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Use of computer-assisted self-interview in detection of and referral for depression among adolescents living with HIV at an urban HIV treatment clinic in Uganda: a quasi-experimental study

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ABSTRACT

Background Depression is common among adolescents living with HIV (ALHIV) and impacts their quality of life. However, it is not routinely detected and treated due to a lack of screening tools, coupled with large numbers of clients in the HIV clinics and limited staff. Enabling adolescents to do a self-assessment for depression on a tablet computer could possibly improve the detection of depression in this population. We set out to assess the detection and referral of depression among ALHIV in care in Uganda.

Methods This was a quasi-experimental study design with a historical control at Baylor College of Medicine of Children's Foundation. We conducted a retrospective chart review of 425 adolescents covering a 3-month period and documented the proportion screened for depression and referred to the clinic counsellors. From July to September 2022, eligible adolescents aged 10–19 years who had assented and consented self-assessed for depression using a Patient Health Questionnaire-Adolescent on a tablet computer-assisted self-interview (CASI). Adolescents who screened positive had a prompt on the tablet computers referring them to the counsellor for mental healthcare. We compared the proportions of participants screened for depression and referred to counsellors from clinic chart review and on the CASI using paired t-tests.

Results Out of 425 medical records reviewed, 54% (231/425) were females and the median age was 15 years. Of the participants who self-assessed on the CASI, 52% (222/425) were males and the median age of all participants was 16 years. Self-assessment on the CASI increased the rate of detection of depression from 0% to 23.3%. Of those referred on the CASI, 15% accessed care at the referral point.

Conclusion The use of CASI improves the rate of detection of depression among ALHIV; however, there is a need to address the barriers to effective referral for mental health services.

WHAT IS ALREADY KNOWN ON THIS TOPIC
⇒ Depression is common among adolescents living with HIV; however, there is limited resources for routine screening and management.

WHAT THIS STUDY ADDS
⇒ Using a computer-assisted self-interview (CASI) by adolescents enables early detection and facilitates early treatment.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY
⇒ However, there is a need to create feasible referral pathways. More research is needed on the feasibility, acceptability and cost-effectiveness of the CASI.

INTRODUCTION

According to UNAIDS,[1] 1.7 million adolescents are living with HIV globally. Adolescents with chronic physical illnesses like HIV are more likely to suffer from psychological illnesses such as depression compared with their healthy peers.[2] Depression is the leading cause of disability among adolescents[3] and the onset of this disease in this age group is associated with a chronic and episodic course of the illness in adult life.[4 5] Depression is common among adolescents with chronic physical illnesses due to their symptoms, long-term medication regimens and highly expressed emotions from their parents.[2] Additionally, adolescents living with HIV (ALHIV) face social stigma, psychological distress, concern about disease progression, pain and ill physical health due to comorbidities, and death which may all lead to depression.[6–8] Depression results in low quality of life, poor social and academic functioning, and poor adherence in this population.[9–11]

Uganda contributes 4% of the world's ALHIV and this makes it one of the 15 highest burden countries globally.[12] Depression is the leading cause of disability among ALHIV with a prevalence of ~16% in Uganda.[13] Although

depression is common among ALHIV and impacts their quality of life, it is not routinely detected and treated.[14] A major cause of limited detection is the lack of screening tools, coupled with large numbers of clients in the HIV clinic and limited staff.[15 16] There is limited data on detecting depression and referral for mental health-care in this vulnerable population, especially in Uganda. Providing a platform for adolescents to routinely self-screen using a computer-assisted self-interview (CASI) could enhance detection of depression and result in early referral to mental healthcare with possibly improved HIV treatment outcomes.[17] The use of self-paper screening forms is cumbersome and hindered by challenges like scoring, filing, storing the paper forms and transcribing the scores which are all resource-intensive.[18] Comput-erised screening using CASI in the waiting room may provide a comfortable and fun way to involve adoles-cents in their physical and mental healthcare.[18] The use of CASI may overcome adolescents' concerns about talking directly to clinicians about their mental health challenges. A study conducted by Wright *et al* comparing computer-assisted and paper-based self-assessment for substance use found that adolescents were more honest with CASI.[19] Watson *et al* carried out a study on percep-tion of adolescents about CASI and found high levels of acceptability and enjoyment because the adolescents identified high levels of privacy and confidentiality with the CASI.[18] This study set out to (1) determine whether depression is screened for among ALHIV in care and (2) assess the effect of self-assessment on a computer tablet by adolescents on the rate of detection of depression and referral for treatment.

METHODS

This was a quasi-experimental study design with a histor-ical control conducted at Baylor College of Medicine of Children's Foundation-Uganda Clinical Centre of Excel-lence in Kampala (Baylor-Uganda COE). Baylor-Uganda COE has provided care for ALHIV for over 20 years. The centre is located in Kampala with an average monthly attendance of 500–650 adolescents (during this COVID-19 time). Over and above clinical care (provision of Anti-retroviral therapy (ART)), the Baylor-Uganda COE clinic provides education services about reproduc-tive health, HIV preventive messages, adherence coun-selling, general public health messages (hygiene and prevention of communicable diseases). The counselling services are provided by clinical counsellors who are clin-ical health personnel. The centre has five clinical coun-sellors who provide HIV and adherence counselling, psychosocial support for those with psychological and social challenges. These counsellors also counsel those failing on treatment regimens and teenagers who are expectant or adjusting to different phases of life.

We included adolescents aged 10–19 years who had been in care for at least 6 months and had a caretaker to provide consent or were emancipated minors. We excluded adolescents who were too ill physically to engage in the rigorous activity of answering research questions since getting urgent medical care was priori-tised to participation in the study and those unable to communicate in English or Luganda. The tools used were in English and translated to Luganda which is the commonly spoken local language in the study setting area. The dependent variable was a positive screen for depression and the sociodemographic characteristics were the independent variable. A sample size of 425 was arrived at using the formula for clinical intervention studies

Measurements and tools
Sociodemographic questionnaire
A sociodemographic questionnaire was administered to record participants' age, sex, education level, family structure and clinical characteristics.

The Patient Health Questionnaire-Adolescent
Depression was screened using the Patient Health Questionnaire-Adolescent (PHQ-A), which was self-administered by each adolescent on a tablet computer. This technique was referred to as the CASI. The PHQ-A is a self-report tool that has been used in primary care settings outside Uganda and found to be reliable and valid for the detection of depression among adoles-cents.[20] The psychometric properties of the adolescent version PHQ-9 were assessed with the Children's Depres-sion Rating Scale-Revised (CDRS-R) and Quick Inventory of Depressive Symptomatology-Adolescent (17-item) Self-Report (QIDS-A17-SR). It was reported that the PHQ-A had a Cronbach's α coefficient of 0.879, 0.859 and 0.827 at baseline, 4 and 8 weeks while that for the CDRS-R was 0.739, 0.835 and 0.867 and for wQIDS-A17-SR was 0.712, 0.777 and 0.804, respectively. The PHQ-A had moderate convergent validity with the CDRS-R but good conver-gent validity with the QIDS-A17-SR. However, it was less sensitive to changes in symptom severity than the other two tools.[20] The validation of the Thai version of the PHQ-A when compared with the Children's Depression Inventory and the Centre for Epidemiologic Studies-Depression Scale showed an internal consistency coeffi-cient of 0.92 with a specificity and sensitivity of 0.8.[21]

The PHQ-A is a nine-item questionnaire based on the nine symptoms of depression in the Diagnostic and Statistical Manual with a Likert scale from 0 to 4 (graded as; not at all, several days, more than half the days, nearly every day). It screens for depression symptoms over the previous 2 weeks period.

Both the PHQ-2 and PHQ-A are used in screening for depression with an acceptable accuracy.[22 23]

Study procedure
From 21 June 2022 to 27 June 2022, we conducted a retrospective chart review of 425 adolescents covering a 3-month period from July to September 2021 of clinic attendance who met the inclusion criteria. From the

chart review, we documented the proportion screened for depression and referred to the clinic counsellors. We also collected sociodemographic and clinical factors (viral load and CD 4 count) during the chart review.

Primary data was collected between 8 July 2022 and 27 September 2022. We collected data at the same time period of the year (July–September) to prevent any seasonal bias. On the adolescent clinic days at the Baylor-Uganda COE clinic. The research assistants (RAs) sought written consent from the caretakers and assent from the adolescents at the point of triage and assessed for eligibility to participate in the study. The RAs collected sociodemographic data from eligible adolescents. Consented adolescents then proceeded to self-screen for depression using the PHQ-A which was on a tablet computer. Those who could not use the tablets were guided by the RAs on how to use them. Adolescents who screened positive (PHQ-A≥10) or had suicidal ideations were prompted to seek mental healthcare from the clinic counsellors. We recruited a total of 425 ALHIV to match the number of records collected from the chart reviews. All prompts to referral for mental healthcare were captured in the electronic patient record system for purposes of follow-up on who actually reached the referral point. The RAs and principal investigator followed up with adolescents who did not reach the counsellors after a positive screen to encourage them to seek mental health services. The team also regularly reminded the counsellors about the study and alerted them to the fact that they would receive referrals/screen positive cases.

Data management and analysis

Data was entered using Epi-Data and analysed by using Stata V.15.1.(StataCorp). Descriptive analysis was done for the sociodemographic factors. Continuous variables were summarised using means with SDs or medians with IQRs and categorical variables using their frequencies and percentages. We compared the proportions of participants screened for depression from the chart review with those from the CASI using paired t-tests online supplemental files 1 and 2.

RESULTS

We reviewed 425 medical records and recruited 425 adolescents who self-screened for depression on the CASI using the PHQ-A. One participant was excluded from the study because she had visual impairment and could not use the tablet. Among participants whose clinic medical records were reviewed, 54% were females and the median age of all the participants was 15 years. The sociodemographic characteristics collected from secondary data (medical records reviews) are presented in table 1.

Of the participants who self-assessed on the CASI 52.2% were males, and the median age of the participants was 16 years. The sociodemographic characteristics for the participants who used the CASI are in table 2.

Table 1 Sociodemographic characteristics from medical records review

	Frequency (n)	Percentage (%)
Sex		
Male	194	45.7
Female	231	54.3
Age, median (IQR)	15 (13–17)	
Duration on Anti-retroviral drugs (ARVs) (years), median (IQR)	10.3 (7.9–12.3)	
ARV medication		
ABC/3TC/DTG	105	24.7
AZT/3TC/DTG	20	4.7
TDF/3TC/DTG	251	59.1
Others	49	11.5
Recent viral load		
<1000 copies	383	90.5
≥1000 copies	40	9.5
CD4 count, median (IQR)	996 (749–1343)	
Miss medication		
Yes	50	11.8
No	375	88.2
Depression tool		
Yes (PHQ-2)*	6	1.4
No	419	98.6

*None had depression.
DTG, dolutegravir; PHQ, Patient Health Questionnaire.

The clinical characteristics for the participants assessed on the CASI are presented in table 3.

We further analysed depression and referral-related measures for the participants who self-assessed on the CASI; 23.3% screened positive for depression on the PHQ-A (score≥10). This data is presented in table 4.

We compared the proportions of those screened for depression from the chart reviews with those screened with the CASI. The results are shown in figure 1.

We compared the proportions of positive screens for depression from the chart review with those from the CASI as shown in figure 2. The six participants screened for depression using the PHQ-2, from the medical records were aged 8–15 years, three had ever missed their medication and three had a viral load of >500 copies.

Using the CASI, the proportion of adolescents detected having depression increased from 0% to 23.3%.

DISCUSSION

This study set out to determine the detection and referral of depression among ALHIV at a large urban HIV treatment clinic in Uganda. We compared proportions of

Table 2 Sociodemographic characteristics of the participants for CASI

	Frequency (n)	Percentage (%)
Sex		
Male	222	52.2
Female	203	47.8
Age, median (IQR)	16 (14–18)	
<15	137	32.3
15–19	287	67.7
Education*		
None/primary	233	54.8
Secondary/tertiary	192	45.2
Religion		
Born again	94	22.1
Catholic	134	31.5
Anglican	80	18.8
Muslim	104	24.6
Others	13	3.0
Marital status		
Married/cohabiting	7	1.6
Separated/divorced/ widowed	3	0.7
Single	415	97.7
Employment		
Trade person	10	2.4
Transport worker	16	3.8
Pupil/student	368	86.6
Unemployed	20	4.7
Parents alive		
Both parents are alive	225	52.9
Mother only is alive	84	19.8
Father only is alive	71	16.7
Both parents are not alive	44	10.4
Don't know whether my parent(s) are alive	1	0.2

Primary: 233 (54.8%); secondary: 180 (42.4%); tertiary: 12 (2.8).
*None: 00.
CASI, computer-assisted self-interview.

Table 3 Clinical characteristics of the CASI participants (primary data)

	Frequency (n)	Percentage (%)
Duration on ARVs (years), median (IQR)	11.9 (9.4–15.3)	
ARV medication		
ABC/3TC/DTG	87	20.5
AZT/3TC/DTG	25	5.9
TDF/3TC/DTG	297	69.9
Others	16	3.7
Recent viral load		
<1000 copies	369	87.8
≥1000 copies	53	12.5
(missing)	3	0.7
CD4 count, median (IQR)	944 (678–1260)	
Miss medication		
Yes	150	35.3
No	275	64.7

CASI, computer-assisted self-interview; DTG, dolutegravir.

the information we have. However, we note that from the clinic attendance registers, there is a slightly higher quarterly attendance of females than males.

From the medical records, the median age of the adolescents was 15 years with a median duration on ARV of 10.3 years compared with the median age of the CASI participants of 16 years and a median duration on ARVs of 11.9 years. This speaks to the validity of the study results because the two data sets are 1 year apart though same time interval of the year (July–September).

In the sociodemographic characteristics of the CASI participants, 97.7% were single and this could be explained by the fact that the majority (86.6%) of study participants were pupils/students hence they were focused on the academic responsibilities.

All the adolescents assessed on the CASI had some level of education and this could be because of the universal primary[24] and secondary education programme[25] provided by the government of Uganda for the past 27 years and 17 years, respectively, with free education for these levels of education. A total of 97.2% had achieved primary or secondary level education which would be expected given the age category of 10–19 years and that 86.6% of the participants were students.

In the chart review, 88.5% of the participants were on dolutegravir (DTG)-based ART regimen and this percentage increased to 97.3% 1 year later in the CASI sample. This could be because of the Uganda Ministry of Health recommendation to have DTG replace efavirenz in first-line ART regimens.[26 27]

There was a higher percentage of participants (90.5%) with a viral load below 1000 copies in the chart review

adolescents screened for depression from medical records with those who self-screened using the CASI. From the records, six adolescents had been screened for depression in a 3-month period using the PHQ-2 and these all screened negative. This indicates that the targeted screening currently being done at the clinic may not be efficient in identifying the depressed adolescents.

There were more females from the chart review (54.3%) compared with those screened on the CASI (47.8%). The reason for this difference is not clear from

Table 4 Depression related measures of the CASI participants (primary data)

	Frequency (n)	Percentage (%)
Depression		
None (0–4)	201	47.3
Mild (4–9)	125	29.4
Moderate (10–14)	59	13.9
Moderately severe (15–19)	30	7.1
Severe (20–27)	10	2.3
Suicidal ideation		
No	330	77.6
Yes	95	22.4
Ever attempted suicide		
No	363	85.4
Yes	62	14.6
Referred		
No	277	65.1
Yes	148	34.9
Counselling		
Referred and counselling was depression/suicide-related	11	2.59
Referred but did not see the counsellor	116	26.42
Referred but counselling was not related to depression	21	4.9
Did not need to see the counsellor (not referred)	277	65.2
Screened positive for depression (n=99)		
Referred and counselling was depression/suicide related	7	7.1
Referred but did not see the counsellor	84	80.8
Referred but counselling was not related to depression	8	8.1
Screened for suicide without depression (n=48)		
Referred and counselling was depression/suicide related	4	8.3
Referred but did not see the counsellor	32	66.7
Referred but counselling was not related to depression	12	25.0
Screened for suicide with depression (n=47)		
Referred and counselling was depression/suicide-related	6	12.8
Referred but did not see the counsellor	36	76.6
Referred but counselling was not related to depression	5	10.6
Screened for suicide with or without depression (n=95)		
Referred and counselling was depression/suicide-related	10	8.06
Referred but did not see the counsellor	68	61.29
Referred but counselling was not related to depression	17	11.29

CASI, computer-assisted self-interview.

sample compared with the sample assessed on the CASI (87.8%). This could be explained by the fact that more participants from the CASI sample (35.3%) reported missing their medication compared with 11.8% from the chart review hence affecting their clinical parameters. These findings resonant well with previous studies that have shown a relationship between adherence to ART and viral load suppression.[28–30] A study conducted through the British Columbia Centre for Excellence in HIV/AIDS Drug Treatment Programme showed that there were higher CD4 counts among participants who were adherent to medication than those who were not.[31]

From the use of the CASI, we identified 23.3% (99/425) of adolescents as having depression, a figure similar to that documented in a study by Akimana *et al* (2019) which found the prevalence of depression among adolescents with cancer at the Uganda Cancer Institute to be 26%.[32] These findings also support the CASI as an effective

Screening for depression before and after the intervention

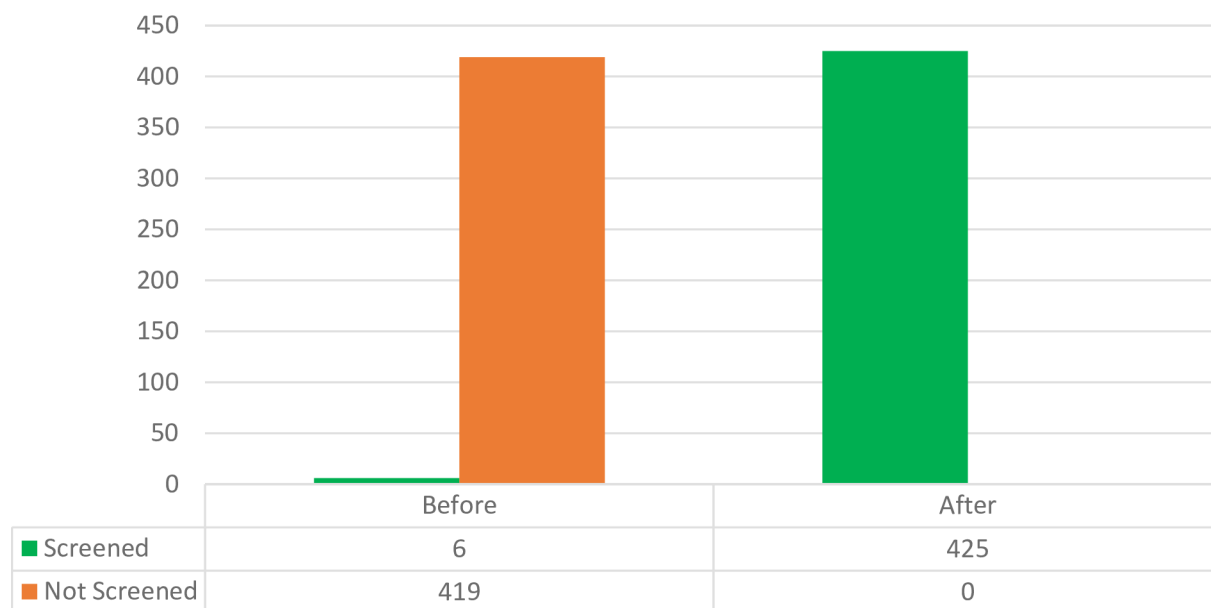|	Before	After
■ Screened	6	425
■ Not Screened	419	0

Figure 1 Screening for depression from chart review and CASI. CASI, computer-assisted self-interview.

method of self-screening for depression in a busy primary care setting with limited staff.[17] The use of the CASI is superior to self-paper screening forms which are cumbersome and hindered by challenges like scoring, filing and storing the paper forms and transcribing the scores which are all resource intensive and not feasible in primary care settings that have huge patient numbers with scarce staff numbers. This makes the CASI a user-friendly screening method for a busy centre and yet delivers timely results for timely intervention.[17] Previous studies have indicated that adolescents may be more comfortable and honest with their responses about sensitive information like their mental health in using the CASI to assess their mental health symptoms than responding to tools administered by clinicians.[17–19 33]

Given the current advancement in technology and research showing that technology based health programmes attract adolescents, the use of the CASI could actually be a fun and comfortable way to engage adolescents in their own physical and mental health.[34] The CASI could further be incorporated on the phones of the adolescents for periodic self-assessment at their convenience and outside the clinical visits.[35 36]

Out of the 99 adolescents who screened positive for depression and were referred by a prompt on the CASI to the clinic counsellors, only 15 (15.2%) interacted with the counsellor. Reasons for failure to access care at the referral point as identified from qualitative interviews (findings reported in another study) were; lack of time, perceived stigma, misconceptions about
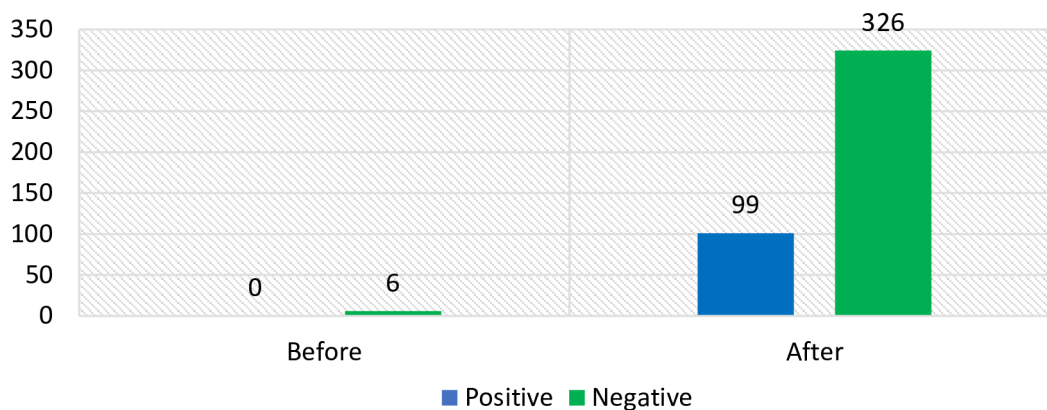
Figure 2 Comparison of proportions screened positive from chart review with those from the CASI. CASI, computer-assisted self-interview.

the counselling process, limited awareness, inadequate information at the point of referral and lack of trust about confidentiality in the counselling process. These reasons are similar to those from previous studies about failure of the referral processes for mental healthcare in primary care settings.[37 38]

The main limitation of the study was the fact that this was a cross-sectional study conducted at a centre of excellence hence results may not be generalisable to other HIV treatment Centres. The study was conducted at a centre of excellence where technology gadgets like tablet computers are easily accessible and this may not be the case with the rest of HIV treatment centres in Uganda with technology challenges further limiting generalisability of the results. The exclusion of adolescents who were too ill physically to engage in answering study questions because obtaining urgent medical care was prioritised could have biased the results since this category is more prone to depression.

In conclusion, the use of CASI does improve the rate of detection of depression among ALHIV; however, adolescents are unlikely to seek mental healthcare at the clinic following a prompt on the CASI. There is a need for the clinic staff to provide more awareness on mental health and counselling services to facilitate access to mental health services by the adolescents at the clinic.

There is need for further studies on the acceptability, feasibility and cost-effectiveness of the CASI in primary care settings to better inform policy-makers.

study questions. Adolescents who screened positive for depression and suicidal behaviour but never reached the referral point for mental healthcare with the clinic counsellors were followed up by the study team using telephone calls to encourage them to visit the clinic counsellors. A list of these adolescents was also shared with the clinical head of the unit to facilitate their linkage to mental healthcare.

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