability, validity, and the factor structure of the 10-item ALHIV-SS in a clinic-based sample of adolescents and young adults living with perinatally-acquired HIV in a rural region of southwestern Uganda.

METHODS

Study setting

Participants were recruited from the HIV clinic at the Mbarara Regional Referral Hospital (MRRH). MRRH is in Mbarara city, in southwestern Uganda, approximately 270 km from the capital city, Kampala. Mbarara city is the 4th largest city in Uganda by population (97,500) according to the 2024 census conducted by the Uganda Bureau of Statistics (30). Most of the people who attend the HIV clinic live in surrounding villages and earn their livelihood through subsistence farming, animal husbandry, and small-scale trading, and face challenges of water and food insecurity (31, 32). By 2020 the HIV clinic at MRRH had enrolled over 34,000 patients of whom 11,000 were active in care including 700 adolescents aged 18 years and below and 600 young adults (19–24 years) (33). The prevalence of HIV among young people has been estimated at 0.9% and 2.2% for young men and young women respectively while prevalence of HIV in Mbarara District is 13%, which is higher than the 5.8% prevalence nationwide (5).

We recruited adolescents and young adults living with perinatally-acquired HIV aged 15–24 years of age, who were fully aware of their HIV status (i.e., through disclosure to them by their parents or guardians), and who were able to provide written informed assent and/or consent. Perinatally acquired HIV status was self-reported by the participants and confirmed by the medical reports indicating that the AYLHIV were started on ART below 10 10 years of age. We excluded adolescents and young adults living with perinatally-acquired HIV who could not tolerate the length of the interview, those who were not aware of their HIV status (i.e., because their parents or guardians had not disclosed to them their status), and those who were too cognitively impaired to participate in the interview as assessed by the attending clinician in consultation with a licenced Ugandan psychiatrist.

Enrolment procedure

Adolescents and young adults were recruited consecutively as they came to the HIV clinic for their regular clinical visits between October and December 2021. A research assistant fluent in both Runyankore and English approached individuals who met the eligibility

criteria to introduce the study and request participation. After conducting informed consent procedures, the research assistant administered a questionnaire. To ensure reliability and validity, the questionnaire was translated into the local language and then back translated into English to maintain conceptual equivalence. Additionally, the questionnaire was pretested on a small sample (that was not part of the final study sample) to assess clarity, comprehension, and cultural relevance, further improving its reliability and applicability in the target population.

Measures

HIV stigma was assessed using the 10-item ALHIV-SS (25). The scale was based on a shortened version of the Berger HIV Stigma Scale (26, 27) and adapted for use among adolescents living with HIV in South Africa. It assesses internalized stigma (5 items), anticipated stigma (2 items), and enacted stigma (3 items). Each item is rated on a three-point Likert type scale with response options 0=never, 1=sometimes, and 2=most of the time. In the validation sample, the scale demonstrated acceptable internal consistency on 2 of the 3 subscales, as measured with Cronbach's alpha: enacted stigma, 0.57; anticipated stigma, 0.70; and internalized stigma, 0.75. In another study of adolescents living with HIV in Kenya, the scale demonstrated good to excellent reliability in measuring enacted and internalized stigma (34)

Our outcome of interest was ART adherence which was measured using two items with binary response options (yes/no): "Do you sometimes forget to take your HIV medicines?" and "Over the past 2 weeks, were there any days when you did not take your HIV medicines?"

We assessed depression using the 'Adolescents Living with HIV - Depression scale' (ALHIV-D) (ALHIV-D) (35). The ALHIV-D is a 20-item scale that captures both affective and cognitive symptoms of depression. Sample questions include "In the last two weeks, how often have you felt hopeless about the future?" and "In the last two weeks, how often did you feel you had no peace?" Each item is scored on a 4-point Likert-type scale, ranging from "not at all" (0) to "all the time" (3). The total scale score is computed by summing across the items, with the possible score ranging from 0 to 60. The scale had an excellent internal consistency (Cronbach's alpha=0.91) in the validation sample (35). In the present study the scale had a Cronbach's alpha=0.92. We also administered a single item inquiring about whether the study participant sometimes had thoughts of self-harm because of their HIV status; those who "agreed" or "strongly agreed" with the statement were categorized as having thoughts of self-harm.

Data analysis

Data were analysed using Stata software (version 17, College Station, Tex.). The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and the Bartlett's test of sphericity of the correlation matrix were used to assess the suitability of the data for factor analysis (36). We considered a KMO ≥ 0.60 as adequate for factor analysis (37). We conducted exploratory factor analysis using principal components with promax rotation to assess the factor structure of the ALHIV-SS (38) and used different criteria to guide retention of

factors. We assessed for factors with an eigenvalue ≥ 1.0 . We plotted the eigenvalues in descending order to identify the scree. Lastly, we assessed the factor loadings and assigned an item to a factor if its factor loading was ≥ 0.40 (39). We measured the internal consistency of the retained factors using Cronbach's alpha.

To assess construct validity, we correlated the ALHIV-SS with depression and with thoughts of self-harm, given that these relationships have been consistently observed across numerous studies of both adults and adolescents with HIV (15, 25, 32, 40, 41). We also correlated the ALHIV-SS with the two single-item measures of ART adherence problems, given that stigma has also shown a consistent and enduring negative association with ART adherence (42). To assess the extent to which these measures of validity and reliability differed among minors (aged 18 years and younger) vs. young adults (aged 19–24 years), we repeated the assessments stratified by age.

Ethical considerations

The Research Ethics Committee of the Mbarara University of Science and Technology (20/08–19) and the Partners Human Research Committee (2019P003451) approved this study. Additionally, this study received clearance from the Uganda National Council for Science and Technology (#HS512ES). Study participants below the age of consent provided assent after their parents/caregivers provided written informed consent. Emancipated minors (i.e., adolescents below 18 years of age who are either pregnant, have a child, or are responsible for their own livelihood) and empowered adolescents (i.e., adolescents below 18 years of age who are empowered to take responsibility for their own health) were allowed to provide written informed consent without involving their caregivers, consistent with national guidelines (43). Each participant received 25,000 Ugandan Shillings (approximately USD \$7 at the time the study was done) as reimbursement for their travel expenses to the study site.

RESULTS

Of the 315 adolescents and young adults screened, we enrolled 300 as study participants. Fifteen participants declined participation due to various reasons including lack of time, school, work schedule and long distance from the clinic. The mean age of the study participants was 19.1 years (standard deviation ± 2.8) and they were on ART for a mean of 15 (± 4.7) years. Most (71%) of the study participants were still in school (Table 1).

Factor structure

Exploratory factor analysis of the ALHIV-SS revealed three factors. The first factor had an eigenvalue of 3.5 and explained 31% of the variance. Six items loaded on this factor, with factor loadings ranging from 0.64 to 0.82 and corresponding to the construct of internalized stigma. The second factor had an eigenvalue of 1.3 and explained 24% of the variance. Three items loaded on this factor, with factor loadings ranging from 0.72 to 0.85 and corresponding to the construct of enacted stigma. The third factor had an eigenvalue of 1.1 and explained 19% the variance. Two items loaded on this factor, with factor loadings of 0.77 and 0.88 and corresponding to the construct of anticipated sigma (Table 2).

Reliability and construct validity

The 10-item ALHIV-SS was internally consistent with a Cronbach's alpha of 0.78. The internal consistency of the subscales was 0.76 for the internalized stigma subscale, 0.68 for the enacted stigma subscale, and 0.57 for the anticipated stigma subscale. The item-test correlations ranged between 0.49 and 0.66, and deletion of any single item only slightly increased the average inter-item correlations but did not increase Cronbach's alpha.

Stigma was strongly correlated with depression (Spearman's $\rho=0.44$, $p<0.001$), demonstrating construct validity of the scale. The mean stigma score was also higher among study participants who reported thoughts of self-harm (6.5 vs. 3.0, $t=5.7$, $P<0.001$). The mean stigma score was higher among study participants who reported sometimes forgetting to take ART (4.0 vs. 2.8, $t=3.3$, $P=0.001$) and among those who reported any days in the past 2 weeks on which they took no ART (3.9 vs. 3.2, $t=1.59$, $P=0.11$).

Differences by age

The ALHIV-SS showed the same three-factor structure among both minors aged 18 years and younger vs. young adults aged 19–24 years. Internal consistency did not differ between the two age groups. The stigma scores also had comparable associations with depression, thoughts of self-harm, and ART adherence problems between the two age groups.

DISCUSSION

In this study of 300 adolescents and young adults living with perinatally-acquired HIV in rural Uganda, we confirmed that the 10-item ALHIV-SS has a three-factor structure measuring internalized stigma, enacted stigma, and anticipated stigma. We also found evidence that the scale is internally consistent, with evidence for construct validity demonstrated through correlations with ART adherence, depression, and thoughts of self-harm. The indices of reliability and validity did not appear to differ by age. We conclude that the ALHIV-SS is a reliable and valid instrument for measuring HIV stigma in this population.

The three-factor structure reflects findings of previous studies, which have shown that HIV stigma experiences of adolescents living with HIV are similar across countries in Africa (44, 45). The anticipated and enacted stigma sub-scales showed slightly lower Cronbach's alpha coefficients compared to the internalized stigma sub-scale, which could be explained by the low number of items on these sub-scales (46, 47). However, as a whole, the 10-item ALHIV-SS meets criteria recommended for demonstrating good reliability (48–50).

The positive correlation between the 10-item ALHIV-SS and depression found in our study echoes previous research showing the positive association between depression and stigma in this population (12, 15, 24, 51–56). A bidirectional association between HIV stigma and depression has been supported by previous studies highlighting the complexity of the causal pathways between HIV stigma and depression (57, 58). HIV stigma has been documented to affect mental wellbeing among adolescents (52, 59) and worse psychological outcomes, especially among adolescents orphaned by HIV (60). ALHIV who experience stigma tend

to have low social support which increases the risk of mental health problems, especially depression and self-harm (12, 44).

Our finding that the levels of stigma were higher among study participants reporting ART adherence problems is also in agreement with previous research among AYLHIV (42, 61, 62). HIV stigma has been documented as the main barrier to ART adherence among AYLHIV (59, 63). AYLHIV who internalize negative beliefs related to their HIV status may experience feelings of shame, depression, and low self-esteem, which can undermine their motivation to adhere to treatment (12, 64, 65)). Internalized stigma has been shown to be a significant barrier to medication adherence, as it may lead to avoidance behaviors and disengagement from care (51, 66). Similarly, because of anticipated experiences of discrimination and social rejection, AYLHIV often conceal their HIV status, which affects their ability to seek care and adhere to treatment (62, 67, 68). The fear of unintended disclosure and anticipation of discrimination may particularly impact ART adherence among ALHIV enrolled in school due to the stigma associated (69, 70).

Although various HIV stigma scales for adolescents living with HIV exist, many of them do not assess all dimensions of HIV stigma (18, 22) while others are targeted toward children living with HIV (24). The HSS-12, which measures three dimensions of stigma, was validated for use only among young adolescents aged 12 to 17 years in Kenya (28), thus, its psychometric properties among older adolescents and young adults are unknown. Our findings offer a significant contribution by establishing a short and valid measure of HIV stigma among AYLHIV in rural Uganda

Several limitations should be taken into consideration. First, the study enrolled a consecutive sample of AYLHIV from one HIV clinic in southwestern Uganda. The findings may not be generalizable to AYLHIV in other African settings. Second, while the scale showed good psychometric properties in our sample, it is important to note that stigma manifestations are socially and culturally embedded (71). These differences could pose limitations in the use of the 10-item ALHIV-SS across different cultures in Uganda.

Conclusion

The validation of the 10-item ALHIV-SS scale for AYLHIV provides a reliable and valid tool for assessing stigma in this vulnerable population. With an overall Cronbach's alpha of 0.78 and the retention of the original three-factor structure, the scale demonstrates internal consistency and construct validity. While other stigma measurement tools exist, this validation underscores the importance of context-specific instruments tailored to the unique experiences of AYLHIV in rural Uganda. By ensuring that stigma is accurately measured in this population, this tool can contribute to more targeted interventions aimed at reducing stigma and improving psychosocial outcomes.

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References

1. UNICEF. HIV Statistics - Global and Regional Trends. New York, USA.; 2024.
2. Slogrove AL, Mahy M, Armstrong A, Davies MA. Living and dying to be counted: What we know about the epidemiology of the global adolescent HIV epidemic. *Journal of the International AIDS Society*. 2017;20:21520. [PubMed: 28530036]
3. UNAIDS. 2020 Global AIDS Update ?- Seizing the moment ?- Tackling entrenched inequalities to end epidemics. Geneva, Switzerland: UNAIDS; 2020.
4. UNAIDS. Young people and HIV Geneva, Switzerland: UNAIDS; 2024.
5. Uganda AIDS commission. Uganda HIV and AIDS factsheet based on data ending December 2023. Kampala: Uganda AIDS commison 2024.
6. Zenebe Haftu A, Desta AA, Bezabih NM, Bayray Kahsay A, Kidane KM, Zewdie Y, et al. Incidence and factors associated with treatment failure among HIV infected adolescent and adult patients on second-line antiretroviral therapy in public hospitals of Northern Ethiopia: multicenter retrospective study. *PloS one*. 2020;15(9):e0239191. [PubMed: 32986756]
7. Enane LA, Apondi E, Omollo M, Toromo JJ, Bakari S, Aluoch J, et al. "I just keep quiet about it and act as if everything is alright"-The cascade from trauma to disengagement among adolescents living with HIV in western Kenya. *Journal of the International AIDS Society*. 2021;24(4):e25695. [PubMed: 33838007]
8. Enane LA, Vreeman RC, Foster C. Retention and adherence: global challenges for the long-term care of adolescents and young adults living with HIV. *Current Opinion in HIV and AIDS*. 2018;13(3):212–9. [PubMed: 29570471]
9. Martinez J, Harper G, Carleton RA, Hosek S, Bojan K, Clum G, et al. The impact of stigma on medication adherence among HIV-positive adolescent and young adult females and the moderating effects of coping and satisfaction with health care. *Aids Patient Care STDS* 2012;26(2):108–15. [PubMed: 22149767]
10. Vreeman RC, Nyandiko WM, Ayaya SO, Walumbe EG, Marrero DG, Inui TS. Factors sustaining pediatric adherence to antiretroviral therapy in western Kenya. *Qual Health Res* 2009;19(12):1716–29. [PubMed: 19949221]
11. Ashaba S, Zaroni BC, Baguma C, Tushemereirwe P, Nuwagaba G, Kirabira J, et al. Challenges and Fears of Adolescents and Young Adults Living with HIV Facing Transition to Adult HIV Care. *AIDS and Behavior*. 2022:1–10.
12. Ashaba S, Cooper-Vince CE, Vo?echovská D, Rukundo GZ, Maling S, Akena D, et al. Community beliefs, HIV stigma, and depression among adolescents living with HIV in rural Uganda. *African journal of AIDS research*. 2019;18(3):169–80. [PubMed: 31339461]
13. Mutwa PR, Van Nuil JI, Asiimwe-Kateera B, Kestelyn E, Vyankandondera J, Pool R, et al. Living situation affects adherence to combination antiretroviral therapy in HIV-infected adolescents in Rwanda: a qualitative study. *PloS one*. 2013;8(4):e60073. [PubMed: 23573232]
14. Ashaba S, Cooper-Vince CE, Maling S, Satinsky EN, Baguma C, Akena D, et al. Childhood trauma, major depressive disorder, suicidality, and the modifying role of social support among adolescents living with HIV in rural Uganda. *Journal of affective disorders reports*. 2021;4:e100094–e.
15. Ashaba S, Cooper-Vince C, Maling S, Rukundo G, Akena D, Tsai A. Internalized HIV stigma, bullying, major depressive disorder, and high-risk suicidality among HIV-positive adolescents in rural Uganda. *Global mental health (Cambridge, England)*. 2018;5:e22. [PubMed: 29997894]

16. Gavan L, Hartog K, Koppenol-Gonzalez GV, Gronholm PC, Feddes AR, Kohrt BA, et al. Assessing stigma in low-and middle-income countries: A systematic review of scales used with children and adolescents. *Social Science & Medicine*. 2022;307:115121. [PubMed: 35843180]
17. Kuhn L, Steinberg M, Mathews C. Participation of the school community in AIDS education: an evaluation of a high school programme in South Africa. *AIDS care*. 1994;6(2):161–71. [PubMed: 8061076]
18. Riley GA, Baah-Odoom D. Do stigma, blame and stereotyping contribute to unsafe sexual behaviour? A test of claims about the spread of HIV/AIDS arising from social representation theory and the AIDS risk reduction model. *Social science & medicine*. 2010;71(3):600–7. [PubMed: 20605667]
19. El-Gadi S, Abudher A, Sammud M. HIV-related knowledge and stigma among high school students in Libya. *International journal of STD & AIDS* 2008;19(3):178–83. [PubMed: 18397558]
20. Bekele A, Ali A. Effectiveness of IEC interventions in reducing HIV/AIDS related stigma among high school adolescents in Hawassa, Southern Ethiopia. *The Ethiopian Journal of Health Development*. 2008;22(3).
21. Maughan-Brown B, Spaul N. HIV-related discrimination among grade six students in nine Southern African countries. *PLoS One*. 2014;9(8):e102981. [PubMed: 25105728]
22. Earnshaw VA, Kidman RC, Violari A. Stigma, depression, and substance use problems among perinatally HIV-infected youth in South Africa. *AIDS and Behavior*. 2018;22(12):3892–6. [PubMed: 29909588]
23. Boyes ME, Mason SJ, Cluver LD. Validation of a brief stigma-by-association scale for use with HIV/AIDS-affected youth in South Africa. *AIDS care*. 2013;25(2):215–22. [PubMed: 22774842]
24. Vreeman RC, Scanlon ML, Tu W, Slaven J, McAteer C, Aluoch J, et al. Validation of an HIV/AIDS stigma measure for children living with HIV and their families. *Journal of the International Association of Providers of AIDS Care (JIAPAC)*. 2019;18:2325958219880570. [PubMed: 31581890]
25. Pantelic M, Boyes M, Cluver L, Thabeng M. ‘They say HIV is a punishment from god or from ancestors’: cross-cultural adaptation and psychometric assessment of an HIV stigma scale for South African adolescents living with HIV (ALHIV-SS). *Child Indicators Research*. 2018;11(1):207–23. [PubMed: 29497463]
26. Wright K, Naar-King S, Lam P, Templin T, Frey M. Stigma scale revised: reliability and validity of a brief measure of stigma for HIV+ youth. *Journal of adolescent health*. 2007;40(1):96–8.
27. Berger BE, Ferrans CE, Lashley FR. Measuring stigma in people with HIV: Psychometric assessment of the HIV stigma scale. *Research in nursing & health*. 2001;24(6):518–29. [PubMed: 11746080]
28. Wanjala SW, Ssewanyana D, Mwangala PN, Nasambu C, Chongwo E, Luchters S, et al. Validity, reliability, and measurement invariance of an adapted short version of the HIV stigma scale among perinatally HIV infected adolescents at the Kenyan coast. *Global Health Research and Policy*. 2021;6:1–10.
29. Reinius M, Wettergren L, Wiklander M, Svedhem V, Ekström AM, Eriksson LE. Development of a 12-item short version of the HIV stigma scale. *Health and quality of life outcomes*. 2017;15:1–9. [PubMed: 28069015]
30. Uganda Bureau of Statistics. *Main Cities by population in Uganda*. Kampala: Uganda Bureau of Statistics; 2024.
31. Mushavi RC, Burns BF, Kakuhikire B, Owembabazi M, Vořechovská D, McDonough AQ, et al. “When you have no water, it means you have no peace”: a mixed-methods, whole-population study of water insecurity and depression in rural Uganda. *Social Science & Medicine*. 2020;245:112561. [PubMed: 31790879]
32. Tsai AC, Bangsberg DR, Frongillo EA, Hunt PW, Muzoora C, Martin JN, et al. Food insecurity, depression and the modifying role of social support among people living with HIV/AIDS in rural Uganda. *Social Science & Medicine*. 2012;74(12).
33. Jumba I, Kanyesigye M, Ndagijimana G, Wattira J, Olong C, Olok RA, et al. Perceived barriers and facilitators to antiretroviral therapy adherence among youth aged 15–24 years at a regional

- HIV clinic in South-Western Uganda: a qualitative study. *African Health Sciences*. 2022;22(2):54–62. [PubMed: 36407355]
34. Mugo C, Seeh D, Guthrie B, Moreno M, Kumar M, John-Stewart G, et al. Association of experienced and internalized stigma with self-disclosure of HIV status by youth living with HIV. *AIDS and Behavior*. 2021;25:2084–93. [PubMed: 33389374]
 35. Ashaba S, Cooper-Vince C, Vořechovská D, Maling S, Rukundo GZ, Akena D, et al. 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*. 2019;7:100332. [PubMed: 30560198]
 36. Dziuban CD, Shirkey EC. When is a correlation matrix appropriate for factor analysis? Some decision rules. *Psychological bulletin*. 1974;81(6):358.
 37. Tabachnick BG, Fidell LS, Ullman JB. *Using multivariate statistics*: pearson Boston, MA; 2007.
 38. Costello AB, Osborne J. Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Practical assessment, research, and evaluation*. 2005;10(1):7.
 39. Floyd FJ, Widaman KF. Factor analysis in the development and refinement of clinical assessment instruments. *Psychological Assessment*. 1995;7(3):286.
 40. Tsai AC, Weiser SD, Steward WT, Mukiibi NF, Kawuma A, Kembabazi A, et al. Evidence for the reliability and validity of the internalized AIDS-related stigma scale in rural Uganda. *AIDS and Behavior*. 2013;17:427–33. [PubMed: 22869104]
 41. Bebell LM, Kembabazi A, Musinguzi N, Martin JN, Hunt PW, Boum Y II, et al. Internalized stigma, depressive symptoms, and the modifying role of antiretroviral therapy: A cohort study in rural Uganda. *SSM-Mental Health*. 2021;1:100034. [PubMed: 35252904]
 42. Katz IT, Ryu AE, Onuegbu AG, Psaros C, Weiser SD, Bangsberg DR, et al. Impact of HIV-related stigma on treatment adherence: systematic review and meta-synthesis. *Journal of the international AIDS Society*. 2013;16:18640. [PubMed: 24242258]
 43. Uganda National Council for Science and Technology. *National guidelines for research involving humans as research participants*. 2007.
 44. Casale M, Boyes M, Pantelic M, Toska E, Cluver L. Suicidal thoughts and behaviour among South African adolescents living with HIV: Can social support buffer the impact of stigma? *Journal of affective disorders*. 2019;245:82–90. [PubMed: 30368074]
 45. Wanjala SW, Ssewanyana D, Mwangala PN, Nasambu C, Chongwo E, Luchters S, et al. Validity, reliability, and measurement invariance of an adapted short version of the HIV stigma scale among perinatally HIV infected adolescents at the Kenyan coast. *Global Health Research and Policy*. 2021;6(1):1–10.
 46. Tavakol M, Dennick R. Making sense of Cronbach's alpha. *International journal of medical education*. 2011;2:53. [PubMed: 28029643]
 47. Green SB, Lissitz RW, Mulaik SA. Limitations of coefficient alpha as an index of test unidimensionality I. *Educational and Psychological Measurement*. 1977;37(4):827–38.
 48. Cohen RJ, Swerdlik ME, Phillips SM. *Psychological testing and assessment: An introduction to tests and measurement*: Mayfield Publishing Co; 1996.
 49. Clark LA, Watson D. *Constructing validity: Basic issues in objective scale development*. 2016.
 50. BrckaLorenz A, Chiang Y-C, Nelson Laird T. *Internal consistency. Faculty Survey of Student Engagement*; 2013.
 51. Masa R, Zimba M, Tamta M, Zimba G, Zulu G. The association of perceived, internalized, and enacted HIV stigma with medication adherence, barriers to adherence, and mental health among young people living with HIV in Zambia. *Stigma and health*. 2022;7(4):443. [PubMed: 36408093]
 52. Dow DE, Turner EL, Shayo AM, Mmbaga B, Cunningham CK, O'Donnell K. Evaluating mental health difficulties and associated outcomes among HIV-positive adolescents in Tanzania. *AIDS care*. 2016;28(7):825–33. [PubMed: 26837437]
 53. Cluver L, Orkin M. Cumulative risk and AIDS-orphanhood: Interactions of stigma, bullying and poverty on child mental health in South Africa. *Social science & medicine*. 2009;69(8):1186–93. [PubMed: 19713022]

54. Boyes ME, Cluver LD, Meinck F, Casale M, Newnham E. Mental health in South African adolescents living with HIV: correlates of internalising and externalising symptoms. *AIDS care*. 2019;31(1):95–104. [PubMed: 30241443]
55. Gentz SG, Calonge Romano I, Martínez Arias R, Ruiz Casares M. Predictors of mental health problems in adolescents living with HIV in Namibia. *Child and Adolescent Mental Health*. 2017;22(4):179–85. [PubMed: 32680414]
56. Okawa S, Mwanza Kabaghe S, Mwiya M, Kikuchi K, Jimba M, Kankasa C, et al. Psychological well-being and adherence to antiretroviral therapy among adolescents living with HIV in Zambia. *AIDS care*. 2018;30(5):634–42. [PubMed: 29347827]
57. MacLean JR, Wetherall K. The association between HIV-stigma and depressive symptoms among people living with HIV/AIDS: A systematic review of studies conducted in South Africa. *Journal of affective disorders*. 2021;287:125–37. [PubMed: 33780828]
58. Pantelic M, Boyes M, Cluver L, Meinck F. HIV, violence, blame and shame: pathways of risk to internalized HIV stigma among South African adolescents living with HIV. *African Journal of Reproduction and Gynaecological Endoscopy*. 2017;20(1).
59. Mutumba M, Bauermeister JA, Musiime V, Byaruhanga J, Francis K, Snow RC, et al. Psychosocial challenges and strategies for coping with HIV among adolescents in Uganda: a qualitative study. *AIDS patient care and STDs*. 2015;29(2):86–94. [PubMed: 25607900]
60. Cluver LD, Gardner F, Operario D. Effects of stigma on the mental health of adolescents orphaned by AIDS. *Journal of Adolescent Health*. 2008;42(4):410–7.
61. Sweeney SM, Venable PA. The association of HIV-related stigma to HIV medication adherence: a systematic review and synthesis of the literature. *AIDS and Behavior*. 2016;20:29–50. [PubMed: 26303196]
62. Ammon N, Mason S, Corkery J. Factors impacting antiretroviral therapy adherence among human immunodeficiency virus-positive adolescents in Sub-Saharan Africa: a systematic review. *Public health*. 2018;157:20–31. [PubMed: 29501984]
63. Mavhu W, Berwick J, Chirawu P, Makamba M, Copas A, Dirawo J, et al. Enhancing psychosocial support for HIV positive adolescents in Harare, Zimbabwe. *PloS one*. 2013;8(7):e70254. [PubMed: 23894625]
64. Logie CH, Okumu M, Kibuuka Musoke D, Hakiza R, Mwima S, Kyambadde P, et al. Intersecting stigma and HIV testing practices among urban refugee adolescents and youth in Kampala, Uganda: qualitative findings. *Journal of the International AIDS Society*. 2021;24(3):e25674. [PubMed: 33713571]
65. Hudelson C, Cluver L. Factors associated with adherence to antiretroviral therapy among adolescents living with HIV/AIDS in low-and middle-income countries: a systematic review. *AIDS care*. 2015;27(7):805–16. [PubMed: 25702789]
66. Ashaba S, Zandoni BC, Baguma C, Tshemereirwe P, Nuwagaba G, Kirabira J, et al. Challenges and Fears of Adolescents and Young Adults Living with HIV Facing Transition to Adult HIV Care. *AIDS and behavior*. 2023;27(4):1189–98. [PubMed: 36129557]
67. Ankrah DN, Koster ES, Mantel-Teeuwisse AK, Arhinful DK, Agyepong IA, Lartey M. Facilitators and barriers to antiretroviral therapy adherence among adolescents in Ghana. *Patient preference and adherence*. 2016;10:329. [PubMed: 27042024]
68. Denison JA, Banda H, Dennis AC, Packer C, Nyambe N, Stalter RM, et al. “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. *African Journal of Reproduction and Gynaecological Endoscopy*. 2015;18(1).
69. Madiba S, Josiah U. Perceived stigma and fear of unintended disclosure are barriers in medication adherence in adolescents with perinatal HIV in Botswana: a qualitative study. *BioMed Research International*. 2019;2019.
70. Nyogea D, Mtenga S, Henning L, Franzeck FC, Glass TR, Letang E, et al. Determinants of antiretroviral adherence among HIV positive children and teenagers in rural Tanzania: a mixed methods study. *BMC infectious diseases*. 2015;15(1):28. [PubMed: 25637106]

71. Airhihenbuwa CO, Ford CL, Iwelunmor JI. Why culture matters in health interventions: lessons from HIV/AIDS stigma and NCDs. *Health Education & Behavior*. 2014;41(1):78–84. [PubMed: 23685666]

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Table 1:
Sociodemographic characteristics of the validation sample

| Variable | N or mean | Pct. or SD |
|--|-----------|------------|
| Age, years | 19.1 | ± 2.8 |
| <i>Sex</i> | | |
| Female | 171 | 57% |
| Male | 129 | 43% |
| Age when started ART, years | 4.48 | ± 4.7 |
| Duration on ART, years | 15.0 | ± 4.7 |
| <i>Marital status</i> | | |
| Single | 284 | 95% |
| Married | 16 | 5.3% |
| <i>Education level</i> | | |
| Primary | 79 | 26% |
| Secondary | 180 | 60% |
| Above secondary | 41 | 15% |
| <i>Main caregiver</i> | | |
| Father alone | 19 | 6.3% |
| Mother alone | 104 | 35% |
| Both parents | 70 | 23% |
| Grandparents | 26 | 8.7% |
| Other relatives | 81 | 27% |
| <i>Transition status</i> | | |
| Have not yet transitioned | 261 | 87% |
| Transitioned successfully | 11 | 3.7% |
| Failed Transition | 28 | 9.3% |
| <i>HIV care status</i> | | |
| Active in care | 296 | 99% |
| Not active in care | 4 | 1.3% |
| HIV stigma score | 3.3 | ± 3.2 |
| Depression score | 7.9 | ± 8.6 |
| Thoughts of self-harm | 26 | 8.7% |
| Sometimes forget ART | 134 | 45% |
| Recent (past two weeks) days with no ART | 61 | 20% |

Table 2:

The factor structure of the 10-item stigma scale for adolescents living with HIV

| Item | Factor 1 | Factor 2 | Factor 3 |
|---|----------|----------|----------|
| I think that people in my community think HIV-positive people are disgusting | | | 0.776 |
| I think that people in my community think HIV is a punishment from God or ancestors | | | 0.882 |
| I have been teased because of my HIV status | | 0.724 | |
| I have stopped spending time with kids because of my HIV status | | 0.730 | |
| I have lost friends because of my HIV status | | 0.858 | |
| I am ashamed of my HIV status | 0.643 | | |
| I feel I am not as good as other kids because of my HIV status | 0.818 | | |
| I would rather die than be living with HIV | 0.659 | | |
| I feel like a bad person because of my HIV | 0.659 | | |
| I feel that HIV makes me dirty inside | 0.774 | | |

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