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# Mental health challenges and HIV status disclosure among children and adolescents living with HIV in Eastern Uganda

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**Worldwide the prevalence of children and adolescents on antiretroviral therapy is increasing with the advancement in pediatric HIV care. However, this presents unique challenges associated with HIV status disclosure to the child or the adolescent without negatively affecting treatment outcomes. The primary objective of the study was to determine the prevalence of mental health challenges and their association with HIV status disclosure among children and adolescents seeking care at three pediatric HIV clinics in Eastern Uganda. This prospective cross-sectional study was conducted among children and adolescents aged 8–17 years. Disclosure was assessed using an adapted United States Agency for International Development -Academic Model Providing Access to Healthcare (AMPATH) disclosure questionnaire. Mental health outcomes (major depression, suicidality, generalized anxiety and alcohol use disorder) were evaluated using the Mini International Neuropsychiatric Interview (MINI-KID) questionnaire, stigma using the Internalized AIDS-Related Stigma Scale and social support using the Multidimensional Scale of Perceived Social Support. Prevalence of disclosure was determined as a proportion of participants in the study group who screened positive for disclosure as per the AMPATH disclosure questionnaire. Factors associated with mental health conditions were determined by running bi-variable and multivariable logistic regression models. Among the 326 children and adolescents enrolled, 23.3% ($n = 76$) had at least one mental health challenge (MHC). The prevalence of major depression was 14.1%, suicidality, 12.8%, generalized anxiety disorder, 8.59% and alcohol use disorder was 1.2%. MHCs were more common among children and adolescents living with HIV who had been disclosed of their HIV status. HIV status disclosure was a risk factor for both major depression (adjusted odds ratio (aOR) = 2.98, $p = 0.018$) and suicidality (aOR = 2.72, $p = 0.031$) but not generalized anxiety disorder. Older age (13–17 years) was a risk factor for major depression (aOR = 2.52, 95%, $p = 0.001$), while maternal caregiving (aOR = 0.42, $p = 0.026$) was protective. Generalized anxiety disorder (aOR = 7.44, $p < 0.001$) was a strong risk factor for suicidality while high perceived social support (aOR = 0.39, $p = 0.024$) was protective. Education level above primary (aOR = 2.80, $p = 0.030$) and internalized stigma (aOR = 1.67, $p = 0.041$) were risk factors for generalized anxiety disorder. Children and adolescents face unique mental health challenges associated with HIV status disclosure which calls for sociocultural appropriate interventions to bridge this gap.**

**Keywords** HIV, Disclosure, Mental health children and adolescents, Depression, Anxiety, Suicidality

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By 2023, 1.9 million children below age 15 were living with HIV with the majority residing in sub-Saharan Africa[1]. In Uganda, by August 2024 about 72,000 children aged 0–14 years were living HIV and with about 3,200 associated annual HIV related deaths[2]. In the era of highly active antiretroviral treatment under the test and treat policy, many of these children grow through adolescence to adulthood while taking antiretroviral therapy without knowing their diagnosis of HIV[3,4]. Consequently, HIV disclosure is a pertinent issue which has persisted as one of the main challenges in this age group occurring at varying stages of growth in different countries[5]. The World Health Organization (WHO) recommends that HIV status disclosure should be initiated during school going age and must be done incrementally according to the child's cognitive abilities[6]. It should be done preferably by parents/caregivers facilitated by well- trained health workers[7]. However, late childhood and early adolescence periods are critical transitional stages with many physiological, psychological and social changes such as physical growth, development of self-image and gender roles which poses a very high risk for mental health challenges (MHC)[8]. Existing literature is inconclusive about the association between MHC and HIV disclosure with some indicating an increased risk for MHC especially in the immediate stage while other show improved mental health[9,10]. These challenges which include depression and suicidality can further be worsened by HIV-related stigma and discrimination hence leading to poor coping mechanisms such as substance abuse[11]. Also, disclosure-related MHC such as depression and anxiety may affect adherence to HIV treatment and engagement in care, leading to worsened quality of life and high risk of mortality[12]. In the era of anti-retroviral therapy (ART) where people living with HIV live long, poor mental health can negatively affect the HIV treatment outcomes such as poor adherence to medication and also affect quality of life and productivity[13]. Unfortunately, there is paucity of data regarding prevalence of HIV disclosure, its correlates, and association with the specific mental health challenges among this vulnerable population. This study aimed at determining the prevalence of common MHCs and their association with HIV disclosure among children and adolescents living with HIV (CALH) in eastern Uganda.

## Materials and methods

### Study design and setting

This prospective cross-sectional study with a consecutive sampling approach was conducted at three pediatric HIV clinics of Mbale and Jinja Regional Referral Hospitals located in Mbale and Jinja cities respectively in eastern Uganda. Mbale Regional Referral Hospital (MRRH) and Jinja Regional Referral Hospital (JRRH) are the largest hospitals in the region and provides specialized and general medical services to people from Mbale, Jinja and nearby districts with a catchment population of about 4.15 million people from more than 10 districts[14]. This study was conducted at Infectious Disease Clinic (IDC) and The AIDS Supporters Organization (TASO) clinic (at MRRH) as well as Jinja pediatric HIV clinic (at JRRH). The pediatric HIV clinics mainly provide HIV/AIDS care on an outpatient basis and any admissions are referred to the general pediatric ward of the respective hospital. Pediatric HIV care services are usually offered by a team of clinicians ranging from pediatricians, postgraduate students from respective training institutions, general medical doctors, clinical officers, nurses, counsellors and social workers among others. Both hospitals also serve as teaching sites for various training institutions whereby MRRH is a teaching site for Busitema University Faculty of Health Sciences while JRRH for Kampala International University. These health professional trainees also contribute to the general care of CALH especially at Infectious Disease Clinic and JRRH pediatric HIV clinic.

### Study participants

The study targeted all CALH in the Eastern region, however the accessible population was limited to those receiving care at the above clinics. We included all CALH aged 8–17 years; because this is the age-range during most HIV disclosure in Ugandan HIV pediatric clinics occurs. We recruited only those who had an adult caregiver available to give informed consent on their behalf except emancipated minors and empowered adolescents who could legally consent for themselves. We excluded CALH having any emergency physical and mental condition (like acute severe psychosis or mania) that would interfere with their ability to respond meaningfully to the research questions or comprehend the contents of the consent/assent form.

*Sampling and recruitment procedure*

Potential participants were identified through review of their medical records and recruited from the Pediatric HIV clinics as they came for their routine clinic review and medication refill. Participants were approached by a trained research assistant who explained the purpose and procedures of the study to both the child/adolescent and their caregiver. Those that agreed to participate in the study provided written informed consent (caregiver) and assent (the child/adolescent) prior to administration of data collection tools. We applied consecutive sampling to ensure that all eligible children and adolescents accessing care at pediatric HIV clinics of Mbale and Jinja RRHs in Eastern Uganda who were available during the period of data collection were included. Recruitment was carried out until required sample size was reached. Disclosure status was assessed by administering an HIV disclosure assessment questionnaire to the participant and/or their caregiver during routine clinic visits.

### Measurements

For the descriptive aspect, the main outcome variable was HIV status disclosure which was assessed using an adapted USAID-Academic Model Providing Access to Healthcare (AMPATH) disclosure questionnaire which includes questions for both the child and primary care giver[15]. This questionnaire was developed and used to assess disclosure among children living with HIV in Kenya and mainly categorizes disclosure status into disclosure and non-disclosure based on responses from either the caregiver or child. The questions are scored as "yes or no", and disclosure is when a participant scores at least yes on one of the questions. It was modified by

a team of experienced researchers in the field of HIV/AIDS to include partial disclosure and adapted for use in our setting.

For the analytical aspect, the exposure variable was HIV status disclosure, and the outcome variables were MHC including depression, suicidality, generalized anxiety disorder and alcohol used disorder. MHC were determined by administering a Mini International Neuropsychiatric Interview (MINI-KID) questionnaire[16]. MINI-KID questionnaire assesses the common MHCs among children and adolescents and has screening questions corresponding to diagnostic and statistical manual of mental disorder (DSM) major and minor criteria for the disorders. The items are rated as yes or no and these are computed to give a total score from which a diagnosis of the corresponding disorder can be made[17]. This questionnaire has been used in several studies within a similar setting in Uganda[18–20].

Other predictors or confounding variables that were assessed included stigma which was measured using the validated Internalized AIDS-Related Stigma Scale, which assesses internalized stigma for HIV/AIDS[21]. Adherence to HIV treatment and perceived social support, Adherence to Chronic Diseases Scale and Multidimensional Scale of Perceived Social Support (MSPSS) respectively[21,22]. Perceived social support was categorized according to mean MSPSS scores as low (scores of 1-2.9), moderate (scores of 3–5) and high (scores of 5.1-7).

Also, data regarding biological factors such as having other psychiatric (such as psychosis and others) and medical (opportunistic infections and chronic medical conditions such as epilepsy, asthma, etc.) comorbidities were collected using an investigator designed questionnaire. In addition, demographic variables (age and sex, education level, religion, caregiver type, and family financial status) were also collected using the same investigator designed questionnaire.

## Sample size Estimation

*First* sample size 326 was estimated using Kish and Leslie formulae[23], using the prevalence of HIV status disclosure among CALH of 26%[15] and considering z = 1.96, margin of error = 0,05 and non-response rate of 10%. *Second* sample size of 172 CALH was estimated using an online calculator[24] based on students t-test with the main exposure being HIV status disclosure and the primary outcome was MHC, considering *Alpha* = 0.05 (2-sided); Beta = 0.20 (80% power). Consequently, the highest (first) sample size of 326 participants was considered for this study.

## Data collection and management

Data were collected using an electronic questionnaire that was administered by a trained research assistant. The questionnaire was designed using Commcare application with numerous checks to minimize missing data or errors[25]. This is free online software used to design questionnaires and completed data are stored online only accessible through an account that is protected by a password known by the principal investigator. To allow free responses, interviews were conducted in a quiet and separate room. For some sensitive questions such as those regarding HIV status disclosure, the adolescent and caregiver were interviewed separately to prevent accidental disclosure but also ensure confidentiality of participant's information. Some information, for example that regarding participant's HIV treatment was obtained by further reviewing their medical records at the clinic. Participants were allowed to take breaks during the interview according to their discretion and refreshments were provided. The completed forms were submitted to a secure online server from where they were downloaded in an excel form for cleaning and coding prior to analysis. All collected data was anonymized by assigning each participant a unique identifying number to ensure confidentiality. The downloaded data in the excel sheet was kept on a computer which was password protected only accessible with authorization of the principal investigator.

## Quality control measures

The study protocol was developed based on existing high quality scientific literature and was followed strictly and carefully throughout the study. Data collectors were trained in the administration of data collection tools such as MINI-Kid and completed a course in Good Clinical Practice and protection of human participants. Study tools were translated to local language for uniformity during administration by data collectors. During data collection, the PI routinely sat in interview sessions by the different data collectors to assess their performance.

## Data analysis

The collected data were downloaded in an excel form, cleaned and imported into STATA version 14 for quantitative analysis with statistical significance set at a p-value of $< 0.05$. Continuous data were summarized as means (with corresponding standard deviations) or medians with corresponding interquartile ranges. Categorical data were summarized as frequencies, proportions or percentages. Prevalence of mental health challenges and disclosure was determined as a proportion of participants in the study group who screened positive as per the MINI-Kid and the AMPATH disclosure questionnaire respectively. Disclosure was also categorized into no disclosure, partial disclosure/discrepancy (when there are contradicting reports by caregiver and child indicating that child is not aware of their HIV status) and no disclosure. The association between disclosure and mental health outcomes was explored through bi-variable and multiple logistic regression. Factors associated with MHC, including HIV status disclosure, were analyzed using bi-variable and multivariable logistic regression models, adjusting for potential confounders such as age, sex, education level, caregiver type, internalized stigma, and perceived social support. Factors that had p values of less than 0.2 and other confounders based on existing literature (like sex and adherence) were included in the multiple logistic regression model. Initially, regression was conducted to determine association between disclosure and having any MHC (major depression, suicidality or generalized anxiety disorder), followed by assessing association of the former with specific MHCs. The measure of association was odds ratio and 95% confidence intervals were considered.

## Ethical considerations

We obtained ethical approval from Mbarara University Research Ethics Committee (number MUST-2022-704), registration with Uganda National Council of Science and Technology (HS4017ES) and written permission from respective hospital administration prior to collecting data. Assent was obtained from the children and adolescents (8–17 years) with written consent from the adult caretaker. Participants with severe distress received brief counselling and were referred to the mental health departments of the respective hospital for appropriate assessment and management.

## Results

### Baseline characteristics of participants and prevalence of MHCs

A total of 326 children and adolescents living with HIV were recruited into the study with an average age of 13.9 years with 78.2% ($n=255$) being aged 13–17 years. The majority (53.7%) of the participants were females and Jinja RRH had more children having a MHC (47.4%) compared to the other sites. The majority (78.2%) of participants were either at primary level of education or below.

The overall prevalence of having a MHC was 23.3% ($n=76$), 12.9% ($n=42$) participants only one MHC, 7.7% ($n=25$) had two MHCs, 2.5%($n=8$) had 3 MHCs while only 0.3% ($n=1$) person had all the 4 MHCs. A total of 180 (55.2%) child-caregiver dyads reported full HIV status disclosure, 25 (7.7%) reported partial disclosure or discrepancy in disclosure report, while 121 (37.1%) reported total non-disclosure. For this analysis, partial disclosure/discrepancies and total non-disclosure were considered as no disclosure. The proportion of CALH having MHC was higher among those disclosed 78.9% ($n=60$) compared to those not disclosed 21.1% ($n=16$). (Table 1)

Those having a MHC were significantly older (median age of 15 years) than those without (median age of 14 years) (p value < 0.001). Major depression was the most prevalent (14.1%) followed by suicidality (12.8%) while only 1.2% participants had alcohol use disorder (AUD), and all had been disclosed to (Table 2).

### Association between MHCs and HIV status disclosure

When we combined all MHCs at bivariable analysis, HIV disclosure (aOR = 4.06, 95% CI = 2.22–7.44, $p<0.001$), increasing participant's age (aOR = 1.63, 95% CI = 1.35–1.96, p = < 0.001), education level (above primary) (aOR = 2.58, 95% CI = 1.46–4.57, $p=0.001$), and internalized stigma (aOR = 1.49, 95% CI = 1.06–2.10, $p=0.022$) were significantly associated with having at least one MHC. However, after multivariable analysis only HIV disclosure (adjusted odds ratio [aOR] = 2.54, 95% CI = 1.29–4.97, $p=0.007$) and child's age category of 13–17 years (aOR = 4.72, 95% CI = 1.55–14.39, $p<0.006$) were significant risk factors for having a MHC. (see Table 3)

However, on considering specific MHCs, HIV status disclosure was a risk factor for both major depression (aOR = 3.61, 95% CI = 1.49–8.71, $p=0.004$) and suicidality (aOR = 2.72, 95% CI = 1.09–6.75, $p=0.031$) but not generalized anxiety disorder. Older child's age (13–17 years) was a risk factor for having depression (aOR = 2.52, 95% CI = 1.86–5.23, $p=0.001$) while having a mother as the main caregiver was protective (aOR = 0.42, 95% CI = 0.15–0.89, $p=0.026$). Generalized anxiety disorder (aOR = 7.44, 95% CI = 3.01–18.04, $p<0.001$) was a strong risk factor for suicidality while high perceived social support was protective (aOR = 0.39, 95% CI = 0.17–0.88, $p=0.024$). Education level above primary (aOR = 2.80, 95% CI = 1.11–7.10, $p=0.030$) and internalized AIDS related stigma (aOR = 1.67, 95% CI = 1.02–2.73, $p=0.041$) were the only risk factors for generalized anxiety disorder. (see Table 4). AUD was excluded from this analysis due to the small sample size ($n=4$).

## Discussion

This survey aimed at determining prevalence of common MHCs and their association with HIV status disclosure and other correlates among CALH in Eastern Uganda. The prevalence of at least one MHC among CALH was 23.31%. The prevalence of major depression was 14.1%, suicidality, 12.8%, generalized anxiety disorder, 8.59% and AUD was 1.2%.

Depression was associated with disclosure. It was also associated with older age and maternal care giver was protective. Suicidality was not associated with disclosure but associated with depression and social support was protective while anxiety was associated with internalized AIDS related stigma.

Our finding of a prevalence of 23.31% of MHCs among CALH is comparable to that estimated in Zambia (34.3%)[26] and Rwanda (25%)[27]. The prevalence is however considerably lower than that reported in Kenya (49%), a country also in East Africa[28]. The differences in prevalence however could be due to differences in types of mental disorders assessed in that study like social phobia, oppositional defiant disorder and attention deficit hyperactivity disorder as well as having included older children up to 18 years. On the other hand, in the above study, that prevalence of depression (17.8%) was comparable to that found in our study. Findings from this and other studies emphasize that depression is becoming increasingly common among CALH[29–31]. For instance, a systematic review of 10 studies in 2021 revealed that more than a quarter of adolescents living with HIV had depression[32]. In our study we found depression as the most common MHC among CALH, a prevalence that is higher than that at the national level (5.3%)[33]. Several factors may contribute to development of depressive symptoms among CALH especially in relation to HIV disclosure including the perception of the illness as chronic disease with long-term negative consequences, chronic medication use and feelings of stigma and discrimination[34–36]. A randomized controlled trial in Kenya found that rates of depression were significantly higher among adolescents who had been disclosed of their status and those who did not know their HIV status at 6 months during the intervention[37]. However, there were no differences in rates of depression between the two groups after 12months during the intervention[37].These findings may suggest that depressive symptoms post disclosure are short lived or can promptly be alleviated by well-designed HIV disclosure interventions[38]. Older children above the recommended age of disclosure were more likely to have a MHC, specifically depression. This

| Variable | Total (*n*, %) | MHC (*n*, %) | | *P* values |
|---|---|---|---|---|
| | | No (*n* = 250) | Yes (*n* = 76) | |
| Participants' age in years (median, (IQR)) | 14 (2.0) | 14 (3.0) | 15 (2.0) | **< 0.001** |
| Age categories (in years) | | | | **< 0.001** |
| 8–12 | 71 (21.8) | 67 (26.8) | 4 (5.3) | |
| 13–17 | 255 (78.2) | 183 (73.2) | 72 (94.7) | |
| Sex | | | | 0.318 |
| Male | 151 (46.3) | 112 (44.8) | 39 (51.3) | |
| Female | 175 (53.7) | 138 (55.2) | 37 (48.7) | |
| Study site | | | | |
| TASO | 100 (30.7) | 84 (33.6) | 16 (21.0) | **0.004** |
| Infectious disease clinic | 121 (37.1) | 97 (38.8) | 24 (31.6) | |
| JRRH | 105 (32.2) | 69 (27.6) | 36 (47.4) | |
| Caregiver type | | | | 0.179 |
| Both parents | 58 (17.8) | 46 (18.4) | 12 (15.8) | |
| Mother only | 146 (44.8) | 118 (47.2) | 28 (36.8) | |
| Father only | 27 (8.3) | 21 (8.4) | 6 (7.9) | |
| Grandparent | 54 (16.5) | 39 (15.6) | 15 (19.7) | |
| Others | 41 (12.6) | 26 (10.4) | 15 (19.7) | |
| Level of education | | | | **0.001** |
| Primary and below | 255 (78.2) | 206 (82.4) | 49 (64.5) | |
| Above primary | 71 (21.8) | 44 (17.6) | 27 (35.5) | |
| Religion | | | | 0.254 |
| Catholic | 45 (13.8) | 34 (13.6) | 11 (14.5) | |
| Protestant | 82 (25.1) | 62 (24.8) | 20 (26.3) | |
| Muslim | 118 (36.2) | 98 (39.2) | 20 (26.3) | |
| Born again | 71 (21.8) | 49 (19.6) | 22 (28.9) | |
| Others | 10 (3.1) | 7 (2.8) | 3 (3.9) | |
| Number of children in homestead (median, (IQR)) | 3 (3.0) | 3 (3.0) | 3 (2.0) | 0.529 |
| Family financial status | | | | 0.143 |
| Poor | 47 (14.4) | 35 (14.0) | 12 (15.8) | |
| Not well off | 205 (62.9) | 165 (65.6) | 41 (53.9) | |
| Quite well off | 74 (22.7) | 51 (20.4) | 23 (30.3) | |
| Wealthy | 0 (0) | 0 (0) | 0 (0) | |
| Family history of mental illness | | | | 0.301 |
| No | 308 (94.5) | 238 (95.2) | 70 (92.1) | |
| Yes | 18 (5.5) | 12 (4.8) | 6 (7.9) | 0.490 |
| Having history of other chronic medical conditions | | | | |
| No | 313 (96.0) | 239 (95.6) | 2 (2.6) | |
| Yes | 13 (4.0) | 11 (4.4) | 74 (97.4) | 0.634 |
| Average ACDS score | 28 (1.0) | 28 (1.0) | 27.5 (1.0) | 0.075 |
| Internalized AIDS related stigma score (mean (SD)) | 2.1 (±0.7) | 2.0 (0.6) | 2.2 (1.0) | 0.998 |
| Perceived social support (MSPSS) | | | | 0.121 |
| Low | 8 (2.5) | 4 (1.6) | 4 (5.3) | |
| Moderate | 50 (15.3) | 36 (14.4) | 14 (18.4) | |
| High | 268 (82.2) | 210 (84.0) | 58 (76.3) | |
| HIV disclosure | | | | **< 0.001** |
| No | 146 (44.8) | 130 (52.0) | 16 (21.1) | |
| Yes | 180 (55.2) | 120 (48.0) | 60 (78.9) | |

**Table 1**. Baseline characteristics of participants (*n* = 326). *IQR* Interquartile range, *SD* standard deviation, *ACDS* Adherence to Chronic Diseases Scale, *MSPSS* Multidimensional Scale of Perceived Social Support. Significant values are in bold.

could be because as children grow, their conceptualization of physical and psychological phenomena improves and are hence more likely to understand and internalize effects from stressful events related to living with HIV which predisposes them to depression[30,32]. Additionally, they also go through late childhood to adolescence which is a transitional stage characterized by rapid physical and social growth, as well as transition to adolescence HIV

| MHC | Total (*n*, %) | Disclosure (*n*, %) | No disclosure (*n*, %) |
|---|---|---|---|
| At least one MHC | 76 (23.31) | 60 (78.95) | 16 (21.05) |
| Major depression | 46 (14.11) | 38 (82.61) | 8 (17.39) |
| Suicidality | 42 (12.83) | 34 (80.95) | 8 (19.05) |
| Generalized anxiety disorder | 28 (8.59) | 24 (85.71) | 4 (14.29) |
| Alcohol use disorder | 4 (1.22) | 0 (0) | 4 (100) |

**Table 2**. Prevalence of MHCs stratified by HIV disclosure status.

| Variable | cOR | 95% CI | *P* value | aOR | 95% CI | *P* value |
|---|---|---|---|---|---|---|
| HIV disclosure | 4.06 | 2.22–7.44 | **< 0.001** | **2.54** | **1.29–4.97** | **0.007** |
| Sex | | | | | | |
| Male | Ref | | | Ref | | |
| Female | 0.77 | 0.46–1.29 | 0.319 | 0.77 | 0.43–1.37 | 0.379 |
| Age categories | | | | | | |
| 8–12 | Ref | | | Ref | | |
| 13–17 | 6.6 | 2.32–18.74 | **< 0.001** | **4.72** | **1.55–14.39** | **0.006** |
| Education level | | | | | | |
| Primary and below | Ref | | | Ref | | |
| Above primary | 2.58 | 1.46–4.57 | **0.001** | 1.55 | 0.81–2.96 | 0.184 |
| Caregiver type | | | | | | |
| Both parents | Ref | | | Ref | | |
| Mother only | 0.91 | 0.43–1.93 | 0.806 | 0.74 | 0.27–1.45 | 0.471 |
| Father only | 1.09 | 0.36–3.31 | 0.872 | 0.68 | 0.19–2.28 | 0.513 |
| Grandparent | 1.47 | 0.62–3.52 | 0.382 | 1.46 | 0.58–3.91 | 0.432 |
| Others | 1.21 | 0.90–5.43 | 0.083 | 1.41 | 0.47–3.28 | 0.478 |
| Internalized AIDS related stigma | 1.49 | 1.06–2.10 | **0.022** | 1.43 | 0.98–2.03 | 0.063 |
| Perceived social support | | | | | | |
| Low to moderate | Ref | | | Ref | | |
| High | 0.28 | 0.07–1.14 | 0.075 | 0.59 | 0.29–1.20 | 0.147 |

**Table 3**. Factors associated with having any mental health challenge. Significant values are in bold. *cOR* crude odds ratio, *CI* Confidence Interval, *aOR* adjusted odds ratio.

care all of which may present with increased fear of stigma and discrimination and inadequately tailored services to their stage in life hence posing higher risk of depression[32,39]. Generally, depression is known to be a strong risk factor for suicidal behaviour, which may point to suicidality being a complication of depression related to disclosure. Additionally, suicidal risk is generally higher among children below 19 years of age which is the same age for HIV disclosure. Therefore, these findings further emphasize the need to screen children and adolescents for depression and suicidality after HIV disclosure. However, unlike findings from other studies, there was no significant association between sex and depression meaning that both are equally at risk of depression following disclosure[32].

Regarding caregiver type, having a mother as the main caregiver was found to be protective against depression in the current study. Parenting has been identified as a factor contributing to depression among adolescents in some studies[40,41]. In Traditional African culture, child care is mainly left to mothers while resource provision belongs to the male domain[42].The children therefore tend to have a good attachment with the mothers and this is protective against depression and other psychological distress among children[43]. On the other hand, children whose primary caregivers are not mothers (because of case of death) may have more depressive symptoms as part of bereavement which weakens their support system.

The prevalence of suicidality among CALH in this study was comparable to that reported in other HIV clinics for children and adolescents different parts of Uganda[32,37,38] though lower than that found in a Tanzanian study which only assessed for suicidality among adolescents and not young children[44]. This prevalence was markedly higher than the 1.8% reported among CALH in two districts of central Uganda and the suspected attempted suicide rate of 6.7–7.1/100,000 persons in general population, in Uganda[45,46]. This high suicidality among CALH can be explained by several factors including occurrence of depression, anxiety, anger, feelings of stigma, and discrimination following HIV status disclosure or concurrent medical challenges[47–49]. One study among adolescents with HIV in Uganda has also identified emotional and physical abuse in this population as significant contributors to suicidality[50]. In this study, suicidality was associated with having major depression and anxiety which conforms with the widely existing literature where mental illness or psychological unwell-being are associated with increased risk of suicidality[51–53]. This psychological unwell being may be due to factors

| MHC | Major depression | | | Suicidality | | | GAD | | |
|---|---|---|---|---|---|---|---|---|---|
| Variables | aOR | 95% CI | *P* value | aOR | 95% CI | *P* value | aOR | 95% CI | *P* value |
| HIV disclosure | **3.61** | **1.49–8.71** | **0.004** | **2.72** | **1.09–6.75** | **0.031** | 3.03 | 0.92–9.94 | 0.068 |
| Sex | | | | | | | | | |
| Male | Ref | | | Ref | | | Ref | | |
| Female | 1.12 | 0.56–2.23 | 0.758 | 1.09 | 0.52–2.27 | 0.807 | 0.54 | 0.23–1.31 | 0.175 |
| Age | | | | | | | | | |
| 8–12 | Ref | | | Ref | | | Ref | | |
| 13–17 | **2.52** | **1.86–5.23** | **0.001** | 1.69 | 0.52–5.44 | 0.378 | 1.87 | 0.38–9.27 | 0.442 |
| Education level | | | | | | | | | |
| Primary and below | Ref | | | Ref | | | Ref | | |
| Above primary | 0.96 | 0.44–2.04 | 0.908 | 1.04 | 0.44–2.44 | 0.920 | 2.80 | 1.11–7.10 | 0.030 |
| Caregiver type | | | | | | | | | |
| Both parents | Ref | | | | | | | | |
| Mother only | **0.42** | **0.15–0.89** | **0.026** | | | | 0.34 | 0.10–1.16 | 0.086 |
| Father only | 0.23 | 0.17–1.08 | 0.099 | | | | 1.04 | 0.23–4.62 | 0.957 |
| Grandparent | 0.81 | 0.27–2.40 | 0.708 | | | | 0.92 | 0.25–3.33 | 0.895 |
| Others | 1.19 | 0.42–3.40 | 0.739 | | | | 0.73 | 0.19–2.84 | 0.655 |
| Internalized AIDS related stigma | 1.41 | 0.93–2.12 | 0.111 | 1.24 | 0.80–1.90 | 0.334 | **1.67** | **1.02–2.73** | **0.041** |
| Perceived social support | | | | | | | | | |
| Low to moderate | Ref | | | Ref | | | Ref | | |
| High | 0.75 | 0.32–1.78 | 0.520 | **0.39** | **0.17–0.88** | **0.024** | 0.97 | 0.32–2.97 | 0.961 |
| Generalized anxiety | | | | **7.44** | **3.01–18.04** | **<0.001** | | | |

**Table 4**. Association between HIV status disclosure and specific mhcs. Significant values are in bold. *CI* Confidence Interval, *aOR* adjusted odds ratio.

like bullying at home or school following HIV disclosure to other people or worries related to the nature of the illness[18,53]. Conversely, higher perceived psychosocial support was protective against suicidality among CALH. This is in tandem with studies where adolescents reported that social support from friends and relatives helps them overcome the inaccurate beliefs of HIV infection being a death sentence hence preventing 'slow suicide'[36,54]. This creates a timely opportunity for researchers to consider interventions that boost social support for CALH at home, school and community settings including health facilities to reduce risk of suicidality.

The prevalence of anxiety was lower than that reported in Indonesia[55] which could be because we only considered one anxiety disorder (generalized anxiety disorder) yet anxiety can manifest in other types like separation anxiety, panic, agoraphobia, social phobia etc. Like suicidality, generalized anxiety disorder was not significantly associated with HIV disclosure. This is in line with existing literature, which indicates that disclosure does not some worsen mental health outcomes of CALH[56]. MHCs like generalized anxiety were also associated with having higher internalized AIDS related stigma score. Stigma is a main contributor of poor mental health especially among adolescents. Adolescents have also reported feelings of anxiety and suicidal ideation due to stigma following HIV status disclosure to other people[39]. Stigma often occurs due to disclosure of HIV status may lead to suicidal ideations in an attempt to avoid ostracization though this has not been supported by some large studies[39,57]. Among school going children, risk of anxiety was higher among those above primary level as may these tend to internalize more feelings of stigma and discrimination than those in primary schools. In addition, getting to know that they are suffering from a life threatening and chronic disease may trigger feelings of anxiety about a grim future.

## Study limitations

This was a health-facility based study conducted at three HIV clinics in eastern Uganda, which may limit the generalization of findings to community settings and other regions. In addition, the cross-sectional design of the study limits the establishment of temporal and causal relationships between HIV disclosure and mental health challenges which calls for longitudinal studies to establish these relationships.

## Conclusion

Generally, these findings show that CALH face MHCs in relation to HIV status disclosure with depression and suicidality being the most important. This points to the need unmet mental health needs among CALH in relation to HIV disclosure calling for designing socioculturally appropriate pediatric HIV disclosure intervention or adapting the existing ones to bridge this gap like the HCW-assisted disclosure intervention by Blasini et al. in Puerto Rico[58]. These interventions should mainly focus on early disclosure, and target management or prevention of mental health challenges children by reinforcing CA's psychosocial support systems and reducing HIV/AIDS related stigma and discrimination in home and school environments.

## Data availability

The data that support the findings of this study are not openly available due to reasons of sensitivity and are available from the corresponding author upon reasonable request.

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## Author contributions

JK conceived the idea, wrote proposal, participated in data collection, analysis and interpretation, drafted initial manuscript. GZR, SA, EKW, CO, BCZ and HB contributed during proposal development, study implementation, data analysis and interpretation. LA, CEO, NEA contributed to data collection, analysis and interpretation. All authors reviewed all versions of manuscripts and approved the final version.

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## Declarations

## Ethics approval and consent to participate

The study was approved by Mbarara University of Science and Technology Research Ethics Committee and

Uganda National Council of Science and Technology, approval numbers MUST-2022-704 and HS4017ES respectively. All participants provided written informed consent prior to participation in the study.

## Competing interests
The authors declare no competing interests.

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