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Rates, types and co-occurrence of emotional and behavioural disorders among perinatally HIV-infected youth in Uganda: the CHAKA study

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Abstract

Purpose To describe the rates, types and comorbidity of emotional and behavioural disorders among perinatally HIV-infected children and adolescents attending care at five HIV youth clinics in Central and Southwestern Uganda.

Methods 1339 CA-HIV attending care at HIV youth clinics in Uganda were interviewed using the DSM-5-based Child and Adolescent Symptom Inventory-5 (CASI-5; caregiver reported) and the Youth Inventory-4R (YI-4R; youth reported). Prevalence, risk factors and comorbidity for psychiatric disorders were estimated using logistic regression models.

Results According to caregiver or youth report, the prevalence of 'any DSM-5 psychiatric disorder' was 17.4% (95% CI 15.4–19.5%), while that of 'any behavioural disorder' was 9.6% (95% CI 8.1–11.2%) and that of 'any emotional disorder' was 11.5% (95% CI 9.9–13.3%). The most prevalent behavioural disorder was attention deficit hyperactivity disorder (5.3%), while the most prevalent emotional disorder was separation anxiety disorder (4.6%). The statistically significant risk factors were: for behavioural disorders, sex (more among males than females) and age group (more among adolescents than among children); for emotional disorders, age group (more among adolescents than among children) and the caregiver's highest educational attainment (more among CA-HIV with caregivers with secondary education and higher, than among CA-HIV with caregivers with no formal education or only primary level education). About a quarter (24.5%) of CA-HIV with at least one emotional disorder and about a third (33.5%) of the CA-HIV with at least one behavioural disorder had a comorbid psychiatric disorder.

Conclusion There was a considerable burden of psychiatric disorders among CA-HIV that spanned a broad spectrum and showed considerable comorbidity.

Keywords Children · Adolescents · HIV · Emotional and behavioural problems · Psychiatric disorder · Africa

Background

According to the UNAIDS report of 2014, there are 5.8 million children and young people (aged 0–24 years) living with HIV in sub-Saharan Africa, a sub-population that is at risk of developing psychiatric disorders [1, 2]. Studies undertaken in both the West and in sub-Saharan Africa have reported rates of psychiatric disorder (PD) among children and adolescents with HIV (CA-HIV) of between 9 and 60% [3–9]. PD in HIV has been associated with a number of

negative outcomes including: faster HIV disease progression [10, 11], poor adherence to medication [12, 13], risky sexual behaviour [12, 14] and poor linkage to care [15]. These in turn secondarily lead to HIV transmission (through the promotion of HIV drug resistance) [16] and impaired academic and social functioning [5, 14]. Despite the above outlined burden, the majority of HIV care services in sub-Saharan Africa still lack mental health care [17].

The provision of mental health services to persons living with HIV including CA-HIV in sub-Saharan Africa is beset with many challenges including: lack of demand for formal mental health services (most patients with mental health problems first seek care from traditional healers and faith healers before coming to formal mental health care services); a severe shortage of mental health professionals

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(for example, Uganda a country of 34 million has only about 30 psychiatrists, the majority of whom work in the capital city of Kampala); the reluctance of primary care providers to engage in mental health care (due to a combination of factors including lack of training in mental health, lack of appreciation of the value of mental health care and a lack of time and resources due to many competing demands) and a severe shortage of primary care workers in most primary health care facilities (which typically have one clinician for 50–100 patients daily) [18, 19].

Despite the above outlined challenges, many African countries have embraced the WHO recommendation to integrate mental health care into HIV care services [20–22]. Therefore, policy makers and health care providers are looking to research to provide innovative mental health integration models that are locally appropriate and cost effective. To inform the development of such models, there is need for more systematic research to better understand the characteristics of PD in HIV in the African socio-cultural context. To contribute to this, we describe the rates, types and comorbidity of PD among CA-HIV attending the study, 'Mental health among HIV infected CHildren and Adolescents in KAmpala and Masaka, Uganda' (the CHAKA study). To facilitate cross-cultural comparisons, we used two locally adapted DSM-5 referenced instruments, the caregiver-reported Child and Adolescent Symptom Inventory-5 (CASI-5) [23, 24] and the youth-reported Youth Inventory-4R (YI-4R) [25] to assess for psychiatric disorders.

Methods

Participants

This study was undertaken at five youth HIV clinics in urban Kampala (the capital city of Uganda; the clinics were Joint Clinical Research Centre (JCRC)and the Nsambya Home-care Department) and in rural Masaka district [about 120 km from Kampala; the clinics were The AIDS Support Organisation (TASO) clinic, Kitovu Mobile AIDS organisation and The Uganda Cares clinic]. The study recruited a sample of 1339 child/adolescent–caregiver dyads from the five study sites with each site contributing a varied number of study participants: JCRC, 418; TASO Masaka, 373; Nsambya Home Care, 266; Uganda Cares Masaka, 245; and Kitovu Mobile AIDS Organisation, 37 participants (Table 1).

While Table 1 attempts to provide the number of active CA-HIV attending each youth HIV clinic as of April 2014 (when the study was initiated), these figures were largely estimates. It was difficult to establish the actual number of active clients attending a given study clinics, as clients were all the time transferring either temporarily or permanently out of their HIV care clinic mainly due to changes in their primary caregiver or a change in school. Second, at study initiation, clinic managers were suspicious about our intentions (did we represent funders who were here to audit their performance?) and hence were reluctant to discuss issues related to clinic size. To even out these risks, the study investigators decided to allocate each study clinic an equal number of recruitment slots of 268 per study clinic. It was decided that during the course of the 6-month recruitment period, study participants would be enrolled continuously until a clinic's allotted slots had been filled. It was also decided that if a study clinic experienced saturation (could no longer enrol new study participants), then the unused recruitment slots would be redistributed among the other clinics. Each of the study clinics run a children's HIV care clinic either once or twice a week and an adolescent HIV clinic once a week. During each of these clinic days, the study staff visited the patient waiting areas of each clinic and introduced the study and then requested participants to enrol into the study. At each of the study sites, CA-HIV/caregiver dyads who agreed to participate in the study were then subjected to the eligibility criteria. Study eligibility criteria for the CA-HIV/caregiver dyads was: (i) CA-HIV aged between 5 and 17 years of age, with children defined as aged between 5 and 11 years and adolescents defined as aged between 12 and 17 years; (ii) caregivers older than 17 years of age; (iii) both able to speak English or Luganda (the local language spoken in the study areas); and (iv) both expected to remain

Table 1 Size of the study clinics and the number of participants recruited

Study clinic	Total number of CA-HIV as of April 2014[a]	Number of children (aged 5–11 years) April 2014	Number of adolescents (aged 12–17 years)	Number recruited into the study	% Recruited from each study clinic (%)
Joint Clinic Research Centre (JCRC)	1213	Not given	Not given	418	34.5
Nsambya Home Care	633	276	357	266	42.0
TASO Masaka	464	260	204	373	80.4
Kitovu Mobile AIDS Organisation	125	48	77	37	29.6
Uganda Cares Masaka Hospital	726	479	247	245	33.7

[a]Accuracy on the number of active clients attending each clinic varied across study sites

in the study area for the subsequent 12 months. Exclusion criteria were: (i) concurrent enrolment in another study (this applied to only one study site, the Joint Clinical Research Centre site); (ii) sick and in need of immediate medical attention; and (iii) those unable to understand the study instruments for whatever reason. Eligible CA-HIV/caregiver dyads were then required to provide informed consent (caregiver) and assent (CA-HIV) after explanation of the study objectives and procedures. Consented CA-HIV/caregiver dyads were then recruited into the study. The number of study participants recruited each clinic day at a given clinic varied between zero and six. The overall recruitment pattern was that there were more study participants recruited in the early months of the study than in the later months of the study. Second, more participants were recruited during the school holiday season than during the school academic season, with no participants recruited during the examination period. About 2% of eligible participants were not recruited for various reasons including participation in an ongoing study, being unable to contact the caregiver to obtain consent or refusal to give consent by the caregiver.

Measures

The assessment battery comprised of structured and standardised, locally translated psychosocial instruments (see "Measures" below). The study protocol was administered by trained psychiatric nurses and psychiatric clinical officers supervised by a psychiatrist (EK) and a clinical psychologist (RM). The psychosocial assessment tools used for the first time in the Ugandan population included the psychiatric disorder assessment instruments, the Child and Adolescent Symptom Inventory-5 (CASI-5) [23] and the Youth Inventory-4R (YI-4R) [25] which were taken through a translation and local adapted process that is described for the CASI-5 in a separate paper [24].

The variables reported in this paper include: (i) sociodemographic factors—study site, gender, religion, tribe, who the CA-HIV lives with, orphanhood status, highest level of education attained and a socio-economic status index constructed from common household items [25]; (ii) clinical factors—current CD4 count (cells/μl) and whether on ART or not ; (iii) emotional and behavioural disorders—assessed using the DSM-5 referenced Child and Adolescent Symptom Inventory-5 (CASI-5) [23] and Youth Inventory-4R (YI-4R) [25]. The Child and Adolescent Symptom Inventory-5 (CASI-5) [23] is a caregiver-reported behaviour rating scale for DSM-5-defined emotional and behavioural disorders in youths aged between 5 and 18 years. The CASI-5 is categorised into psychiatric disorder-specific modules. For purposes of this paper, we elicited seven DSM-5-based psychiatric disorder diagnoses categorised as emotional disorders [generalized anxiety disorder (GAD), social anxiety disorder

(SAD), separation anxiety disorder (SEAD), major depressive disorder (MDD)] and behavioural disorders [attention deficit hyperactivity disorder (ADHD), oppositional defiant disorder (ODD) and conduct disorder (CD)]. The number of question items per psychiatric disorder category is given in Table 2. On each of the symptom/sign items, the caregiver was required to rate their CA-HIV on a 4-point Likert scale: 0 = never; 1 = sometimes; 2 = often; 3 = very often. Additionally, each psychiatric disorder module had an impairment question that read, 'how often do behaviours/ symptoms described above interfere with child/adolescents' ability to function at home, school, work and getting along with others?' with possible responses being: 0 = never; 1 = sometimes; 2 = often; 3 = very often. A psychiatric symptom/sign was considered present if it was scored by a caregiver as 'often, attracting a score of 2' or 'very often, attracting a score of 3'. To make a particular psychiatric diagnosis, the CA-HIV was required to meet the minimum number of symptom counts (with a score of 2 and above) as specified by the DSM-5 in addition to meeting the minimum score (a score of 2 and above) on the impairment question of that module. The Youth's Inventory-4R (YI-4R) [25] is a youth-reported scale that helps to evaluate DSM-5 emotional and behavioural disorders in youth aged between 12 and 17 years. Responses to the YI-4R can provide valuable insight into the youth's perceptions of his or her problems. The YI-4R has similar symptom/sign and impairment items as the CASI-5, see details in Table 2. In this study, the YI-4R was scored in a similar fashion to the CASI-5 to generate the seven psychiatric diagnostic categories considered in this paper.

Statistical analysis

To assess the reliability of both the CASI-5 and the YI-4R, we undertook the following analyses: (i) determined the internal consistency of each instrument by generating the Cronbach's alpha for the entire instrument and for the constituent subscales; (ii) determined the test–retest reliability of the entire instrument and its constituent subscales by undertaking a correlational analyses between baseline scores and scores at 6 months. (iii) To test the validity of both the CASI-5 and the YI-4R, we undertook a correlational analysis between the constituent subscales and between each of the constituent subscales and the total score. We predicted a priori that the behavioural disorder subscales (ADHD, ODD and CD) and the emotional disorder subscales (MDD, GAD, SAD and SEAD) will each separately be correlated together.

The prevalence of emotional and behavioural problems and disorders were estimated together with exact 95% binomial confidence intervals. Regarding statistical power, a sample size of approximately 1340 CA-HIV/caregiver dyads would ensure that the baseline prevalence of having 'at least

Table 2 Reliability and validity indices of the psychiatric disorder assessment instruments

Symptom category	Item number	Internal consistency (Cronbach's alpha)	Test–retest reliability (r)[a]	ODD[a]	CD[a]	ADHD[a]	GAD[a]	SAD[a]	SEAD[a]	MDD[a]
Child and Adolescent Symptom Inventory-5 (CASI-5)										
Oppositional defiant disorder (ODD)	9	0.79	0.16							
Conduct disorder (CD)	17	0.78	− 0.01	0.25						
Attention deficit hyperactivity disorder (ADHD)	20	0.85	0.20	0.25	0.24					
Generalized anxiety disorder (GAD)	7	0.73	0.11	0.27	0.13	0.17				
Social anxiety disorder (SAD)	5	0.70	0.18	0.15	0.06	− 0.08	0.09			
Separation anxiety disorder (SEAD)	9	0.79	0.04	0.13	0.18	0.13	0.18	0.15		
Major depressive disorder (MDD)	8	0.76	0.22	0.10	0.11	0.09	0.12	0.03	0.16	
Total	75	0.77	0.17	0.32	0.24	0.21	0.20	0.18	0.22	0.21
Youth Inventory-4R (YI-4)										
Oppositional defiant disorder	9	0.69	0.17							
Conduct disorder	16	0.86	0.03	0.06						
Attention deficit hyperactivity disorder	19	0.88	0.22	0.04	0.07					
Generalized anxiety disorder	7	0.82	0.10	0.06	0.12	0.06				
Social anxiety disorder	2	0.49	0.16	0.13	0.12	0.09	0.11			
Separation anxiety disorder	6	0.69	0.06	0.05	0.05	− 0.03	0.06	0.09		
Major depressive disorder	11	0.83	0.26	0.01	0.03	0.03	0.03	− 0.01	− 0.03	
Total	70	0.88	0.20	0.16	0.15	0.10	0.12	0.13	0.10	0.19

[a] All correlations were significant at $p < 0.01$

one psychiatric disorder' could be estimated with a precision of ± 2.4%, assuming that the prevalence of having 'at least one psychiatric disorder' is conservatively estimated at 20% [3]. Multiple logistic regression models were fitted to determine social and clinical factors associated with having 'at least one behavioural disorder' and associated with having 'at least one emotional disorder' using as a priori explanatory variables, study site, sex, age group, tribe, who the CA-HIV lives with, orphanhood status of the CA-HIV, education level of the CA-HIV, SES score (based on the number of a given set of items owned by the caregiver [26]), the current CD4 count of the CA-HIV and whether or not the CA-HIV was on ART. Both unadjusted and adjusted (study site, age group and sex) odds ratio are reported. All analyses were carried out using Stata release 13.1.

Ethical consideration

The study obtained ethical approval from the Uganda Virus Research Institute's Research and Ethics Committee, the Ethics Committee of the London School of Hygiene and Tropical Medicine and the Uganda National Council of Science and Technology. Participants found to have a psychiatric disorder were provided with psychoeducation and referred to their local mental health departments.

Results

Reliability and validity of the CASI-5 and YI-4R

To assess the reliability of both the CASI-5 and the YI-4R, we generated Cronbach's alpha scores for the entire instrument and for each of the constituent subscales (Table 2). We also undertook a correlational analysis comparing the baseline and 6-month scores of the entire instrument and those of the constituent subscales (Table 2). The total Cronbach's alpha scores of both instruments (CASI-5, a score of 0.77 and YI-4R a score of 0.88) were above the recommended threshold of 0.7 [27]. The Cronbach's alpha scores of the constituent subscales of the CASI-5 were all above the recommended threshold of 0.7 [28]. For YI-4R, apart from three subscales, two of which were borderline (both ODD and SEAD had Cronbach's alpha score of 0.69) and one below the mark (SAD had Cronbach's alpha score of 0.49), while the Cronbach's alpha scores of the rest of the subscales were above the recommended threshold [27].

The test–retest reliability indices of the two instruments each scored in its entirety was small (CASI-5, a coefficient of 0.17; YI-4R a coefficient of 0.20) according to the classification provided by Pallant (2007) [27]. The test–retest indices of the subscales in both instruments showed a similar pattern. Overall in both instruments, the correlation

coefficients of the different subscales were small (between 0.10 and 0.26) but for two of the subscales of conduct disorder and separation anxiety disorder, the correlation coefficients were very small (0.01–0.06). The reasons of the low correlation between baseline and 6-month scores observed in this study could have been due to the long interval between the two assessments, so that by the time the second assessment was done, the predominantly reactive psychiatric disorders would have resolved.

To test the validity of both the CASI-5 and the YI-4R, we undertook a correlational analysis between the total scores of each instrument and each of the subscale scores and between the different subscale scores (Table 2). Overall, the correlation between the total scores of each instrument and each of the subscale scores was medium to small (0.10–0.49) according to a classification provided by Pallant [27]. For the CASI-5 as anticipated, the behavioural disorder subscales (ADHD, ODD and CD) were more closely correlated together. However, for the emotional disorder subscales of CASI-5, this anticipated pattern was not observed. For the YI-4R, the correlation between the different subscales was very low and the anticipated pattern between behavioural and emotional disorder groupings was not observed.

Characteristics of study participants

Of the 1339 CA-HIV enrolled into this study, 64% were between 5 and 11 years and 36% were between 12 and 17 years (Table 3). The urban and rural study sites contributed 51% and 50% of participants, respectively. An equal number of males and females were enrolled in this study. With regard to HIV illness parameters, 88% had CD4 counts equal or greater than 350 cells/μL and most (95%) of the participants were on ART.

Prevalence of emotional and behavioural disorders

In Table 4, the percentage of participants with at least one psychiatric disorder in this study was 17.4% more among adolescents (23.8%) than among children (13.7%). Those with sub-threshold psychiatric symptomatology (that met DSM-5 symptom criteria but not impairment criteria) were 28.2%. In this study, 9.6% of the participants had at least one behavioural disorder, more among adolescents (12.4%) than among children (7.7%). The most prevalent behavioural disorder was attention deficit hyperactivity disorder (ADHD; 5.3%) followed by oppositional defiant disorder (ODD; 4.3%). At least one emotional disorder was reported by 11.5% of participants, reported more among adolescents (18.2%) than among children (7.7%). The most prevalent emotional disorder was separation anxiety disorder (4.6%) followed by generalized anxiety disorder (3.9%) and major depressive disorder (3.9%).

Table 3 Characteristics of study participants

Variable	Level	Total ($n=1339$) n (%)	Children ($n=860$) n (%)	Adolescents ($n=479$) n (%)
Study Site	Urban	684 (51.1%)	424 (49.3%)	260 (54.3%)
	Rural	655 (48.9%)	436 (50.7%)	219 (45.7%)
Sex	Male	638 (47.6%)	413 (48.0%)	225 (47.0%)
	Female	699 (52.2%)	446 (51.9%)	253 (52.8%)
	Missing	2 (0.2%)	1 (0.1%)	1 (0.2%)
Religion	Christian	1058 (79.0%)	676 (78.6%)	382 (79.8%)
	Muslim	273 (20.4%)	179 (20.8%)	94 (19.6%)
	Others/missing	8 (0.6%)	5 (0.6%)	3 (0.6%)
Tribe	Baganda	967 (72.2%)	629 (73.1%)	338 (70.6%)
	Non-Baganda	370 (27.6%)	230 (26.7%)	140 (29.2%)
	Missing	2 (0.2%)	1 (0.1%)	1 (0.2%)
Child lives with	Both parents	354 (26.4%)	257 (29.9%)	97 (20.2%)
	Single parent	512 (38.2%)	340 (39.5%)	172 (35.9%)
	Grandparents	258 (19.3%)	168 (19.5%)	90 (18.8%)
	Others/missing	215 (16.1%)	95 (11.1%)	120 (25.1%)
Orphanhood	Single parent orphan	466 (34.8%)	265 (30.8%)	201 (42.0%)
	Double parent orphan	152 (11.4%)	57 (6.6%)	95 (19.8%)
	Non-orphan	721 (53.8%)	538 (62.6%)	183 (38.2%)
Highest level of education attained	No formal	29 (2.2%)	12 (1.4%)	17 (3.6%)
	Pre-primary	217 (16.2%)	214 (24.9%)	3 (0.6%)
	Primary	954 (71.2%)	629 (73.1%)	325 (67.8%)
	Secondary	135 (10.1%)	2 (0.2%)	133 (27.8%)
	Missing	4 (0.3%)	3 (0.4%)	1 (0.2%)
Socio-economic index (PCA)	Mean(std)	1.06 (0.60)	1.01 (0.58)	1.17 (0.62)
Socio-economic index (PCA)(grouped)	Low (≤ 0.75)	505 (37.7%)	356 (41.4%)	149 (31.1%)
	Medium ($> 0.75–1.5$)	483 (36.1%)	314 (36.5%)	169 (35.3%)
	High ($> 1.5–2.5$)	351 (26.2%)	190 (22.1%)	161 (33.6%)
Caregiver's level of education	No formal	120 (9.0%)	79 (9.2%)	41 (8.6%)
	Primary	650 (48.5%)	451 (52.4%)	199 (41.5%)
	Secondary	404 (30.2%)	259 (30.1%)	145 (30.3%)
	Higher	133 (9.9%)	69 (8.0%)	64 (13.4%)
	Missing	32 (2.4%)	2 (0.2%)	30 (6.3%)
Current CD4 counts (cells / μl)	<200	63 (4.7%)	36 (4.2%)	27 (5.6%)
	200–349	74 (5.5%)	22 (2.6%)	52 (10.9%)
	350–599	229 (17.1%)	90 (10.5%)	139 (29.0%)
	600–899	338 (25.2%)	175 (20.4%)	163 (34.0%)
	≥ 900	621 (46.4%)	530 (61.6%)	91 (19.0%)
	Missing	14 (1.0%)	7 (0.8%)	7 (1.5%)
Child on ART	Yes	1277 (95.4%)	824 (95.8%)	453 (94.6%)
	No	62 (4.6%)	36 (4.2%)	26 (5.4%)

PD and its association with socio-demographic and clinical factors

In Table 5, risk factors significantly associated with behavioural disorders included sex (more among males than females) and age group (more among adolescents than among children). For emotional disorders, only age group (more among adolescents than among children) and caregiver's highest educational attainment (more among CA-HIV with caregivers with secondary education and higher than among CA-HIV with caregivers with no formal education or only primary level education) were included.

Table 4 Prevalence of psychiatric disorders among children and adolescents attending the CHAKA Study

Psychiatric disorder	Caregiver report CASI-5			Youth self-report YI-R	Either caregiver or youth self-report Either by CASI-5 or YI-R	
	Children (A)	Adolescents (B)	Total (C)	Adolescents (D)	Adolescents Either B or D	Total Either C or D
Any psychiatric disorder	117 (13.7%) (11.5–16.2)	70 (14.5%) (11.6–17.9)	187 (13.9%) (12.2–15.9)	52 (10.7) (8.2–13.8)	115 (23.8%) (20.2–27.8)	233 (17.4%) (15.4–19.5)
Any behavioural disorder[a]	66 (7.7%) (6.1–9.7)	31 (6.4%) (4.5–9.0)	97 (7.2%) (6.0–8.8)	33 (6.8%) (4.8–9.4)	60 (12.4%) (9.7–15.6)	128 (9.6%) (8.1–11.2)
Oppositional defiant disorder	31 (3.6%) (2.6–5.1)	14 (2.9%) (1.7–4.8)	45 (3.4%) (2.5–4.5)	14 (2.9%) (1.7–4.8)	27 (5.6%) (3.8–8.0)	58 (4.3%) (3.4–5.5)
Conduct disorder	13 (1.5%) (0.8–2.6)	9 (1.7%) (1.0–3.5)	22 (1.6%) (1.1–2.5)	14 (2.9%) (1.7–4.8)	23 (4.7) (3.2–7.1)	39 (2.9%) (2.1–4.0)
Attention deficit hyperactivity disorder	40 (4.7%) (3.4–6.3)	18 (3.7%) (2.3–5.8)	58 (4.3%) (3.4–5.6)	15 (3.1%) (1.9–5.1)	31 (6.4%) (4.5–9.0)	71 (5.3%) (4.2–6.6)
Any emotional disorder[b]	66 (7.7%) (6.1%)	47 (9.7%) (7.4–12.7)	113 (8.4%) (7.1–10.0)	47 (9.7%) (7.3–12.7)	88 (18.2%) (15.0–21.9)	154 (11.5%) (9.9–13. 3)
Any anxiety disorder	49 (5.7%) (4.3–7.5)	29 (6.0%) (4.2–8.5)	78 (5.8%) (4.6–7.2)	49 (10.1%) (7.7–13.1)	71 (14.7%) (11.8–18.1)	120 (9.0%) (7.5–10.6)
Generalized anxiety disorder	17 (1.9%) (1.2–3.2)	10 (2.1%) (1.1–3.8)	27 (2.0%) (1.3–2.9)	26 (5.4%) (3.7–7.8)	35 (7.2%) (5. 2–9.9)	52 (3.9%) (3.0–5.1)
Social anxiety disorder	10 (1.2%) (0.6–2.1)	8 (1.6%) (0.8–3.2)	18 (1.34%) (0.8–2.1)	*	34 (7.0%) (5.1–9.7)	44 (3.3%) (2.4–4.4)
Separation anxiety disorder	28 (3.3%) (2.3–4.7)	18 (3.7%) (2.3–5.8)	46 (3.4%) (2.6–4.5)	10 (2.1%) (1.1–3.8)	26 (5.4%) (3.7–7.8)	54 (4.0%) (3.1–5.2)
Major depressive disorder	27 (3.2%) (2.2–4.6)	24 (5.0%) (3.3–7.3)	51 (3.81%) (2.9–5.0)	1 (0.2) (0.02–1.4)	25 (5.2%) (3.5–7.5)	52 (3.9%) (3.0–5.1)

[a]Any behavioural disorder (refers to oppositional defiant disorder, conduct disorder and attention deficit hyperactivity disorder)

[b]Any emotional disorder (generalized anxiety disorder, social anxiety disorder, separation anxiety disorder and major depressive disorder)

Psychiatric disorder comorbidity

As shown in Table 6, about a quarter (24.5%) of CA-HIV with 'at least one emotional disorder' had a comorbid behavioural disorder with higher rates among children (27.0%) than among adolescents (22.5%). About a third (33.5%) of the CA-HIV with 'at least one behavioural disorder' had a comorbid emotional disorder with rates higher among adolescents (38.6%) than among children (29.7%).

Discussion

This paper presents the results of the largest study to date on emotional and behavioural disorders in CA-HIV. The CA-HIV in this study had suffered considerable family loss, with about half of them being orphaned and only a quarter living with both biological parents. CA-HIV were in relatively good physical health with the majority with CD4 counts greater than 350 cells/μl and in line with WHO guidelines [20] already initiated on ART (95%) with no difference on ART treatment rates between children and adolescents.

About a fifth (17.4%) of the study participants in this study had at least one psychiatric disorder. A similar rate (17%) for at least one psychiatric disorder was reported in the USA where similar psychiatric disorder assessment instruments were used (the CASI-4R and YI-4R) [4]. Anxiety problems were the most prevalent diagnostic category in this study with a similar preponderance reported by other authors in East Africa [9] and in the USA [28]. The most frequently reported behavioural problem was ADHD with a similar pattern having previously been reported in both Kenya [9] and in the USA [4]. About 4% of the participants in this study had a major depressive disorder (MDD). In the USA study where similar assessment instruments was used, a rate of MDD of 2% was reported [4]. Other African studies have reported varied rates of MDD ranging between 2 and 17.8% [6, 9]. The factors significantly associated with psychiatric disorders in this study were: age group (with both behavioural and emotional disorders more common among adolescents than among children), sex of the CA-HIV (only for behavioural disorders, with rates higher among males than among females), highest educational attainment of the caregiver (only for emotional disorders, with rates of emotional disorders being higher among CA-HIV with

Table 5 Association between emotional and behavioural disorders and explanatory factors

Factor	Level	Any emotional disorder[a]				Any behavioural disorder[b]			
		Unadjusted odds ratio (95% CI)	Likelihood ratio P value	Adjusted odds ratio (95% CI)[c]	Likelihood ratio P value	Unadjusted odds ratio (95% CI)	Likelihood ratio P value	Adjusted odds ratio (95% CI)[a]	Likelihood ratio P value
Study site	Urban	1.2 (0.83–1.64)	0.36	1.11 (0.79–1.56)	0.54	0.99 (0.68–1.42)	0.94	0.95 (0.66–1.34)	0.81
	Rural	1		1		1		1	
Sex of child	Male	1	0.26	1	0.23	1	0.01	1	
	Female	0.82 (0.59–1.15)		0.81 (0.57–1.14)		0.61 (0.42–0.89)		0.61 (0.42–0.88)	**0.01**
Age group	Adolescents (12–17)	2.66 (1.89–3.74)	<0.01	2.66 (1.89–3.74)	**<0.01**	1.64 (1.13–2.36)	0.008	1.66 (1.15–2.40)	**0.007**
	Children (5–11)	1		1		1		1	
Tribe of child	Baganda	0.92 (0.63–1.33)	0.65	0.97 (0.66–1.43)	0.89	1.22 (0.80–1.86)	0.35	1.27 (0.82–1.96)	0.28
	Non-Baganda	1		1		1		1	
Who child lives with	Both parents	1	0.66	1	0.35	1	0.41	1	0.50
	One parent/others	0.92		0.83		1.20		1.20	
Orphanhood status	Both parents dead	1	0.53	1	0.55	1	0.77	1	0.72
	One/both parents alive	0.84 (0.48–1.44)		1.20		0.91 (0.50–1.67)		1.12 (0.560–2.09)	
Education Level	None/pre-primary	1	0.02	1	0.39	1	0.89	1	0.65
	Primary/secondary	1.8 (1.08–3.02)		1.27		1.03 (0.64–1.66)		0.89 (0.53–1.48)	
SES index	Per unit increase	1.02 (1.00–1.04)	0.05	1.01 (0.98–1.03)	0.32	1.00 (0.98–1.02)	0.95	0.99 (0.97–1.02)	0.80
CD4 count (cells/µl)	<500	1	0.25	1	0.77	1	0.85	1	0.58
	500 and above	0.79 (0.53–1.18)		1.06 (0.70–1.62)		0.96 (0.61–1.51)		1.14 (0.71–1.83)	
Child on ART	Yes	1.02 (0.45–2.29)	0.96	1.08 (0.48–2.44)	0.85	0.82 (0.36–1.84)	0.64	0.84 (0.37–1.90)	0.68
	No	1		1		1		1	
Caregiver education	None/primary	1	0.01	1	**0.03**	1	0.87	1	0.96
	Secondary/higher	1.57 (1.12–2.21)		1.48 (1.03–2.12)		1.03 (0.71–1.49)		1.01 (0.68–1.49)	

[a] Any emotional disorder (generalized anxiety disorder, social anxiety disorder, separation anxiety disorder and major depressive disorder)

[b] Any behavioural disorder (refers to oppositional defiant disorder, conduct disorder and attention deficit hyperactivity disorder)

[c] Adjusted for study site (rural/urban), age group (child/adolescent) and sex

caregivers with secondary education and higher than among CA-HIV with caregivers with no formal education or only primary level education). The observation of lower rates of behavioural problems among females compared to males has previously been reported by Mellins et al. [3] in their USA study. The observed higher rates of both behavioural and emotional disorders among adolescents than among children has previously been reported by Mellins et al. who reported that older youth were more likely to report mood and behavioural disorders compared to younger youth [3]. There is no ready explanation why CA-HIV of caregivers with higher educational attainment should report higher rates of emotional disorders than those CA-HIV with caregiver of lower educational attainment. One possible explanation would be

Table 6 Psychiatric disorder comorbidity overall and by youth category

Psychiatric disorder category (symptom criteria)	Level	Total ($n=1339$) a/n (%)	Children ($n=860$) a/n (%)	Adolescents ($n=479$) a/n (%)
Any behavioural disorder (n)[a]	Have comorbid internalising disorder (a)	54/161 (33.5%)	27/91 (29.7%)	27/70 (38.6%)
Any emotional disorder (n)[b]	Have comorbid externalising disorder (a)	54/220 (24.5%)	27/100 (27.0%)	27/120 (22.5%)

[a]Any behavioural disorder (refers to oppositional defiant disorder, conduct disorder and attention deficit hyperactivity disorder)

[b]Any emotional disorder (generalized anxiety disorder, social anxiety disorder, separation anxiety disorder and major depressive disorder)

that more educated caregivers were better able to recognise psychiatric symptomatology among their CA-HIV than less educated caregivers. In this study, all other investigated socio-demographic and clinical factors were not significantly associated with any disorder category, similar results were reported by Mellins et al. [3] in their study in the USA.

An alternative explanation for the lack of association between emotional and behavioural disorders (particularly emotional problems) and socio-demographic factors including indices of social disadvantage could be the potential buffering by social support systems [29] of the effect of these factors on emotional and behavioural problems. From the qualitative sub-study of this project [30], we were able to establish that some of these CA-HIV received instrumental support from other relatives and 'sponsors' from the west. The material support from both relatives and sponsors may buffer these children from the financial hardships being experienced by their primary caregivers.

In this study, about a quarter of CA-HIV with 'at least one emotional disorder' also had comorbid behavioural disorders with slightly higher rates reported among children than among adolescents. Similarly, about a third of the CA-HIV with 'at least one behavioural disorder' had a comorbid emotional disorder with higher rates reported among adolescents than among children. Studies undertaken in both Kenya [9] and the USA [3, 28] have reported rates of psychiatric comorbidity among CA-HIV of between 26 and 44%.

In conclusion, about a fifth of the children and adolescents with HIV in this study presented with at least one psychiatric disorder with an additional 28% having subthreshold psychiatric symptomatology. Previous work by this research group and others has shown that sub-threshold psychiatric disorders are not only a significant predictor of future psychiatric disorder [31, 32], but have been associated with increased disability and many other negative consequences [33]. Emotional and behavioural problems including psychiatric disorders in this study spanned a broad spectrum of psychopathology. Apart from sex, age group and highest educational attainment of caregiver, all other investigated socio-demographic and clinical factors were not significantly associated with emotional or behavioural problems. Lastly, there was considerable psychiatric comorbidity.

On limitations of this study, first, because we could not establish with accuracy the sampling frame at each of the study sites, the sampling procedure employed in this study may have introduced bias. This was thought to have been minimised as the recruitment phase of this study was given adequate time (6 months) and at all study sites, recruitment was carried out until saturation (when no more new study participants who were eligible could be identified). Second, although overall the symptoms items of the two psychiatric assessment instruments held together as a whole and within each subscale category (thus giving us good Cronbach's alpha scores), the other reliability and validity indices of the these two instruments were low, more so for the instrument that was administered through youth report (the YI-4R) than the one administered through caregiver report (CASI-5). Despite this shortcoming, the adolescent prevalence figures for DSM-5 PD provided through youth self-report were very similar to those provided through caregiver report and to those reported by studies in the USA where similar assessment instruments were used, indicating that these two approaches of assessing youth psychopathology do have some merit in this sub-population. However, there is need for more research into the validity and reliability of these two approaches to assess youth psychopathology in this socio-cultural context. The third limitation of this study is that given the cross-sectional design, it was difficult to determine the direction of causality between the dependent and independent variables. This problem will be resolved through data that will be provided by the longitudinal component of the CHAKA research project.

The findings from this study have a number of implications for mental health service development in HIV care in low resourced settings. First, given the considerable burden of emotional and behavioural problems including psychiatric disorders demonstrated in this study, there is an urgent need to provide mental health services to CA-HIV. Second, since CA-HIV suffered from psychiatric morbidity spanning a broad spectrum, any mental health intervention programme that is to be implemented in HIV care services for CA-HIV should cater to this broad spectrum of psychopathology. Third, since most of the investigated socio-demographic and clinical factors were not significantly associated with

psychiatric disorder, it is difficult to build a profile for the 'at risk for emotional and behavioural problems CA-HIV'. Therefore, interventions for emotional and behavioural problems among CA-HIV should be based on case detection through the deployment of easy to use screening tools. Fourth, due to the high rate of psychiatric comorbidity, mental health screening and treatment programmes should be comprehensive to ensure assessment of the entire spectrum of emotional and behavioural problems. Lastly, in line with WHO's call for integrated mental health services in HIV care, there is a need to develop and evaluate mental health integration models that will provide mental health care to HIV-infected youth [20].

Compliance with ethical standards

Conflict of interest No conflict of interest to declare.

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