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Psychosocial experiences and sexual risk behaviour of the adolescents living with and affected by HIV who reside in HIV affected homes in Uganda

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ABSTRACT
We compared the levels of psychosocial and sexual experiences of adolescents aged 10–19 years who were living with (ALHIV) and affected by HIV who resided in HIV-affected homes of Uganda. Data were collected using a questionnaire that was validated using factor analysis. The levels of psychosocial and sexual experiences of these adolescents were compared using variance and Kruskal–Wallis tests. Results showed that whereas these adolescents were exposed to each observed factor, the ALHIV were significantly more vulnerable to lower education levels, living with sick people, death of both parents, changing homes, living with caregivers who were relatives or alcohol users, negative peer influence, poverty, personal and interpersonal problems, distress, sexual risk behaviour, and negative coping methods, compared to those not living with HIV or unaware of their HIV status. Hence, despite the higher primary education achievement and access to HIV services, ALHIV face a lesser sense of belonging, a higher burden of caring for their family members' sicknesses, higher vulnerability to sexually transmitted diseases, and poorer coping abilities compared to the other adolescents in the same home. Interventions are needed from families, schools and agencies to address the risk and protective factors among these adolescents.

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Introduction

Due to the continued new HIV infections in adolescents and adulthood deaths plus the longer survival of children living with HIV, the number of adolescents living with HIV (ALHIV) and orphaned (affected) by HIV is rising globally (UNAIDS, 2022b). This has led to increased research about their psychosocial and sexual health (Louthrenoo et al., 2018; Lowenthal et al., 2014).

However, an in-depth examination of existing literature on these topics shows that most of the studies were conducted in high-income countries such as USA (Mellins & Malee, 2013; Pellowski et al., 2013) and middle-income countries such as South Africa (Kalichman, 2023; Toska et al., 2022). The results of these studies are mixed since some found that ALHIV had a significantly *higher risk* of experiencing psychosocial problems (e.g., developing depressive-anxiety) and sexual risk behaviour (e.g., having unprotected sex) compared to adolescents affected by HIV (Bomba et al., 2010;

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Elkington et al., 2011; Mellins et al., 2012), whereas others found that these two groups had a *comparable risk* of developing psychological stress symptoms such as depression and somatisation (Gadow et al., 2012a; Mutumba et al., 2016), and some found that ALHIV had a significantly *lower risk* of experiencing psychological problems and sexual risk behaviour compared to adolescents affected by HIV (Malee et al., 2011a; Mellins et al., 2011) and when compared to adolescents in general (UNCEF, 2017). Furthermore, these studies mainly assessed psychological stress symptoms of clinical relevance (e.g., attention deficit, hyperactivity, or suicide disorders) and their demographic causal factors (Mellins & Malee, 2013) in a section or mixture or overlaps of children and adolescents and youths in health care settings (Gadow et al., 2012b; Kalungwana et al., 2022; Malee et al., 2011a, 2011b; Mutumba et al., 2016; Toska et al., 2022; Visser et al., 2018). They therefore provided little insight into the level of psychosocial experiences and sexual risk behaviour for ALHIV and adolescents affected by HIV (i.e., not living with HIV or not aware of the personal HIV status), who live in HIV affected homes (i.e., where someone has AIDS or died of AIDS-related illnesses).

Further scrutiny of similar research in Uganda indicates that much attention was given to ALHIV aged from 12 to 19 years who were attending HIV care (Ashaba et al., 2019; Bakeera-Kitaka et al., 2019; Kihumuro et al., 2021; Kimera et al., 2020; MacCarthy et al., 2018; Mutumba, 2014; Mutumba et al., 2015; Sunday et al., 2019). These studies overlooked ALHIV and adolescents affected by HIV who resided in HIV affected homes and were not receiving HIV/psychosocial care although they constituted a major part of the population that was exposed to HIV (MOH-ACP, 2014a, 2014b; UAC, 2020; UNAIDS, 2015, 2022a, 2022b; WHO, 2014) and could be facing different psychosocial and sexual experiences (Lowenthal et al., 2014).

Additionally, nearly all previous research related to the psychosocial and sexual experiences among ALHIV and/or adolescents affected by HIV in Uganda, did not extensively examine the various sociodemographic situations faced, community stressors encountered, psychosocial distress signs experienced, coping methods used, and sexual risk behaviour engaged in (Ashaba et al., 2019; Bakeera-Kitaka et al., 2019; MacCarthy et al., 2018; MOH-ACP, 2014a; Mutumba, 2014; Mutumba et al., 2016; Sunday et al., 2019; UBOS & ICF, 2018; UNICEF, 2017; UPHIA, 2022; UYP, 2014; Whitton et al., 2022). Thus, little empirical data exists on the level of psychosocial experiences and sexual risk behaviours[1] that are rife in the adolescents who reside in homes where they are continually faced with risks related to HIV in Uganda.

These knowledge gaps beget two questions which are addressed in this paper: (1) What is the level of psychosocial experiences and sexual risk behaviour in ALHIV and adolescents affected by HIV who reside in HIV affected homes in Uganda? (2) How do these groups of adolescents compare on the observed psychosocial and sexual risk behaviour variables? It is hypothesised that these groups will exhibit considerable and comparable rates of the observed psychosocial experiences and sexual risk behaviour, since they all reside in homes affected by HIV.

Methodology

Research design

In a cross-sectional study, a paper-based structured questionnaire was used to collect data from 289 ALHIV aged 10–19 years, 756 adolescents who were not living with HIV and 392 adolescents who were not aware of their HIV status, who resided in 691 registered HIV affected homes that were randomly selected from HIV burdened parishes in the Lira, Rukungiri and Kayunga districts of Uganda. These adolescents deserved research because they constituted a considerable percentage of the adolescent population in Uganda (MOH-ACP, 2014a) and often faced the risks and effects of acquiring the virus which causes AIDS (NAFOPHANU, 2017, 2019), yet their psychosocial and sexual health was not examined (Lowenthal et al., 2014; Magadi & Uchudi, 2015; MOH-ACP, 2014a).

Sample size

The sample of 1437 adolescents was obtained using the Cochran (1977) and Kish-Leslie's (1995) formulae for computing a suitable sample size for a cross-sectional study with a population of interest that is equal to or more than 100,000, which is:

$$n = \left(\frac{z^2 pq}{\varepsilon^2}\right)(deff)/r$$

where, n is the recommended sample size; z is the desired standard deviate at 95% confidence level, which is 1.96; e is the permissible margin of error, which is .03; p is the proportion of adolescents aged 10–19 years who had lifetime sex, which is .215 (UNICEF, 2017); q is 1-p (1−.215), which is .785; *deff is* the maximum design effect due to multistage cluster sampling, which is 2; and r *is* the estimated response rate, which is .97.

After replacing the formula with these figures, the computed sample size was 1485. This figure was apportioned to each research district using the formula $n_i = (N_i)\ (1{,}485)/\Sigma\ N_i$, where, n_i is the number of adolescents selected from the i^{th} district, and N_i is the number of participants in that district (Table 1). However, the estimated sample sizes were not attained due to registering a small number of HIV affected homes in the districts of Kayunga and Rukungiri, and disqualifying a total of 48 adolescents from the study for refusing to participate, or displaying signs of anxiety at the onset of the interviews, or for not responding to at least six out of the 201 items in the questionnaire (Figure 1).

Sampling strategy

Purposive multistage sampling techniques were used to select the research locations. Initially, the 10 HIV subregions in Uganda[2] were ranked based on the adolescent HIV rate and the inclusion cut-off rate was set at 3%. Five subregions qualified, namely Ankole-Kigezi, South Buganda, Kampala, North Buganda, and Lango-Acholi. South Buganda was excluded because many HIV studies were conducted there in the past (UAC, 2009, 2017, 2018), while Kampala was excluded for being a national HIV referral centre (MOH-ACP, 2014b; UAC, 2017, 2020) and inhabited mainly by people who lived in nearby districts and often changed settings (UBOS, 2016, 2018a). Lira, Kayunga and Rukungiri districts were purposely selected from the Lango-Acholi, North Buganda and Ankole-Kigezi subregions because they had adolescent HIV rates of at least 3% (MOH-ACP, 2014b), community groups supporting people living with HIV (NAFOPHANU, 2017, 2019), and limited adolescent HIV research (UAC, 2017) and service centres (MOH-ACP, 2014b; UAC, 2017; UPHIA, 2017).

A purposive sampling method was again used to select every listed HIV burdened locality from a list of sub-counties and parishes for each district. Afterwards, simple random sampling methods were used to select HIV affected homes in the HIV burdened localities. Every listed home was assigned a unique serial number that was written on a separate piece of paper, folded, placed in a box and churned. Using a raffle technique, one folded paper was picked from the box at a time and opened, and its serial number was read out and ticked on the list until the required number of homes in each chosen locality had been attained. Nearly all homes with the caregivers who had allowed their adolescents to participate in the initial stage were selected, except those where caregivers or adolescents were absent or refused to participate at the time of data collection.

Lastly, the research assistants and caregivers generated a list of children in each selected HIV affected home and recruited all adolescents who were available, willing to participate and able to read and write or listen and respond to questions in English or local languages.

Table 1. Distribution of the estimated adolescent sample among the three research districts.

		Population	Estimated adolescents aged 10–19 years				Estimated sample	
	District	Overall	Percentage	Number	HIV rate	No. HIV+	Share	Size
1.	Lira	453,500	25.7[a]	116,550[a]	0.034[b]	3963[b]	38	564[c]
2.	Rukungiri	327,400	25.7[a]	84,142[a]	0.039[b]	3282[b]	31	460[c]
3.	Kayunga	394,000	25.7[a]	101,258[a]	0.032[b]	3240[b]	31	460[c]
	Total	1,174,900	25.7[a]	301,949[a]	0.035	10,568	100	1485[d]

[a] Estimated percentage and number of adolescents in the research districts (UBOS, 2018a, 2018b).
[b] Estimated adolescent HIV rate and number in the HIV sub-regions from which research districts were selected (MOH, 2014b).
[c] Planned district samples sizes.
[d] Planned overall sample size.

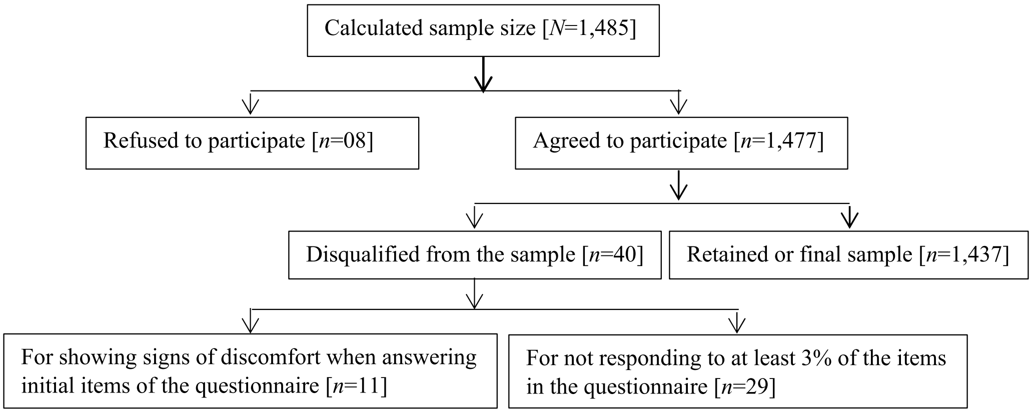

Figure 1. Recruitment flowchart of the calculated sample for this study.

Research methods and instruments

Data was collected by administering a paper-based household status form to caregivers and semi-structured questionnaire to participating adolescents in each chosen HIV affected home. The caregivers' household status form consisted of 10 items that sought information about the home location, caregiver's HIV status, children's personal and social attributes (name, age, gender, parental existence, health, care), and whether they would allow their children to participate in the study. The adolescents' questionnaire consisted of 201 items that were divided into a sociodemographic and a psychometric section.

The sociodemographic section consisted of 25 semi-structured items designed to assess the adolescent's personal and social attributes such as HIV status, age, gender, religion, ethnicity, occupation, school attendance, educational level, parental death, orphanhood type and age, home locality, number of homes lived in, time of residing in the current home, number of people in the home, number of sick people in the home, type of usual caregiver, number of caregivers, HIV status of the caregiver, sexuality talks with caregivers, and access to HIV/psychosocial care.

The psychometric section consisted of 176 items that were got from scales which were used in earlier research to gauge adolescents' levels of socioeconomic well-being (Majumder, 2021; Wani, 2019), peer influence (Santor et al., 2000), stressors related to poverty, personal threats, interpersonal problems (Avalos et al., 2010; Kalichman et al., 2006) and HIV stigma (Visser et al., 2008), as well as levels of psychosocial distress (Achenbach & Rescorla, 2001a, 2001b; Bordin et al., 2013), sexual risk behaviour (Friedrich et al., 2004; Wherry et al., 2009) and coping with adversities by self-control (Tangney et al., 2004), social support (Schwarzer & Schulz, 2013), socialisation, and deflection (Frydenberg & Lewis, 1993). The phrasing and response format of some items in these scales were simplified for cultural appropriateness to adolescents in Uganda and were thus verified for measurement precision and reliability using factor analysis on real data. The items that yielded low item-to-item and item-to-factor correlations were removed from these scales (Table 2).

Psychometric characteristics of the final scales

The final socioeconomic status scale had eight items, which assessed well-being reflected by family possession of assets, such as, a cemented house and land to farm, and personal access to basics such as a mattress and clothing each day. Each item was rated on a scale of zero to one (i.e., "no" or "yes"). This scale yielded a high internal consistency reliability of $\alpha = .79$.

The final peer influence scale included four items, which assessed experience of pressure from friends to, for instance, change views on anything or engage in negative behaviour like substance use and breaking home or school or community rules. Each item was rated on a scale of zero to one (i.e., "no" or "yes"). This scale yielded a high internal consistency reliability of $\alpha = .82$.

The final community stressors scale included 28 items. These items were divided into subscales for poverty reflected by the absence of basic needs, personal threats, interpersonal problems and HIV stigma. *The*

Table 2. Psychometric properties of the original and final scales for this study.

	Items, scoring format and reliability of the original scales			Items adopted	Items excluded*	Items, scoring format and reliabilities of the final scales			Average, standard deviation, min and max scores on the final scales			
Scales and subscales	*N*	Scoring	Conbach's *α*	*N*	*N*	*N*	Scoring	Cronbach's *α*	Mean ($\bar{x}$)	*SD*	Min	Max
Peer-socioeconomic influence	**12**	**-**	**-**	**12**	**0**	**12**	**0–1**	**.773**	**6.11**	**2.973**	**0**	**12**
Peer influence	11	0–4	.84	4	0	4	0–1	.815	1.07	1.409	0	4
Socioeconomic status	9	0–1	-	8	0	8	0–1	.798	5.04	2.446	0	8
Community stressors	**34**	**0–1**	**-**	**34**	**6**	**28**	**0–1**	**.884**	**10.84**	**8.187**	**0**	**38**
Poverty	6	0–1	-	6	0	6	0–1	.751	2.31	1.879	0	6
Personal threats	5	0–1	-	8	5	3	0–1	.717	1.63	1.152	0	3
Interpersonal problems	11	0–1	-	8	0	8	0–1	.786	0.98	1.638	0	8
HIV-related stigma	12	0–1	.87	12	1	11	0–2	.944	5.92	7.079	0	21
Psychosocial distresses	**112**	**0–2**	**.81**	**74**	**0**	**74**	0–2	**.964**	**25.54**	**22.59**	**0**	**105**
Internalising signs	-	0–2	-	**54**	**0**	**54**	0–2	**.956**	**21.34**	**18.05**	**0**	**82**
Anger/tantrums	-	0–2	-	8	0	8	0–2	.817	3.48	3.338	0	16
Inattentiveness	-	0–2	-	7	0	7	0–2	.812	2.67	2.955	0	14
Anxiety	-	0–2	-	9	0	9	0–2	.836	4.83	4.069	0	18
Depression	-	0–2	-	5	0	5	0–2	.765	2.26	2.351	0	10
Loneliness/withdrawal	-	0–2	-	5	0	5	0–2	.753	2.08	2.227	0	10
Sleep unrest	-	0–2	-	4	0	4	0–2	.638	1.45	1.719	0	8
Psychosis/thought problems	-	0–2	-	7	0	7	0–2	.828	1.47	2.415	0	13
Somatisation/fatigue	-	0–2	-	5	0	5	0–2	.762	2.19	2.093	0	10
Suicide ideation	-	0–2	-	4	0	4	0–2	.781	0.92	1.515	0	8
Externalising signs	**-**	**0–2**	**-**	**20**	**0**	**20**	0–2	**.924**	**4.20**	**6.100**	**0**	**37**
Disobedience	-	0–2	-	3	0	3	0–2	.753	0.80	1.236	0	6
Disruptiveness	-	0–2	-	6	0	6	0–2	.812	1.55	2.317	0	12
Destructiveness	-	0–2	-	2	0	2	0–2	.746	0.43	0.879	0	4
Aggressiveness	-	0–2	-	3	0	3	0–2	.729	0.70	1.173	0	6
Delinquency	-	0–2	-	6	0	6	0–2	.881	0.72	1.787	0	12
Coping methods	**48**		**-**	**42**	**13**	**29**		**.858**	**37.90**	**9.277**	**0**	**58**
Club membership	6	0–2	-	6	6	0	-	-	-	-	-	-
Social support	14	0–3	.83	12	2	10	0–2	.905	16.21	4.843	0	20
Self-control	10	0–4	.81	10	3	7	0–2	.778	10.70	3.023	0	14
Socialisation	5	0–4	.62	7	1	6	0–2	.679	5.56	2.863	0	12
Deflection	13	0 -4	.75	7	1	6	0–2	.768	5.419	3.246	0	12
Sexual risk behaviour	**45**	**0–2**	**.84**	**14**	**2**	**12**	**0–1**	**.886**	**2.26**	**2.971**	**0**	**12**
Risky social situations	-	0–2	.76	8	2	6	0–1	.784	1.34	1.617	0	6
Risky sexual acts	-	0–2	.79	6	0	6	0–1	.829	0.92	1.559	0	6
Total	**251**			**176**	**21**	**155**						

Notes**:** (*) These items were removed from the various scales during the exploratory and confirmatory factor analysis stages. (-) The number and or internal consistency reliability coefficients for items in the original scale are not applicable or specified.

poverty of basic needs subscale had six items, which assessed experiences of lack of basics such as a home, food, or water and unemployment of the head of the household. Each item was rated on a scale of zero to one (i.e., “no” or “yes”). This scale yielded an adequate internal consistency reliability of $\alpha = .75$. *The personal threats subscale* had three items which assessed experience of illness, death, or neglect of significant others like parents and siblings. Each item was rated on a scale of zero to one (i.e., “no” or “yes”). This scale yielded an adequate internal consistency reliability of $\alpha = .72$. *The interpersonal problems subscale* had eight items, which assessed experience of personal sickness, a family members’ or own pregnancy and relationship problems with parents, siblings, friends, partner(s), own children, neighbours, or workmates. Each item was rated on scale of zero to one (i.e., “no” or “yes”). This scale yielded a high internal consistency reliability of $\alpha = .79$. *The HIV stigma subscale* had 11 items, which assessed personal judgmental and social distancing attitudes about PLHIV, such as, feeling that PLHIV should be blame themselves for their HIV status, feeling afraid or uneasy amidst people who have signs of AIDS, and not feeling like being friends or sitting next or eating on the same plate or working with someone who has signs of AIDS. Each item was rated on a scale of zero to two (i.e., “disagree” to “agree”). This scale yielded an excellent internal consistency reliability of $\alpha = .94$.

The final psychosocial distress scale had 74 items. Eight items assessed signs of *anger*, such as acting without stopping to think. Seven items assessed signs of *inattention*, such as failure to finish any task. Nine items assessed signs of *anxiety*, such as feeling trapped by others. Five items assessed signs of *depression*, such as crying without a good reason. Five items assessed signs of *loneliness*, such as keeping things to oneself. Four items assessed signs of *sleep unrest*, such as experiencing nightmares. Seven items assessed signs of *psychosis*, such as repeating certain acts several times. Five items assessed signs of *somatisation*, such as experiencing fatigue. Four items assessed signs of *suicide*, such as feeling worthless. Three items assessed signs of *disobedience*, such as breaking rules of the home, school, or community. Six items assessed signs of *disruptiveness*, such as teasing others and bragging a lot. Two items assessed signs of *destructiveness*, such as destroying personal or other people’s property. Three items assessed signs of *aggression*, such as physically attacking or fighting with people, while six items assessed signs of *delinquency*, such as stealing from people. Each item was rated on a scale of zero to two (i.e., “never” to “always”). This scale yielded a quite adequate to high internal consistency reliability, which ranged from $\alpha = .64$ for the *sleep unrest subscale* to $\alpha = .88$ for the *delinquency subscale*.

The final coping methods scale included 29 items, which were divided into four subscales. *The social support subscale* had 10 items that assessed whether significant others, such as caregivers, showed empathy, comfort, affection, dependability, assurance, encouragement, readiness, optimism, care, and guidance whenever needed. Each item was rated on a scale of zero to two (i.e., “disagree” to “agree”). This scale yielded an excellent internal consistency reliability of $\alpha = .91$. *The self-control subscale* had seven items that assessed personal restraint from disturbance, offensive communication, events that are risky even if others think that they are pleasurable, and acting without thinking through alternatives. Each item was rated on a scale of zero to two (i.e., “not like me” to “like me”). This scale yielded an adequate internal consistency reliability of $\alpha = .78$. *The socialisation subscale* had six items that assessed coping by relaxing, exercising, interacting with peers, keeping to oneself and participating in other social events such as parties and religious prayers. Each item was rated on a scale of zero to two (i.e., “never” to “always”). This scale yielded a quite adequate internal consistency reliability of $\alpha = .68$. *The deflection subscale* included six items that assessed coping by trying to solve the problems, working hard, focusing on positive aspects of life, blaming self or others, assuming the worst may have occurred, and joking about the situation. Each item was rated on a scale of zero to two (i.e., “never” to “always”). This scale yielded an adequate internal consistency reliability of $\alpha = .77$.

The final sexual risk behaviour scale included 12 items. Six items assessed experience of *social situations* that could result in sexual risk behaviour, such as, staring at sexual parts of others, exposing own private parts, having peers who have sex partners, having friends of the opposite sex, or facing sexual advances. The other six items assessed participation in *sexual activities* that could result in HIV infection or spread, such as, having sex which was forced, consensual, in exchange of gifts, with someone who looked older, with more than one partner, or without condom use. Each item was rated on a scale of zero to one (i.e., “no” or “yes”). This scale yielded an adequate to a very high internal consistency reliability of $\alpha = .78$ for the *risky social situations subscale*, $\alpha = .83$ for the *risky sexual acts subscale* and $\alpha = .89$ for the *entire scale*.

These reliability results indicate that the final scales adequately assessed the observed psychosocial circumstances and sexual risk behaviour of the adolescents who participated in this study. The psychometric characteristics of each final scale are presented in Table 2.

Data collection procedure

Data was collected over a period of three months from 16th December 2019 to 17th February 2020 by research assistants who were recruited from the study districts. Before they commenced with data collection, each district chief administrative officer, resident commissioner, and director of health services was briefed about the study and handed letters approving the research.

Then, the coordinator for each district network of PLHIV[3] generated a register of HIV burdened areas and homes, including the names and contacts of their caregivers, and sought initial consent from them regarding their willingness to allow their children to participate in the study.

Next, one fieldwork supervisor, five research assistants and two fieldwork guides were recruited from each research district based on their proficiency in adolescent research and fluency in English and local languages. They received three days' training in research ethics, sampling processes and methods for building rapport, obtaining consent, administering questionnaires to participants, and in detecting and handling discomforts. They also participated in verifying translations and pilot-testing instruments.

Once the training had been completed, each district research team convened to scrutinise and update the registers, identify the homes with caregivers who had earlier agreed to participate in the study, prepare a fieldwork schedule, and notify leaders of support groups in the chosen parishes about the fieldwork dates. Research assistants were also appointed and handed the research materials consisting of a research protocol, registers of HIV burdened parishes and homes, research clearance letters, consent forms, household status forms, questionnaires, notebooks, pencils, and envelopes.

On the fieldwork days, pairs of research assistants visited different parishes where they met leaders of the support groups and jointly updated the register by adding new HIV affected homes and removing those with caregivers who changed their minds about participating.

Afterwards, they randomly chose homes to visit in each parish, briefed caregivers about the study and again asked them whether they would allow their adolescents to participate. When the caregivers agreed to their adolescents' participation, the research assistants thanked them, explained the selection process, and asked them to provide information regarding the names, ages, genders and health of the children in the home, including the type of care they received[4] and the available health records to verify their status. Caregivers who refused their adolescents' participation were politely thanked for their courtesy and the research assistants moved on to the next chosen home.

Next, each research assistant invited one chosen adolescent at a time to a private place, sat facing them, and explained the purpose of the study, the processes that would be followed and how privacy, discomforts, rights and benefits would be managed, before asking whether they would be willing to participate in the study or not (UNCST, 2014). Those who refused were allowed to leave, while those who accepted were interviewed.

During the interviews, the research assistants established rapport with the participants by respectfully greeting and introducing themselves. The participants were then given guidelines for responding to the questionnaire and were assured of the confidentiality of their answers. They were also informed that they were free to withdraw from the study at any time. The research assistants read out one item at a time in English or the appropriate local language, clarified any tricky items to enable proper comprehension and reduce guessing, wrote answers in the questionnaire using pencil, paused or ended the interviews if the adolescent showed any sign of anxiety, and handed each of them to the fieldwork guides or their caregivers for counselling. Lastly, each participant who finished the interview was thanked and given a bar of soap as compensation for participating.

Afterwards, research supervisors and assistants collated the completed questionnaires, checked and rectified errors, verified each adolescent's background information against the data in the household status form, and affixed it to the matching set of the completed questionnaires.

Once the interviews had been completed, the two research assistants thanked caregivers for allowing their children to participate in the study and proceeded to the next chosen home where they repeated

Table 3. Personal attributes of the adolescents, separated according to HIV status.

Observed personal variables	Total (*N* = 1437)		Infected (*n* = 289)		Uninfected (*n* = 756)		Unaware (*n* = 392)		Sig. *p value*	Effect-size Cohen's *d*
	N/ $\bar{X}$	*%/SD*	*n/*$\bar{x}$	*%/SD*	*n/*$\bar{x}$	*%/SD*	*n/*$\bar{x}$	*%/SD*		
HIV status of the sample^a	1,437	100%	289	20.1%	756	**52.6%**	392	27.3%	**<.001**	
Age they knew of HIV status^b	10.00	(3.227)	9.09	(2.528)	**11.97**	(3.706)			**<.001**	**.17**
Age in years^b	14.01	(2.765)	14.13	(2.715)	**14.34**	(2.805)	13.29	(2.588)	**<.001**	**.17**
10–14 years	811	56.4%	152	52.6%	385	50.9%	274	**69.9%**	**<.001**	
15–19 years	626	43.6%	137	47.4%	371	**49.1%**	118	30.1%		
Gender^b									.613	.03
Female	778	54.1%	162	**56.1%**	411	54.4%	205	52.3%		
Male	659	45.9%	127	43.9%	345	45.6%	187	**47.7%**		
Religion^b									**<.001**	**.18**
Catholic	563	39.2%	121	41.9%	321	**42.5%**	121	30.9%		
Anglican	533	37.1%	102	35.3%	293	**38.8%**	138	35.2%		
Muslim	170	11.8%	32	11.1%	60	7.9%	78	**19.9%**		
Pentecostal, SDA, Orthodox	171	11.9%	34	11.7%	82	10.9%	55	**14.1%**		
Currently enrolled in school^b	1,201	83.6%	247	85.5%	609	80.6%	345	**88.0%**	**.003**	.09
Highest education level^b									**.002**	.11
< Primary 4	267	18.6%	37	12.8%	150	19.8%	80	**20.4%**		
Primary 4 - 7	788	54.8%	173	**59.9%**	386	51.1%	229	58.4%		
> Primary 7	382	26.6%	79	27.3%	220	**29.1%**	83	21.2%		
Occupation^b									**<.001**	**.17**
None	340	23.7%	57	19.7%	166	22.0%	117	**29.8%**		
Student	877	61.0%	192	**66.4%**	443	58.6%	242	61.7%		
Farmer	162	11.3%	23	8.0%	116	**15.3%**	23	5.9%		
Home/bar tender, hawker, etc.	39	2.7%	12	**4.2%**	19	2.5%	8	2.0%		
Parental death/orphanhood^c	615	42.8%	202	**69.9%**	308	40.7%	105	26.8%	**<.001**	**.30**
Age at parental death^c	6.99	(3.714)	6.49	(3.503)	**7.70**	(3.791)	5.86	(3.463)	**<.001**	**.19**
Orphaned at ≤ 5 years	200	32.5%	77	38.1%	79	25.6%	44	**41.9%**	**<.001**	.12
Orphaned at >5-9 years	264	42.9%	83	41.1%	134	43.5%	47	**44.8%**		
Orphaned at > 9 years	151	24.6%	42	20.8%	95	**30.8%**	14	13.3%		
Type of orphanhood^c	615	100%	202	32.95%	308	50.1%	105	17.1%	**<.001**	**.23**
Paternal orphans	382	62.1%	97	15.8%	211	**34.3%**	74	12.0%		
Maternal orphans	128	20.8%	48	7.8%	62	**10.1%**	18	2.9%		
Double orphaned	105	17.1%	57	**9.3%**	35	5.7%	13	2.1%		
Span of orphanhood^c	7.41	(4.008)	**7.81**	(3.633)	7.08	(4.106)	7.61	(4.342)	.114	.09
≤ 2 years	53	8.6%	10	1.6%	32	**5.2%**	11	1.8%	.191	
>2-4 years	112	18.2%	34	5.5%	59	**9.6%**	19	3.1%		
> 4 years	450	73.2%	158	25.7%	217	**35.3%**	75	12.2%		

Note: Variables without *%* sign are stated in means with their *SD* in parentheses and *p* values. This data was obtained from a one-way ANOVA on responses of the three adolescent groups. *P* values for variables with a *%* sign were obtained from chi-square tests on cross-tabulations between adolescents' HIV status and personal attributes. *P* values are significant if ≤ .05. The significant *p* values are written in bold.

^{a}Percentages are between adolescent groups. The bold percentages indicate a higher occurrence of the variable in the group compared to the other two groups.

^{b}Means *($\bar{x}$)*, standard deviations *(SD)* and percentages *(%)* are within adolescent groups. The bold means and percentages show a higher occurrence of the variable in that group compared to the other two groups.

^{c}Percentages are within adolescent groups who are orphans.

the process until the required sample per chosen locality had been attained. This process enabled the participation of adolescents with varied demographic characteristics, minimised experience of discomfort, and ensured data privacy, completeness and accuracy.

Data analysis

Data was entered twice in the Epidata software and moved to the SPSS Version 24 for checking, cleaning, labelling and `analysis trials. Clean data was exported to the R-plugin programme Version 11.05.0 and exploratory factor analysis was performed on items that assessed peer influence, socioeconomic status, community stressors, psychosocial distress, coping methods, and risky sexual behaviour to verify their links with the proposed factors (Choi et al., 2011; Lorenzo-Seva & Ferrando, 2019, 2020). Unrelated and weak items with loadings of less than .3 were removed from the proposed factor and the retained items were assessed for inter-item and inter-factor correlations to prove the factor structures (Byrne, 2005, 2016; Lorenzo-Seva & Ferrando, 2021).

Afterwards, confirmatory factor analysis was performed on data for items in each factor to verify their goodness of fit with the theorised factor structure[5], and internal consistency reliability in assessing the observed and latent factors (Byrne, 2016; Snedecor & Cochran, 1989).

Table 4. Familial and social attributes of the adolescents, separated according to HIV status.

	Total (N = 1,437)		Infected (*n* = 289)		Uninfected (*n* = 756)		Unaware (*n* = 392)		Sig.	Effect-size
Observed attributes	*N*/ $\bar{X}$	*%/SD*	$n/\bar{x}$	*%/SD*	$n/\bar{x}$	*%/SD*	$n/\bar{x}$	*%/SD*	*p value*	Cohen's *d*
Home locality[a]									**<.001**	**.33**
Lira	587	40.8%	163	**56.4%**	278	36.8%	146	37.2%		
Rukungiri	446	31.0%	71	24.6%	316	**41.8%**	59	15.1%		
Kayunga	404	28.1%	55	19.0%	162	21.4%	187	**47.7%**		
Ethnicity[a]									**<.001**	**.33**
Muganda	158	11.0%	26	9.0%	73	9.7%	59	**15.1%**		
Musoga	120	8.4%	17	5.9%	55	7.3%	48	**12.2%**		
Munyankole	239	16.6%	50	17.3%	161	**21.3%**	28	7.1%		
Mukiga	215	15.0%	20	6.9%	155	**20.5%**	40	10.2%		
Langi and Acholi	571	39.7%	160	**55.4%**	267	35.3%	144	36.7%		
Mugishu, Itesot, Munyoro, etc.	134	9.3%	16	5.5%	45	6.0%	73	**18.6%**		
Number of homes lived in[a]	1.62	(0.98)	**1.93**	(1.08)	1.47	(0.89)	1.70	(1.002)	**<.001**	**.48**
1	843	58.7%	110	38.1%	518	**68.5%**	215	54.8%	**<.001**	**.24**
2	413	28.7%	123	**42.6%**	171	22.6%	119	30.4%		
>2	181	12.6%	56	**19.4%**	67	8.9%	58	14.8%		
Time spent in HIV affected home[a]	10.86	(5.02)	9.35	(4.99)	**11.84**	(4.79)	10.08	(5.06)	**<.001**	**.43**
≤ 4 years	236	16.4%	65	**22.5%**	95	12.6%	76	19.4%	**<.001**	**.24**
> 4–8 years	163	11.3%	63	**21.8%**	52	6.9%	48	12.2%		
> 8–12 years	434	30.2%	70	24.2%	236	31.2%	128	**32.7%**		
> 12–16 years	422	29.4%	69	23.9%	251	**33.2%**	102	26.0%		
> 16 years	182	12.7%	22	7.6%	122	**16.1%**	38	9.7%		
Number of persons in home [a]	6.74	(2.6)	6.09	(2.1)	6.74	(2.7)	**7.22**	(2.8)	**<.001**	**.31**
1-3 residents	93	6.5%	22	**7.6%**	49	6.5%	22	5.6%	**<.001**	.13
4-6 residents	677	47.1%	166	**57.4%**	355	47.0%	156	39.8%		
> 6 residents	667	46.4%	101	34.9%	352	46.6%	214	**54.6%**		
Number of sick persons in home[a]	1.40	(1.05)	**1.57**	(0.99)	1.37	(0.95)	1.32	(1.26)	**<.001**	**.25**
None	255	17.8%	38	13.1%	115	15.2%	102	**26.0%**	**<.001**	**.21**
1	605	42.1%	101	34.9%	358	**47.4%**	146	37.2%		
2	405	28.2%	107	**37.0%**	204	27.0%	94	24.0%		
>2	164	11.4%	43	**14.9%**	78	10.3%	43	11.0%		
Don't know	8	0.6%	00	0.0%	1	0.1%	7	**1.8%**		
Caregivers lived with[a]	1.74	(0.74)	1.67	(0.79)	1.69	(0.66)	**1.88**	(0.85)	**<.001**	
1	566	39.4%	138	**47.8%**	297	39.3%	131	33.4%	**<.001**	.15
2	740	51.5%	120	41.5%	413	**54.6%**	207	52.8%		
>2	131	9.1%	31	10.7%	46	6.1%	54	**13.8%**		
Type of usual caregiver[a]									**<.001**	**.29**
Both parents	572	39.8%	53	18.3%	344	**45.5%**	175	44.6%		
Father/brother only	114	7.9%	27	**9.3%**	60	7.9%	27	6.9%		
Mother/sister only	401	27.9%	83	28.7%	221	**29.2%**	97	24.7%		
Grandparents	204	14.2%	61	**21.1%**	80	10.6%	63	16.1%		
Others (uncle/aunt/maid)	146	10.1%	65	**22.5%**	51	6.7%	30	7.6%		
Caregivers' usual job[a]									**<.001**	.20
None	52	3.6%	10	3.5%	26	3.4%	16	**4.1%**		

(*Continued*)

Table 4. Continued.

Observed attributes	Total (N = 1,437)		Infected (*n* = 289)		Uninfected (*n* = 756)		Unaware (*n* = 392)		Sig.	Effect-size
	N/ $\bar{X}$	*%/SD*	*n/*$\bar{x}$	*%/SD*	*n/*$\bar{x}$	*%/SD*	*n/*$\bar{x}$	*%/SD*	*p value*	Cohen's *d*
Shop/home/bar tender	29	2.0%	9	**3.1%**	8	1.1%	12	**3.1%**		
Farmer	992	69.0%	193	66.8%	570	**75.4%**	229	58.4%		
Trader	187	13.0%	39	13.5%	64	8.5%	84	**21.4%**		
Civic worker (cleric, teacher, etc.)	136	9.5%	29	**10.0%**	71	9.4%	36	9.2%		
Driver/tout/builder/repairer	41	2.9%	9	3.0%	17	2.3%	15	**3.9%**		
Caregivers' alcohol consumption[a]	339	23.6%	93	**32.2%**	162	21.4%	84	21.4%	**<.001**	.12
Caregivers' HIV status[a]									**<.001**	**.27**
Positive	954	66.4%	144	49.8%	582	**77.0%**	228	58.2%		
Negative	328	22.8%	114	**39.4%**	102	13.5%	112	28.6%		
Unknown	155	10.8%	31	10.7%	72	9.5%	52	**13.3%**		
Got sexuality talks from caregivers[a]	1,223	85.1%	261	90.3%	692	**91.5%**	270	68.9%	**<.001**	**.28**
Got HIV/psychosocial care [a]	436	30.3%	266	**92.0%**	128	16.9%	42	10.7%	**<.001**	**.65**
Level of peer influence [a]									**<.001**	.18
Low ($\bar{x}$ *score of* ≤ 1)	1,003	69.8%	169	58.5%	540	71.4%	294	**75.0%**		
Quite moderate ($\bar{x}$ *score* >1*-*2)	127	8.8%	34	11.8%	46	6.1%	47	**12.0%**		
Moderate ($\bar{x}$ *score* > 2 *-* 3)	164	11.4%	48	**16.6%**	83	11.0%	33	8.4%		
Quite high ($\bar{x}$ *score* >3 *-* 4)	143	10.0%	38	**13.1%**	87	11.5%	18	4.6%		
Socioeconomic status [a]									.104	.09
Low/1st quartile ($\bar{x} \leq 2$)	254	17.7%	43	14.9%	150	**19.8%**	61	15.6%		
Quite moderate/2nd quartile ($\bar{x} > 2$ *-* 4)	297	20. 7%	62	21.5%	146	19.3%	89	**22.7%**		
Moderate/3rd quartile ($\bar{x} > 4$ *-* 6)	390	27.1%	93	**32.2%**	191	25.3%	106	27.0%		
Quite high/4th quartile ($\bar{x} > 6$ *-* 8)	496	34.5%	91	31.5%	269	**35.6%**	136	34.7%		

Notes**:** [a]The means *(*$\bar{x}$*)*, standard deviations *(SD)* and percentages *(%)* are within adolescent groups. The bold means and percentages show a higher occurrence of the variable in the group compared to the other two groups. Variables without a *%* sign are stated in means with their *SD* in parenthesis and *p* values. This data was obtained from the Kruskal-Wallis test on the responses of the three adolescent groups. *P* values for variables with a *%* sign were obtained from chi-square tests on cross-tabulations between adolescents' HIV status and family attributes. *P* values are significant if equal to or less than .05. The significant *p* values are written in bold. Cohen's *d* is the effect-size or the strength of effect of the relationships between adolescent's HIV-status and the other observed attributes. The *d* values of .2 = small effect, .5 = medium effect, and .8 = high effect. The bold *d* values indicate that the adolescent's HIV status had small to high effect on their other observed experiences.

Table 5. Adolescents' mean scores on measures for peer influence, socioeconomic status, community stressors, psychosocial distress, coping methods, and sexual risk behaviour

Constructs and observed factors	Total ($N = 1437$)		ALHIV ($n = 289$)		Uninfected ($n = 756$)		Unaware ($n = 392$)		Uncorrected *p value*	Corrected[a] *p value*	Effect size Cohen's *d*
	$\bar{X}$	*SD*	$\bar{x}$	*SD*	$\bar{x}$	*SD*	$\bar{x}$	*SD*			
Socioeconomic peer influence	6.12	(2.973)	**6.47**	(2.839)	6.02	(3.144)	6.01	(2.701)	.093	>.00135	.09
Peer influence	1.07	(1.409)	**1.41**	(1.495)	1.02	(1.465)	0.91	(1.176)	**<.001**	**.00135**	**.25**
Socioeconomic status	5.04	(2.445)	5.06	(2.313)	4.99	(2.580)	**5.10**	(2.270)	.989	>.00135	.07
Community stressors	10.84	(8.187)	11.39	(8.737)	9.48	(8.005)	**13.04**	(7.588)	**<.001**	**.00135**	**.41**
Poverty of basics	2.31	(1.878)	**2.94**	(2.062)	2.24	(1.863)	1.97	(1.645)	**<.001**	**.00135**	**.32**
Personal threats	1.63	(1.152)	**1.86**	(1.110)	1.52	(1.218)	1.66	(1.018)	**<.001**	**.00135**	**.20**
Interpersonal problems	0.98	(1.637)	**1.89**	(2.325)	0.75	(1.364)	0.76	(1.230)	**<.001**	**.00135**	**.47**
HIV-related stigma	5.92	(7.079)	4.71	(5.939)	4.97	(7.074)	**8.66**	(7.148)	**<.001**	**.00135**	**.59**
Judgmental attitudes	2.49	(3.208)	1.79	(2.525)	2.07	(3.150)	**3.81**	(3.392)	**<.001**	**.00135**	**.56**
Social distancing attitudes	3.43	(4.276)	2.91	(3.891)	2.89	(4.267)	**4.85**	(4.251)	**<.001**	**.00135**	**.51**
Psychosocial distress	25.54	(22.59)	**38.70**	(27.17)	18.62	(18.82)	29.17	(20.29)	**<.001**	**.00135**	
Internalizing symptoms	21.34	(18.05)	**31.43**	(20.35)	15.73	(15.50)	24.70	(16.74)	**<.001**	**.00135**	
Anger	3.48	(3.338)	**5.04**	(3.687)	2.64	(2.855)	3.94	(3.433)	**<.001**	**.00135**	**.58**
Inattentiveness	2.67	(2.954)	**3.87**	(3.444)	1.96	(2.571)	3.17	(2.873)	**<.001**	**.00135**	**.57**
Anxiety	4.83	(4.069)	**5.98**	(4.136)	3.80	(3.722)	5.96	(4.143)	**<.001**	**.00135**	**.57**
Depression	2.25	(2.350)	**3.64**	(2.772)	1.62	(2.026)	2.45	(2.114)	**<.001**	**.00135**	**.70**
Loneliness	2.08	(2.227)	**3.22**	(2.409)	1.51	(2.006)	2.32	(2.125)	**<.001**	**.00135**	**.64**
Sleep unrest	1.45	(1.718)	**1.93**	(1.870)	1.05	(1.530)	1.86	(1.760)	**<.001**	**.00135**	**.54**
Psychosis	1.47	(2.415)	**2.46**	(3.054)	0.96	(1.977)	1.70	(2.391)	**<.001**	**.00135**	**.50**
Somatisation	2.19	(2.093)	**3.18**	(2.424)	1.71	(1.911)	2.40	(1.865)	**<.001**	**.00135**	**.56**
Suicide ideation	0.92	(1.514)	**2.10**	(1.867)	0.47	(1.113)	0.89	(1.428)	**<.001**	**.00135**	**.92**
Externalizing symptoms	4.20	(6.100)	**7.27**	(8.820)	2.89	(4.546)	4.47	(5.396)	**<.001**	**.00135**	
Disobedience	0.80	(1.235)	**1.29**	(1.464)	0.63	(1.110)	0.79	(1.188)	**<.001**	**.00135**	**.43**
Disruptiveness	1.55	(2.317)	**2.42**	(3.104)	1.12	(1.912)	1.73	(2.144)	**<.001**	**.00135**	**.41**
Destructiveness	0.43	(0.879)	**0.71**	(1.085)	0.25	(0.700)	0.58	(0.937)	**<.001**	**.00135**	**.51**
Aggressiveness	0.70	(1.172)	**1.23**	(1.545)	0.49	(0.912)	0.73	(1.176)	**<.001**	**.00135**	**.43**
Delinquency	0.72	(1.787)	**1.62**	(2.859)	0.42	(1.282)	0.64	(1.329)	**<.001**	**.00135**	**.36**
Coping-methods	37.90	(9.277)	36.38	(9.728)	**39.12**	(9.821)	36.67	(7.348)	**<.001**	**.00135**	**.23**
Social support	16.21	(4.843)	15.10	(5.360)	16.43	(4.711)	**16.59**	(4.580)	**<.001**	**.00135**	**.21**
Emotional support	6.64	(1.999)	6.08	(2.263)	**6.81**	(1.897)	6.71	(1.914)	**<.001**	**.00135**	**.31**
Informational support	9.57	(3.163)	9.01	(3.387)	9.62	(3.126)	**9.88**	(3.017)	**<.001**	**.00135**	.16
Self-control	10.70	(3.023)	9.86	(3.296)	**11.19**	(2.844)	10.39	(2.977)	**<.001**	**.00135**	**.35**
Socialisation	5.56	(2.863)	**5.85**	(2.593)	5.79	(3.116)	4.91	(2.407)	**<.001**	**.00135**	**.28**
Deflection	5.42	(3.246)	5.56	(2.966)	**5.70**	(3.415)	4.77	(3.017)	**<.001**	**.00135**	**.23**
Sexual risk behaviour	2.26	(2.971)	**3.49**	(3.839)	2.01	(2.762)	1.83	(2.329)	**<.001**	**.00135**	**.30**
Risky social situations	1.34	(1.617)	**1.98**	(1.982)	1.20	(1.540)	1.16	(1.324)	**<.001**	**.00135**	**.32**
Risky sexual acts	0.92	(1.559)	**1.51**	(2.068)	0.81	(1.437)	0.67	(1.204)	**<.001**	**.00135**	**.25**

The mean ($\bar{x}$), standard deviation *(SD)* and *p* values are computed within adolescent groups. The bold means show a higher occurrence of the variable in the group compared to the other two groups. These values are derived from the Kruskal-Wallis equality-of-populations rank tests on the scores of adolescents to each psychometric scale in this study. The uncorrected *p* values are significant if equal to or less than .05. The corrected *p* values are significant if equal to or less than .00135. The significant uncorrected and corrected *p* values are written in bold. Cohen's *d* is the strength-of-effect of the relationships between adolescent's HIV-status and the other observed attributes. The *d* value of .2 = small effect, .5 = medium effect, and .8 = high effect. The bold *d* values indicate that the adolescent's HIV status had small to high effect on their other observed experiences.

[a] The corrected *p* values were calculated using the Bonferroni formula of controlling for the inflation of Type I error (false positives) associated with running multiple separate tests across different factors in the same dataset, which is *α/K*, where α represents the original significance level (.05), and *K* denotes the total number of separate Kruskal-Wallis tests performed on factors in this Table (37) = .00135. Cohen's *d* is the effect-size or the strength of effect of the relationships between adolescent's HIV status and the other observed attributes. The *d* values of .2 = small effect, .5 = medium effect, and .8 = high effect. The bold *d* values indicate that the adolescent's HIV status had small to high effect on their other observed experiences.

Then, univariate, variance and Kruskal–Wallis equality-of-populations rank tests were performed to compute and compare the frequency, mean, standard deviation, median, range, kurtosis, skewedness and percentage scores of the ALHIV, adolescents who were not living with HIV and those unaware of their HIV status on the measures for the observed psychosocial factors[6] and sexual risk behaviours.[7]

In addition, the Bonferroni correction of significance levels was performed to control for the inflation of Type I error (false positives) associated with running multiple separate Kruskal–Wallis tests across different factors in the same dataset and ultimately prevent the erroneous significant results (Frost, 2024). The corrected significance level was calculated using the formula α/K, where α represents the original significance level (.05), and K denotes the total number of comparisons or separate Kruskal–Wallis tests performed on factors in Table 5 (37). After replacing the formula with these figures, the corrected significance level was $a/K = .05/37 = .00135$. The results showed in Table 5 were, thus, considered statistically significant only when the probability value was less than or equal to .00135.

Finally, Cohen's d test was performed on the results in Tables 3, 4 and 5 to establish the effect-size of the adolescent's HIV status on each observed psychosocial experience (Cohen, 1990).

Results

Sociodemographic description of the adolescent sample, separated according to HIV status

Personal characteristics

Age. More than half of the adolescents who participated in this study were in the 10–14 year age group (n = 811, 56.4%). The adolescents who were not living with HIV ($\bar{x}$ = 14.3 years, SD = 2.81) and were living with HIV ($\bar{x}$ = 14.1 years, SD = 2.72), were significantly older compared to those unaware of their HIV status ($\bar{x}$ = 13.3 years, SD = 2.59) ($X^2(2, N = 1{,}437) = 39.97$, $p < .001$, $d = .17$).

Gender. More than half of the adolescents in the sample were female (n = 778, 54.1%). However, the percentage of females in the group for ALHIV (n = 162, 56.1%), for adolescents who were not living with HIV (n = 411, 54.4%) and for those who were not aware of their HIV status (n = 205, 52.3%), was not significantly different ($X^2(2, N = 1{,}437) = 0.98$, $p = .613$, $d = .03$).

Religion. More than a third of the adolescents were Catholic (n = 563, 39.2%) or Anglican (n = 533, 37.1%) while a small percentage were Pentecostal/Adventist (n = 171, 11.9%) or Muslim (n = 170, 11.8%). There were also more Catholics (n = 321, 42.5%) and Anglicans (n = 293, 38.8%) in the group for adolescents who were not living with HIV and the group for ALHIV (n = 121, 41.9%; n = 102, 35.3%) that they were in the group for those who were unaware of their HIV status (n = 121, 30.9%; n = 138, 35.2%). However, there were more Muslims (n = 78, 19.9%) and Pentecostals/Adventists (n = 55,14.1%) in the group for adolescents who were unaware of their HIV status compared to the group for ALHIV (n = 32, 11.1%; n = 34, 11.7%) and the group for adolescents who were not living with HIV (n = 60, 7.9%; n = 82, 10.9%), ($X^2(8, N = 1{,}437) = 47.85$, $p < .000$, $d = .18$).

Enrolment in school. More than four in five of the adolescents who participated in this study were enrolled in school by the time of this study (n = 1201, 83.6%) and the adolescents who were unaware of their HIV status (n = 345, 88%) and living with HIV (n = 247, 85.5%) had a significantly higher probability of being in school compared to those who were not living with HIV (n = 609, 80.6%), ($X^2(2, N = 1{,}437) = 11.39$, $p = .003$, $d = .09$).

Education attainment. More than a half of the adolescents had achieved primary four to seven levels of education (n = 788, 54.8%) and post-primary levels of education (n = 382, 26.6%) while a small percentage had achieved only lower primary levels of education (n = 267, 18.6%). The group for adolescents who were unaware of their HIV status had a higher probability of achieving only *lower primary levels of education* (n = 80, 20.4%) compared to the group for adolescents who were not living with HIV (n = 150, 19.8%) and group for ALHIV (n = 37, 12.8%). Data also indicate that whereas the group for ALHIV had a higher probability of *achieving primary four to seven levels of education* (n = 173, 59.9%), the group for adolescents who were not living with HIV had a higher probability of *achieving post-primary levels of education* (n = 220, 29.1%) compared to the other two groups ($X^2(4, N = 1{,}437) = 16.94$, $p = .002$, $d = .11$).

Awareness of the personal HIV status and age of knowing the HIV status. Close to three in four of the adolescents in the sample knew their HIV status (n = 1045, 72.7%) and more than half of them reported that they were not living with HIV ($n = 756$, 52.6%) while a smaller percentage reported that they were living with HIV ($n = 289$, 20.1%). In addition, these adolescents knew of their HIV status when they were in the early adolescence stage ($\bar{x} = 10$ years, $SD = 3.22$) and the ALHIV became *aware* at a significantly younger age ($\bar{x} = 9$ years, $SD = 2.53$) compared to adolescents who were not living with HIV ($\bar{x} = 12$ years, $SD = 3.71$), (H (2, $N = 1{,}437$) = 384.68, $p < .001$, $d = .17$).

Parental death. Many adolescents in the sample were orphaned ($n = 615$, 42.8%). Nearly a half of the orphaned adolescents were not living with HIV ($n = 308$, 50.1%), a third were living with HIV ($n = 202$, 33%), and a fifth were unaware of their HIV status ($n = 107$, 17%). The ALHIV were significantly more likely to have been orphaned ($n = 202$, 69.9%) compared to adolescents who were not living with HIV ($n = 308$, 40.7%) and adolescents who were unaware of their HIV status ($n = 105$, 26.8%), (X^2(4, $N = 1{,}437$) = 129.94, $p < .001$, $d = .30$).

Age at parental death. In addition, most of the orphaned adolescents lost one or both of their parents when they were in their preadolescence stage i.e., aged more than five to nine years ($n = 264$, 42.9%) and when they were in their childhood stage i.e., aged zero to five years ($n = 200$, 32.5%). On average, these orphans lost their parents when they were 6.9 years of age ($SD = 3.71$) and those who were unaware of their HIV status had lost their parents at a significantly younger age ($\bar{x} = 5.9$ years, $SD = 3.46$) compared those who were living with HIV ($\bar{x} = 6.5$ years, $SD = 3.50$) and were not living with HIV ($\bar{x} = 7.7$ years, $SD = 3.79$), (F (2, 612) = 12.88, $p < .001$, $d = .19$).

Type of orphanhood. Most of the orphans had lost either their fathers ($n = 382$, 62.1%) or mothers ($n = 128$, 20.8%) while a smaller percentage had lost both parents ($n = 105$, 17.1%). *Death of both parents* was significantly higher in the orphans who were living with HIV ($n = 57$, 9.3%) compared to orphans who were not living with HIV ($n = 35$, 5.7%) and orphans who were unaware of their HIV status ($n = 13$, 2.1%), while *death of the fathers and mothers* were significantly higher in the orphans who were not living with HIV ($n = 211$, 34.3%; $n = 62$, 10.1%) compared to orphans who were living with HIV ($n = 97$, 15.8%; $n = 48$, 7.8%) and orphans who were unaware of their HIV status ($n = 74$, 12%; $n = 18$, 2.9%), (X^2(4, $N = 615$) = 33.19, $p < .001$, $d = .23$).

Span of orphanhood. Most of the orphaned adolescents had faced orphanhood for more than four years ($n = 450$, 73.2%) while a small percentage of them faced it for shorter time ($n = 165$, 26.8%). On average, these orphans had faced orphanhood for 7.4 years ($SD = 4.01$) and those who were living with HIV faced orphanhood for a slightly longer time ($\bar{x} = 7.8$ years, $SD = 3.63$) compared to orphans who were not living with HIV ($\bar{x} = 7.1$ years, $SD = 4.11$) and orphans who were unaware of their HIV status ($\bar{x} = 7.6$ years, $SD = 4.34$), (F (2, 612) = 2.18, $p = .114$, $d = .09$) (Table 3).

Familial and social characteristics

Home setting

Most of the adolescents resided in homes that were located in Lira district ($n = 587$, 40.8%) and Rukungiri district ($n = 446$, 31%), while few of them resided in homes that were located in Kayunga district ($n = 404$, 28.1%). The ALHIV were significantly more likely to have resided in homes that were located in Lira ($n = 163$, 56.4%) compared to adolescents who were not living with HIV ($n = 278$, 36.8%) and unaware of their HIV status ($n = 146$, 37.2%). The adolescents who were not living with HIV were significantly more likely to have resided in homes that were located in Rukungiri ($n = 316$, 41.8%) compared to ALHIV ($n = 71$, 24.6%) and adolescents who were unaware of their HIV status ($n = 59$, 15.1%). The adolescents who were unaware of their HIV status were significantly more likely to have resided in homes that were located in Kayunga ($n = 187$, 47.7%) compared to ALHIV ($n = 55$, 19%) and adolescents who were not living with HIV ($n = 162$, 21.4%), (X^2(4, $N = 1{,}437$) = 159.83, $p < .001$, $d = .33$).

Ethnicity

The adolescents who participated in this study were Lango-Acholi ($n = 571$, 39.7%), Banyankole ($n = 239$, 16.6%), Bakiga ($n = 215$, 15%), Baganda ($n = 158$, 11%), Basoga ($n = 120$, 8.4%) and Bagishu, Itesot, or Banyoro ($n = 134$, 9.3%). The Lango-Acholi outnumbered other *ethnicities* in the group for ALHIV ($n = 160$, 55.4%), for the adolescents who were not living with HIV ($n = 267$, 35.3%) and for adolescents who were not aware of their HIV status ($n = 134$, 36.7%). Furthermore, the adolescents who were Lango-Acholi were significantly more likely to have been *living with HIV* ($n = 160$, 55.4%) compared to adolescents who were of the other identified ethnicities. The adolescents who were Banyankole ($n = 161$, 21.3%) and Bakiga ($n = 155$, 20%) were significantly more likely to have been *uninfected with HIV* compared to the adolescents who were of the other identified tribes. The adolescents who were Baganda ($n = 59$, 15.1%), Basoga ($n = 48$, 12.2%) and Bagishu/Itesot/Banyoro ($n = 73$, 18.6%) were significantly more likely to have been *unaware of their HIV status* compared to the adolescents who were Lango-Acholi, Banyankole and Bakiga, ($X^2(10, N = 1{,}437) = 155.92$, $p < .001$, $d = .33$).

Number of homes resided in

Most of the adolescents resided in one ($n = 843$, 58.7%) to two homes ($n = 413$, 28.7%) during their lifetime and the average number of homes they resided in was two ($\bar{x} = 1.6$, $SD = .98$). The ALHIV resided in a significantly higher number of homes ($\bar{x} = 1.9$, $SD = 1.08$) compared to adolescents who were not living with HIV ($\bar{x} = 1.5$, $SD = .89$) and adolescents who were unaware of their HIV status ($\bar{x} = 1.7$, $SD = 1.002$), (H (2, $N = 1437) = 80.92$, $p < .001$, $d = .48$).

Number of people lived with in the home

Most of the adolescents resided with four to six people ($n = 677$, 47.1%) and seven or more people ($n = 667$, 46.4%) in the home and the average number of people they resided with in the home was seven ($\bar{x} = 7$, $SD = 2.6$). The ALHIV resided in homes with significantly fewer people ($\bar{x} = 6.1$, $SD = 2.1$) compared to adolescents who were not living with HIV ($\bar{x} = 6.7$, $SD = 2.7$) and adolescents who were unaware of their HIV status ($\bar{x} = 7.2$, SD = 2.8), (H (2, $N = 1{,}437) = 33.79$, $p < .001$, $d = .31$).

Number of sick people lived with

Most of the adolescents also shared a home with one or more sick people ($n = 1174$, 81.7%) and the average number of sick people they shared the home with was one ($\bar{x} = 1.4$, $SD = 1.05$). The ALHIV shared a home with significantly more sick people ($\bar{x} = 1.6$, $SD = .99$) compared to adolescents not living with HIV ($\bar{x} = 1.4$, $SD = .95$) and unaware of their HIV status ($\bar{x} = 1.3$, $SD = 1.26$), (H (2, $N = 1{,}437) = 22.91$, $p < .001$, $d = .25$).

Type of caregivers lived with

Most of the adolescents lived with both parents ($n = 572$, 39.8%) and mothers or sisters ($n = 401$, 27.9%) while some of them lived with grandparents ($n = 204$, 14.2%), other relatives such as uncles/aunties ($n = 146$, 10.1%) and their fathers or brothers ($n = 114$, 7.9%). Although the ALHIV were significantly more likely to have been looked after by their fathers/brothers ($n = 27$, 9.3%), grandparents ($n = 61$, 21.1%), or uncles/aunties ($n = 65$, 22.5%) compared to adolescents who were not living with HIV ($n = 60$, 7.9%; $n = 80$, 10.6%; $n = 51$, 6.7%) and adolescents who were unaware of their HIV status ($n = 27$, 6.9%; $n = 63$, 16.1%; $n = 30$, 7.6%), the adolescents who were not living with HIV were significantly more likely to have been cared for by both parents ($n = 344$, 45.5%) and mothers or sisters ($n = 221$, 29.2%) compared to ALHIV ($n = 53$, 18.3%; $n = 83$, 28.7%) and adolescents who were unaware of their HIV status ($n = 175$, 44.6%; $n = 97$, 24.7%), ($X^2(10, N = 1{,}437) = 121.05$, $p < .001$, $d = .29$).

Number of caregivers lived with

Most of the adolescents lived with one ($n = 566$, 39.4%) to two ($n = 740$, 51.5%) caregivers and the average number of *caregivers* they lived with during their lifetime was two ($\bar{x} = 1.7$, $SD = .74$). The ALHIV ($\bar{x} = 1.67$, $SD = .79$) and adolescents who were not living with HIV ($\bar{x} = 1.69$, $SD = .66$) were looked after by significantly fewer lifetime caregivers compared to adolescents who were unaware of their HIV status ($\bar{x} = 1.88$, $SD = .85$), ($X^2(4, N = 1{,}437) = 33.61$, $p < .001$, $d = .15$).

Usual work of the caregivers

The adolescents lived with caregivers who worked as farmers ($n = 992$, 69%), traders ($n = 187$, 13%), civic workers ($n = 136$, 9.5%), drivers or touts or builders or repairers ($n = 41$, 2.9%) and shop/bar/home tenders ($n = 29$, 2%). Whereas the ALHIV were significantly more likely to have been looked after by caregivers who worked as civic workers ($n = 29$, 10%) and shop/home/bar tenders ($n = 9$, 3.1%) compared to adolescents who were not living with HIV ($n = 71$, 9.4%; $n = 8$, 1.1%) and adolescents who were unaware of their

HIV status ($n = 36$, 9.2%; $n = 12$, 3.1%), the adolescents who were not living with HIV were significantly more likely to have been looked after by caregivers *who worked as farmers (n = 570, 75.4%)* compared to the ALHIV ($n = 193$, 66.8%) and adolescents who were unaware of their HIV status ($n = 229$, 58.4%), and those who were unaware of their HIV status were significantly more likely to have been fostered by caregivers *who worked as traders* ($n = 84$, 21.4%) *and drivers/touts/builders/repairers* ($n = 15$, 3.9%) compared to ALHIV ($n = 39$, 13.5%; $n = 9{,}3$%) and adolescents who were not living with HIV ($n = 64$, 8.5%; $n = 17$, 2.3%), (X^2(14, $N = 1{,}437) = 55.37$, $p < .001$, $d = .20$).

Caregivers' HIV status

Most of the adolescents lived with caregivers who were HIV positive ($n = 954$, 66.4%) and HIV negative ($n = 328$, 22.8%) while a few lived with caregivers who were unaware of their HIV status ($n = 155$, 10.8%). Whereas the adolescents who were not living with HIV were significantly more likely to have lived with *HIV positive caregivers* ($n = 582$, 77%) compared to the ALHIV ($n = 144$, 49.8%) and adolescents who were unaware of their HIV status ($n = 228$, 58.2%), the ALHIV were significantly more likely to have lived with *HIV negative caregivers* ($n = 114$, 39.4%) compared to adolescents who were unaware of their HIV status ($n = 112$, 28.6%) and adolescents who were not living with HIV ($n = 102$, 13.5%), and those who were unaware of their HIV status were significantly more likely to have lived with *caregivers of unknown HIV status* ($n = 52$, 13.3%) compared to the ALHIV ($n = 31$, 10.7%) and adolescents who were not living with HIV ($n = 72$, 9.5%), (X^2(4, $N = 1{,}437) = 101.57$, $p < .001$, $d = .27$).

Caregivers' alcohol consumption status

Most of the adolescents lived with caregivers who were not users of alcohol ($n = 1098$, 76.4%) while a few of them lived with caregivers who were users of alcohol ($n = 339$, 23.6%). The ALHIV were significantly more likely to have lived with *caregivers who drank alcohol* ($n = 93$, 32.2%) compared to adolescent who were not living with HIV ($n = 162$, 21.4%) and adolescents who were unaware of their HIV status ($n = 84$, 21.4%), (X^2(4, $N = 1{,}437) = 20.89$, $p < .001$, $d = .12$).

Sexuality discussions with caregivers

Most of the adolescents reported that their caregivers discussed with them issues related to sexuality ($n = 1223$, 85.1%) and few of them reported that their caregivers did not do so ($n = 214$, 14.9%). The adolescents who were not living with HIV were significantly more likely to have *discussed sexuality issues with their caregivers* ($n = 692$, 91.5%) compared to the ALHIV ($n = 261$, 90.3%) and adolescents who were unaware of their HIV status ($n = 270$, 68.9%), (X^2(2, $N = 1{,}437) = 112.28$, $p < .001$, $d = .28$).

Receipt of HIV/psychosocial care services

Nearly a third ($n = 436$, 30.3%) of the 1437 adolescents reported that they had received HIV and/or psychosocial care and as expected, the ALHIV were significantly more likely to have received these services ($n = 266$, 92%) compared to adolescents who were not living with HIV ($n = 128$, 16.9%) and adolescents who were unaware of their HIV status ($n = 42$, 10.7%), (X^2(4, $N = 1{,}437) = 700.81$, $p < .001$, $d = .65$).

Peer influence

Nine in ten of the adolescents who participated in this study reported a low ($n = 1003$, 69.8%) to moderate ($n = 291$, 20.2%) peer influence and the average score they obtained on the scale for peer influence was 1.07 ($SD = 1.41$) out of a maximum of four. The group for ALHIV obtained a significantly higher score on measures of peer influence ($\bar{x} = 1.41$, $SD = 1.49$) compared to the group for adolescents who were not living with HIV ($\bar{x} = 1.02$, $SD = 1.47$) and the group for adolescents who were unaware of their HIV status ($\bar{x} = .91$, $SD = 1.18$), (H (2, $N = 1{,}437) = 23.36$, $p < .001$, $d = .25$) (Table 4).

The results in Tables 3 and 4 further showed that effect of these adolescent's HIV status on their personal, family and social experiences, was a small to medium.

Level of stressors, distresses, coping methods and sexual risk behaviour

Community stressors

The adolescents who participated in this study reported a considerable level of community stressors and the mean score they obtained on the entire scale that consisted of measures of HIV-related stigma, poverty reflected by absence of basic needs, personal threats and interpersonal problems was 10.84 ($SD = 8.19$) out of a maximum score of 32.

Whereas the group for adolescents who were not aware of their HIV status obtained a significantly higher score on measures of HIV-related stigma ($\bar{x} = 8.66$, $SD = 7.15$) compared to the ALHIV ($\bar{x} = 4.71$, $SD = 5.94$) and those who were not living with HIV ($\bar{x} = 4.97$, $SD = 7.07$), (H (2, $N = 1{,}437$) $= 116.85$, $p < .001$, $d = .59$), the group for ALHIV got significantly higher scores on measures of poverty reflected by absence of basic needs ($\bar{x} = 2.94$, $SD = 2.06$, H (2, $N = 1{,}437$) $= 38.01$, $p < .001$, $d = .32$), personal threats ($\bar{x} = 1.86$, $SD = 1.11$, H (2, $N = 1{,}437$) $= 16.16$, $p = .001$, $d = .20$) and interpersonal problems ($\bar{x} = 1.89$, $SD = 2.33$, H (2, $N = 1{,}437$) $= 78.02$, $p < .001$, $d = .47$) compared to adolescents who were not living with HIV ($\bar{x} = 2.24$, $SD = 1.86$; $\bar{x} = 1.52$, $SD = 1.22$; $\bar{x} = .75$, $SD = 1.36$) and those who were not aware of their HIV status (Table 5).

Psychosocial distress

The adolescents also reported a considerable level of psychosocial distress and the average score they obtained on the entire scale that consisted of measures for signs of internalising distress (anger, inattention, anxiety, depression, loneliness, psychosis, sleep unrest, somatisation, suicide ideation) and externalising distress (disobedience, disruptiveness, destructiveness, aggressiveness, delinquency) was 25.54 ($SD = 22.59$) out of a maximum score of 105. The group for ALHIV got significantly higher scores on measures of each observed sign of internalising ($\bar{x} = 31.43$, $SD = 20.35$, H (2, $N = 1437$) $= 179.35$, $p < .001$, $d = .50$ to .92) and externalising distress ($\bar{x} = 7.27$, $SD = 8.82$, H (2, $N = 1437$) $= 78.91$, $p < .001$, $d = .36$ to .51) compared to the group for adolescents who were not aware of their HIV status ($\bar{x} = 24.70$, $SD = 16.74$; $\bar{x} = 4.47$, $SD = 5.39$) and group for adolescents who were not living with HIV ($\bar{x} = 15.73$, $SD = 15.50$; $\bar{x} = 2.89$, $SD = 4.55$) (Table 5).

Coping methods

In addition, the adolescents who participated in this study reported a substantial level of coping with adversities and the mean score they obtained on the entire scale that consisted of measures of coping by self-control, socialisation, deflection and social support methods was 37.90 ($SD = 9.38$) out of a maximum score of 58. The group for adolescents who were not living with HIV obtained significantly higher scores on measures of coping with adversities ($\bar{x} = 39.12$, $SD = 9.82$) compared to the groups for adolescents who were not aware of their HIV status ($\bar{x} = 36.67$, SD = 7.35) and ALHIV ($\bar{x} = 36.38$, $SD = 9.73$), (H (2, $N = 1{,}437$) $= 20.02$, $p = .001$, $d = .23$).

However, the results on the level of coping using different methods among these adolescents indicate that the group for ALHIV obtained a significantly higher score on measures of coping by socialisation ($\bar{x} = 5.85$, $SD = 2.59$) compared to the group for adolescents who were not living with HIV ($\bar{x} = 5.79$, $SD = 3.12$) and the group for adolescents who were not aware of their HIV status ($\bar{x} = 4.91$, $SD = 2.41$), (H (2, $N = 1437$) $= 28.58$, $p < .001$, $d = .28$). The group for adolescents who were not living with HIV obtained significantly higher scores on measures of coping by self-control ($\bar{x} = 11.19$, $SD = 2.84$), (H (2, $N = 1437$) $= 43.98$, $p < .001$, $d = .35$) and deflection of the problems faced ($\bar{x} = 5.70$, $SD = 3.42$), (H (2, $N = 1437$) $= 20.33$, $p < .001$, $d = .23$) compared to the groups for ALHIV ($\bar{x} = 9.86$, $SD = 3.29$; $\bar{x} = 5.56$, $SD = 2.97$) and adolescents who were not aware of their HIV status ($\bar{x} = 10.39$, $SD = 2.98$; $\bar{x} = 4.77$, $SD = 3.02$), while the group for adolescents who were not aware of their HIV status obtained a significantly higher score on measures of coping by seeking informational and emotional social support ($\bar{x} = 16.59$, $SD = 4.58$) compared to the groups for ALHIV ($\bar{x} = 15.10$, $SD = 5.36$) and adolescents who were not living with HIV ($\bar{x} = 16.43$, $SD = 4.71$), (H (2, $N = 1437$) $= 17.26$, $p < .001$, $d = .21$) (Table 5).

Sexual risk behaviour

The adolescents who participated in this study reported a considerable level of sexual risk behaviour and the mean score they obtained on the entire scale that consisted of measures of risky social situations (such as, having sexually active peers) and risky sexual acts (such as, having unprotected sex) was 2.26 ($SD = 2.97$) out of a maximum score of 12.

The group for ALHIV obtained a significantly higher score on measures of sexual risk behaviour ($\bar{x} = 3.49$, $SD = 3.84$) compared to the group for adolescents who were not living with HIV ($\bar{x} = 2.01$, $SD = 2.76$) and group for adolescents who were not aware of their HIV status ($\bar{x} = 1.83$, $SD = 2.33$), ($H\ (2, N = 1437) = 32.55$, $p < .001$, $d = .30$). Similarly, the ALHIV reported a significantly higher level of risky social situations ($\bar{x} = 1.98$, $SD = 1.98$; $H\ (2, N = 1437) = 38.40$, $p < .001$, $d = 32$) and sexual acts ($\bar{x} = 1.51$, $SD = 2.07$; $H\ (2, N = 1437) = 24.34$, $p < .001$, $d = .25$) compared to the group for adolescents who were not living with HIV ($\bar{x} = 1.20$, $SD = 1.54$; $\bar{x} = .81$, $SD = 1.44$) and group for adolescents who were not aware of their HIV status ($\bar{x} = 1.16$, $SD = 1.32$; $\bar{x} = .67$, $SD = 1.20$).

Furthermore, results of the Bonferroni correction on the significance level for the factors in Table 5 showed that the corrected level of significance was .05/37 = .00135. Since the uncorrected probability values of the results in this table ($p < .001$) are less than the Bonferroni corrected probability values ($p = 00135$), except for the socioeconomic and peer influence factor ($p = .093$) and socioeconomic status factor ($p = .989$), the separate Kruskal–Wallis tests which were performed on the dataset for each factor in this table, did not result in false positives (Table 5).

Discussion

The findings showed that whereas the three groups of adolescents who participated in this study were, to an extent, exposed to each observed sociodemographic attribute, community stressor, psychosocial distress, coping method, and sexual risk behaviour, the level of exposure to each of them varied according to their HIV status.

Sociodemographic situations

The ALHIV were significantly more likely to have been aware of their HIV status at a younger age when they were mainly in their preadolescence stage, to have lost a mother and father, to have been orphaned mainly when they were in the childhood stage, to have engaged in risky child labour such as working as house/bar tenders or hawkers, and to have rarely attended post primary levels of education although they attained the upper levels of primary education compared to the adolescents who were not living with HIV. This implies that the ALHIV had to deal with the negative effects of awareness of their HIV and orphanhood status longer, of not continuing to the post primary levels of education, and of participating in risky child labour.

Awareness about the HIV status at a significantly younger age in the group for ALHIV was ascribed to increased coverage of services for prevention of mother to child HIV transmission (PMTCT) and HIV care, which enabled pregnant women and girls to test for their own and children's HIV status regularly so that they initiate HIV treatment and care early (UAC, 2020). Additionally, many adolescents in this group could have acquired HIV from their mothers and experienced repeated illnesses that resulted in caregivers testing their HIV status early (Cluver et al., 2013). The significantly higher reporting of child labour in the group ALHIV could be ascribed to death of both parents and experiencing orphanhood for a long time, which resulted in facing socioeconomic hardships and not being able to continue with education (Cluver et al., 2013), while the low attainment of post primary levels of education in this group could be ascribed to lack of bursaries for this level of education, low ability to cope with stressful school situations (Kihumuro et al., 2021; Kimera et al., 2020), and poor school performance (Mutumba, 2014).

The results also showed that the ALHIV were significantly more likely to have resided in many homes, with fewer residents, with several people who were sick, and with caregivers who were fathers or brothers and relatives, such as grandparents, uncles and aunties. The higher probability of ALHIV residing in many homes and being looked after by their fathers and relatives can be ascribed to many of them losing their mothers and both parents. In addition. some of them, especially the orphans, occasionally resided with relatives who provided their necessities but probably experienced a sense of lack of family and belonging while carrying the burden of caring for their own or other family members' morbidities and worrying about their own health and other family members' sickness and likely death. The small reported number of residents in the home and caregivers in this group can be attributed to the reluctance of caregivers in homes with children living with HIV and other relatives of children in HIV affected families to take in more people due to the stigma and heavy burden of care.

The ALHIV were again significantly more likely to have been Lango or Acholi who resided in Lira district, to have resided with caregivers who were HIV negative or alcohol users, to have received HIV/psychosocial care, and to have reported peer influence. The higher probability of the ALHIV being Lango/Acholi was ascribed to the war insurgency in Northern Uganda that extended into the early 2010s, which not only disrupted the protective sociocultural norms, family systems and social services in these communities but also increased the spread of HIV, parental deaths, orphanhood and alcoholism (UBOS & ICF, 2018; UNICEF, 2017). These circumstances could have not only resulted in some adolescents in this group facing family negligence, a lack of belonging and psychological distress partly linked to the continuous HIV treatments (Kihumuro et al., 2021; Kimera et al., 2020; Mutumba, 2014; Sunday et al., 2019), but also in distrusting family members and trusting the risky advice and behaviours of their peers (Mahmood & Shujja, 2013). The higher probability of ALHIV residing with caregivers who were HIV negative could be ascribed to some of the adolescents in this group experiencing death of both parents and being adopted by their relatives who are HIV negative. It is also possible that more HIV negative caregivers are taking care of their relative's children who are living with HIV or providing little guidance to their children which result in risky sexual behaviour and HIV infections among them. The higher probability of the HIV unaware adolescents living with caregivers who did not know the personal HIV status can be ascribed to caregivers being scared of what may occur if their own or children's HIV tests were positive.

The findings also showed that the adolescents who were not living with HIV were significantly more likely to have attended the post primary levels of education, engaged in farming, faced orphanhood for a shorter time, resided in one home, and to have been looked after by both parents, the mother and caregivers who were living with HIV, did not use alcohol, or discussed sexuality issues. They were also much more likely to have lived in the Rukungiri area that has experienced more political and socioeconomic stability and where society emphasises formal social relationships. The higher probability of the adolescents who were not living with HIV attending post primary education was ascribed to many of them residing with both parents and caregivers who were economically well off (see Table) and experiencing lesser food insecurity and problems of orphanhood, which resulted in better family stability, parental care and school achievement compared to those in the other two groups. The higher probability of the adolescents who were not living with HIV being looked after by caregivers who were HIV positive was ascribed to some of these caregivers giving birth to or fostering more children who did not have the virus that causes AIDS, due to use of services for PMTCT of HIV. Some of these caregivers could be also supervising their children more strictly to avoid participating in activities which would result in sexual risk behaviour and HIV infection among them. It is also possible some caregivers avoided discussing HIV/sexuality issues with ALHIV due to fear of evoking painful memories, while the other caregivers of especially adolescents who were not living with HIV may have discussed such issues because they believed it would raise their risk perception and protect them from danger. These circumstances could have reduced this groups' exposure to various psychosocial and sexual risks and protected them against HIV infection.

The findings also show that ALHIV were significantly more likely to have received HIV/psychosocial care services compared to the adolescents who were not living with HIV and those who were unaware of their HIV status. This was attributed to the scaling up of HIV treatment and psychotherapeutic services for ALHIV in care settings (which increased the coverage of HIV care in this group) and the poor coverage of community, school and family-based HIV counselling services for adolescents affected by HIV/AIDS (UAC, 2020, 2022).

Some of these findings concur with those of earlier studies which found that most of the ALHIV had lost either their father or mother, or both and were living with caregivers who are relatives (Bakeera-Kitaka, et al., 2019; Mutumba, 2014). The findings also concur with Mellins et al. (2012) who found that the ALHIV faced more double orphanhood, household tasks, change of homes and a shorter stay in the home compared to adolescent who were not living with HIV. They also agree with Cluver et al. (2013) who found that the adolescents who were orphaned by AIDS had a higher probability of reporting double orphanhood, household chores, home instability and residing in a home for a shorter time compared to the adolescents who were not orphaned by AIDS.

Community stressors

The results further showed that whereas the group for adolescents who were not living with HIV and for adolescents who were not aware of their HIV status obtained significantly higher scores on the measures of judgmental and social distancing HIV stigma, the ALHIV obtained significantly higher scores on the measures of poverty reflected by the absence of basic needs, personal threats and interpersonal problems.

The significantly higher levels of stigma in the group for adolescents who were not living with HIV and for those unaware of their HIV status was attributed to a lack of knowledge about HIV transmission, while the low stigma among ALHIV was ascribed to better access to information and services related to HIV prevention, treatment and psychosocial care, which helped to reduce their HIV misconceptions. The significantly higher levels of poverty and personal threats in ALHIV was ascribed to some of them and their family members experiencing regular illnesses and deaths or negligence of family members, which resulted in low productivity and socioeconomic hardship while the significantly higher interpersonal problems in the ALHIV was ascribed to the discriminatory and demeaning comments and acts by their peers, family, school and community members, which may have led to poor interpersonal relationships.

These findings concur with Kalungwana et al. (2022) who also found lower levels of interpersonal relationships in children who were living with HIV compared to those who were not. Earlier studies also found significantly high rates of HIV stigma, poverty of basics, personal threats (concern about own and family members' unemployment, continuous sickness and medication, imminent death, property theft, or school performance), and interpersonal problems with peers or significant others among HIV-infected adolescents (Avalos et al., 2010; Mutumba, 2014; NAFOPHANU, 2019). The findings also concur with those of Visser et al. (2008) who found that people who are aware of someone with HIV (e.g., ALHIV due to the higher access to HIV/psychosocial care), had lower rates of HIV stigma than others. However, other studies found that the ALHIV and adolescents who were not living with HIV but were perinatally exposed to HIV (born by mothers who were living with HIV) had comparable rates of community stressors, such as poverty, social abuse, personal and caregivers' illness, family conflicts, neighbourhood insecurity, and HIV-related stigma (Mellins & Malee, 2013; Mutumba et al., 2016).

Findings of the current and earlier studies indicate that exposure to HIV creates various psychosocial adversities in families and communities which foment sexual risk behaviour, especially among ALHIV. This highlights the need for families, schools, communities and organisations that provide social/HIV/sexual/mental health service to implement interventions that prevent poverty, personal threats and interpersonal problems among ALHIV, and judgmental and social distancing stigma in other adolescents.

Psychosocial distress

Furthermore, the ALHIV obtained significantly higher scores on measures of each observed internalising and externalising signs of distress, with the most prominent being anxiety, anger, inattentiveness, depression, loneliness, somatisation, psychosis, disruptiveness, suicide ideation, and delinquency respectively.

The significantly high levels of distress in this group of adolescents compared to those who were not living HIV and who were unaware of their HIV status was ascribed to involvement in risky work such as house/bar tending, frequent change of homes, death of both parents or the mother, single parenting, living with sick people in the home, access to HIV/psychosocial care, negative peer influence and high vulnerability to stressors such as HIV-related stigma, interpersonal problems with friends or family members, poverty of basics, and personal threats, e.g., significant others' negligence, illness or death situations. These experiences may have not only contributed to insufficient family bonding and the rekindling of bad memories of ALHIV, but also weakened their ability to effectively cope with the problems faced, which could have contributed to distress and risky sexual behaviour.

The current findings concur with those of some previous studies that also found that ALHIV had a significantly higher probability of experiencing anxiety (Visser et al., 2018), depression (Cluver et al., 2013; Elkington et al., 2011), loneliness (Bomba et al., 2010), attention deficit (Bomba et al., 2010; Gadow et al., 2012a, 2012b), hyperactivity (Gadow et al., 2012a, 2012b; Visser et al., 2018), psychosis (Bomba et al., 2010), somatic and affective problems (Visser et al., 2018), disobedience (Gadow et al., 2012a, 2012b; Kalungwana et al., 2022), aggression (Kalungwana et al., 2022), antisocial tendencies, and delinquent behaviour (Bomba et al., 2010; Kalungwana et al., 2022; Puthanakit et al., 2013) compared to adolescents who were not living with HIV but were exposed to HIV by way of being born to parents who were living with HIV or to parents who died due to AIDS-related illnesses.

However, some earlier studies found that ALHIV and those who were perinatally exposed but were not living with HIV had comparable rates of anxiety, depression (Kang et al., 2011), suicide ideation and other signs of psychological distress (Foster et al., 2012), while other studies found the ALHIV had significantly lower rates of attention deficit disorder, hyperactivity (Mellins et al., 2011; Visser et al., 2018), depression (Gadow et al., 2012a, 2012b; Mellins et al., 2011), anxiety, loneliness, aggression (Malee et al., 2011a; Mellins et al., 2011; Mellins & Malee, 2013), somatisation, and delinquency (Gadow et al., 2012a, 2012b) compared to the adolescents who were perinatally exposed to HIV but were not living with HIV. The current results underscore the need for interventions to prevent and mitigate psychosocial distress, especially among ALHIV.

Coping

The results further showed that the ALHIV were significantly more likely to have coped with adversities by socialisation (such as attending social events like parties), and significantly less likely to have coped with adversities using self-control (such as refusing bad things), deflection (such as keeping busy), and seeking emotional/informational support compared to the adolescents who were not living with HIV and adolescents who were unaware of their HIV status. The significantly lower probability of ALHIV coping with adversities using constructive methods such as self-control and seeking social support could be ascribed to low self-worth and life skills, and fear of their problems being disclosed to others and used against them (NAFOPHANU, 2019).

To some extent, these findings concur with the previous studies that also found that children living with HIV had significantly higher daily living and socialisation abilities and less adaptive functioning (similar to coping using self-control or deflection) than those who are not living with HIV (Kalungwana et al., 2022). Other studies found that adolescents with chronic illnesses such as AIDS had lower family communication, affective involvement and behavioural control than healthy children (Louthrenoo et al., 2013, 2018), even though they often utilised active methods (such as confrontation or seeking social support) and passive methods (such as withdrawal or depressive reaction) of coping with various stressors and psychological distress (Meijer et al., 2002; Murphy et al., 2000, 2001).

The findings underscore the need to enhance the coping skills of the adolescents who reside in HIV affected homes to address their psychosocial and sexual health risks in a sustainable way.

Sexual risk behaviour

Similarly, the group for ALHIV reported a significantly higher rate of sexual risk behaviour compared to the group for adolescents who were not living with HIV and for adolescents who were unaware of their HIV status. This is attributed to the increased access to and uptake of HIV care, which apart from improving their physical health and optimism of achieving lifetime social goals (Mutumba, 2014), *negatively* affected their perception of risk and psychological health, which could have contributed to sexual risk behaviour.

The significantly higher rate of sexual risk behaviour in the ALHIV was ascribed to high exposure to negative peer influence and socioeconomic hardships, especially among the orphans and those who belonged to the Baganda and Lango ethnicities where some families were relaxing their stance regarding teenage social and sexual relationships. The other contributing factors were the significantly higher exposure to personal threats and interpersonal problems related to parental death or concern about their own and caregivers' sickness or uncertainty about achieving future aspirations. These factors led to some of them experiencing a low sense of belonging, imitating the negative norms of their friends, construing family tolerance of their risky social relationships as approval, and experiencing distress and sexual risk behaviour.

These findings concur with those from earlier studies that also found that ALHIV had a significantly higher probability of engaging in early (Bauermeister et al., 2012; Elkington et al., 2012) unprotected sex (Mellins et al., 2011) compared to those who were perinatally exposed but not living with HIV. This was ascribed to poverty and psychological stress. However, the current findings differ from those of other studies that found that adolescents who were perinatally exposed to HIV but were not living with HIV, had a significantly higher probability of having sex at an early age (Leonard et al., 2010; Mellins et al., 2011), multiple sexual partners, and unprotected sex (Bauermeister et al., 2012; Elkington et al., 2012; Koeing et al., 2011) compared to the ALHIV.

Interventions are needed to address the psychosocial factors contributing to the high vulnerability to sexual risk behaviour, especially among adolescents who are infected with HIV.

Limitations

The research from which this manuscript was extracted faced challenges that could have affected the results discussed in this paper. Firstly, a purposive multistage sampling method was used to select the areas (districts and parishes) and participants that were involved in this research, basing of the burden of HIV. This method of sampling may have contributed to selection of participants who had a higher possibility of accessing HIV services and created other biases, which affected the findings of the study.

Secondly, a review of earlier studies found that some personal and family factors such as caregivers' emotional and instrumental traits and domestic violence affect the psychosocial and sexual well-being of ALHIV and adolescents who were exposed to HIV (Cluver et al., 2012, 2013; Mutumba et al., 2016, UNICEF, 2017, 2022). However, these factors were not assessed in these adolescents and may have also affected the findings of this study.

Thirdly, a self-reporting questionnaire that consisted of 201 questions was utilised to interview adolescents about several sensitive lifetime psychosocial and sexual experiences. Whereas the administration of this questionnaire in a face-to-face manner and in local languages with brief pauses in the interviews allowed adolescents time to comprehend and respond to the questions, the findings may have been affected by fatigue, recall and social desirability biases.

Lastly, since this study focused on adolescents of varied HIV status who resided in HIV affected homes and did not include those in homes that were not affected by HIV, the findings may not be generalised to all adolescents.

Conclusion

Adolescents who reside in HIV affected homes in Uganda experience considerable rates of the observed risk and protective psychosocial and sexual experiences. However, the ALHIV are significantly more vulnerable to nearly all the observed risk factors, such as lower education attainment, living with more sick people in the home, death of both parents, frequent change of homes, having caregivers who are relatives or users of alcohol or discuss sexuality issues, negative effects of receiving HIV care, negative peer influence, poverty reflected by absence of basic needs, personal threats, interpersonal problems, psychosocial distress, sexual risk behaviour, and coping with adversities using negative methods compared to their peers who were not living with HIV or unaware of their HIV status. They, thus, face poorer parental guidance and sense of belonging, a higher burden of caring for their own and other family members' sicknesses, higher vulnerability to STDs abilities compared to their peers in the same home. Interventions are needed from families, schools, communities and agencies to prevent or mitigate the risk factors and promote the protective factors reported in this paper, especially among ALHIV.

Notes

1. *Operational definition of study terms*

   In this study, psychosocial and sexual risk behaviour experiences refer to adolescents' sociodemographic attributes, peer influence, socioeconomic status, community stressors, psychosocial distresses, coping methods and sexual risk behaviour.

Socio-demographic attributes are personal, familial and social factors such as age, gender, religion, ethnicity, being in or out of school, level of education, occupation, HIV status, parental death, number of people in the home, number of sick people in the home, number of homes lived in, number and type of caregivers lived with, HIV status of the usual caregiver, parent to child sexuality talks, access to HIV/psychosocial care, socio-economic status, and peer influence (Cluver et al., 2013).

Peer influence occurs when people do things because others have urged to do so or can be a feeling of being urged by others to do certain things (Santor et al., 2000).

Socioeconomic status is the individual's living standard based on the type of house slept in, land ownership, meals afforded each day and belongings such as clothing, beddings, soap, furniture, radio, telephone, television and a bicycle (Wani, 2019).

Community stressors are adversities in life that create communal distresses, for example HIV-related stigma (Sengupta et al., 2010, 2011; Visser et al., 2008), poverty of basic needs, personal threats and interpersonal problems (Avalos et al., 2010; Kalichman et al., 2006; WONCA, 2015).

Psychosocial distresses are the maladaptive emotional (internalising) and behavioural (externalising) problems like anger, inattentiveness, anxiety, depression, loneliness, sleep unrest, psychosis, somatisation, suicide ideation, disobedience, disruptiveness, destructiveness, aggressiveness, and delinquency (Achenbach & Rescorla, 2001a; Cohen et al., 2007; WONCA, 2015).

Coping methods are personal and social ways of dealing with stressful events and their effects, for example self-control (Mirowsky & Ross, 2017), seeking social support (Schwarzer & Schulz, 2013), socialising by linking with peers or participating in social events like prayer meetings (Pearlin, 1989), and deflecting issues by working hard, exercising, talking with others, keeping to self, blaming, ignoring, avoiding, denying, joking, lying and assuming the worst may have occurred (Compas et al., 2012; Frydenberg & Lewis, 1993; WHO, 2014).

Sexual risk behaviour is experiencing social situations which may result in sexual risk such as dating, tolerating sexual advances, having sexually active peers, showing or staring or peeping at sexual parts, and engaging in sexual acts that enable HIV infection or spread such as having sex forcefully (Igulot, 2022) or for material and financial gain or with many and older partners or without protection (Friedrich et al., 2004).

Adolescents living with HIV are people in the age range from 10 to 19 years who are living with the virus that causes AIDS. This adolescent group may have contracted HIV from their mothers during birth, through their own risky behaviour or in other ways (UNAIDS, 2013). *Adolescents affected by HIV* are people in the age range from 10 to 19 years who are not living with HIV or are unaware of their HIV status and are residing in a home with someone who has AIDS or where someone died of AIDS illnesses. *HIV affected homes* are households with someone who has or has died of AIDS (WHO, 2014).

2. They are: (1) Kampala district, which is the national HIV service referral area; (2) South Buganda, covering the Bukomansimbi, Gomba, Lwengo, Lyantonde, Kalangala, Kalungu, Masaka, Mpigi, Rakai, Ssembabule, and Wakiso districts; (3) North Buganda, covering the Buikwe, Buvuma, Kakumiro, **Kayunga,** Kiboga, Kiryandongo, Kyankwanzi, Luwero, Mityana, Mubende, Mukono, Nakaseke, and Nakasongola districts; (4) Busoga, covering the Bugiri, Buyende, Iganga, Jinja, Kaliro, Kamuli, Luuka, Mayuge, and Namutumba districts; (5) Bukedi-Bugishu, covering the Budaka, Bududa, Bukwa, Bulambuli, Busia, Butaleja, Kapchorwa, Kibuku,Kween, Manafwa, Mbale, Pallisa, Sironko, and Tororo districts; (6) Teso-Karamoja, covering the Abim, Amudat, Amuria, Bukedea, Kaabong, Kaberamaido, Katakwi, Kotido, Kumi, Moroto, Nakapiripirit, Napak, Ngora, Serere, and Soroti districts; (7) Lango-Acholi, covering the Agago, Alebtong, Amolatar, Amuru, Apac, Dokolo, Gulu, Kitgum, Kole, Lamwo, **Lira,** Nwoya, Omoro, Otuke, Oyam, and Pader districts; (8) Alur-Madi-Lubara, covering the Arua, Adjumani, Koboko, Moyo, Nebbi, Maracha, Yumbe, and Zombo districts; (9) Bunyoro-Tooro-Bakonjo, covering the Buliisa, Bundibugyo, Hoima, Kabarole, Kamwenge, Kasese, Kibaale, Kiryandongo, Kyegegwa, Kyenjojo, and Masindi districts; and (10) Ankole-Kigezi, covering the Buhweju, Bushenyi, Ibanda, Isingiro, Kabale, Kanungu, Kiruhura, Kisoro, Mbarara, Mitooma, Ntungamo, Rubanda, Rubirizi, **Rukungiri,** and Sheema districts (MOH, 2017; MOH-ACP, 2014b).
3. These were used because they work with social groups that provide psychosocial support to persons living with and affected by HIV who reside in HIV affected homes across various HIV burdened villages. The social groups and workers consist mainly of persons who are living with or affected by HIV, and who know most of the HIV affected localities and the homes in their areas in which adolescents live. Caregivers in these social groups and in the affected homes either live with HIV or have lost someone due to AIDS-defining illnesses such as oral candidiasis, karposis-sarcoma, tuberculosis, persistent weight loss, acute respiratory infections, jaundice and the presence of abscesses. They also usually know the HIV status and the cause of death of the parents for the children living with them (NAFOPHANU, 2017, 2019; UAC, 2017).
4. Verbal autopsies with caregivers about issues related to AIDS in families used in some studies have been found to be reliable in ascertaining the children's HIV, care or orphanhood status (Cluver et al., 2012, 2013; Kiirya et al., 2016; NAFOPHANU, 2017, 2019; UNICEF, 2017).

5. This was done using multiple sensitive model fit indices namely, the chi-square (X^2) with its related degrees of freedom (*df*), the comparative fit index (*CFI*; Bentler, 1990), the theorised and null model of $\geq .93$, the standardised root mean square residual (*SRMR*; Hu & Bentler, 1998) value of $\leq .05$, and the root mean square error of approximation in the population (*RMSEA*; Steiger, 1990), i.e., $\leq .05$ together with its confidence interval of 95% (*CI*; MacCallum & Austin, 2000).
6. These include (1) socio-demographic attributes i.e., age, gender, religion, ethnicity, being in or out of school, level of education, occupation, HIV status and age of awareness of the HIV status, parental death, home locality, number of people in the home, number of sick people in the home, number of homes lived in (home stability), number and type of caregivers lived with, HIV status of the usual caregiver, parent to child sexuality talks, access to HIV/psychosocial care, socioeconomic status, and peer influence; (2) community stressors i.e., poverty reflected by the absence of basic needs, personal threats, interpersonal problems, and HIV related stigma; (3) psychosocial distress i.e., anger, inattention, anxiety, depression, loneliness, sleep unrest, psychosis, somatisation, suicide ideation, disobedience, disruptiveness, destructiveness, aggressiveness, and delinquency; and (4) coping methods i.e., self-control, socialisation, deflection, and getting informational and emotional support.
7. These include risky social situations such as dating, and risky sexual acts like having unprotected sex.

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Author contributions

CRediT: **Stephen Kisembe Kiirya:** Conceptualization, Data curation, Funding acquisition, Investigation, Methodology, Project administration, Resources, Validation, Visualization, Writing – original draft, Writing – review & editing; **Maretha Visser:** Conceptualization, Supervision, Validation, Visualization, Writing – review & editing; **Andries Masenge:** Data curation, Formal analysis, Software, Validation, Writing – review & editing.

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Data availability statement

The data supporting the results presented in this manuscript can be accessed at University of Pretoria Department of Psychology's archive i.e., HSB 11-14, with consent from the authors.

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