Title

Exploring the Association Between Social Support and Hazardous Alcohol Use Among Persons Living with HIV in South Western Uganda

Journal

AIDS and Behavior, 26(7)

ISSN

1090-7165

Authors

Ngabirano, Christine
Fatch, Robin
Muyindike, Winnie R
et al.

Publication Date

2022-07-01

DOI

10.1007/s10461-021-03557-6

Peer reviewed

HHS Public Access

Author manuscript

AIDS Behav. Author manuscript; available in PMC 2023 February 01.

Published in final edited form as:

AIDS Behav. 2022 July ; 26(7): 2113–2122. doi:10.1007/s10461-021-03557-6.

Exploring the association between social support and hazardous alcohol use among persons living with HIV in south western Uganda

Christine Ngabirano[1], **Robin Fatch**[2], **Winnie R. Muyindike**[1,3], **Nneka I. Emenyonu**[2], **Julian Adong**[3], **Sheri D. Weiser**[2], **Jeffrey H. Samet**[4,5], **Debbie M. Cheng**[5], **Judith A. Hahn**[2]

[1]Global Health Collaborative, Mbarara University of Science and Technology, Mbarara, Uganda

[2]Division of HIV, Infectious Disease and Global Medicine, University of California San Francisco, San Francisco, U.S.A

[3]Department of Internal Medicine, Mbarara Regional Referral Hospital, Mbarara, Uganda.

[4]Boston University School of Medicine, Boston Medical Center, Boston, MA, U.S.A.

[5]Boston University School of Public Health, Boston, MA, U.S.A.

Abstract

Hazardous alcohol use and psychological distress are common among persons living with HIV (PLWH). In Uganda, HIV prevalence is 6.2% with average pure alcohol consumption per capita of 9.8 liters. Social support may mitigate hazardous alcohol use. In a cohort of 443 PLWH, we measured social support using the Duke - UNC functional social support scale and self-reported alcohol consumption using the Alcohol Use Disorders Identification Test – Consumption (AUDIT-C), augmented by phosphatidylethanol (PEth). We examined the association between low social support and hazardous alcohol use using multiple logistic regression models. 30% had low social support and 44% had hazardous alcohol use (AUDIT-C ≥3 for women and ≥4 for men and/or PEth ≥50 ng/mL). We did not detect an association between low social support and hazardous alcohol

Correspondence: Judith A. Hahn, UCSF Mission Hall, 550 16th Street, Room 3550, UCSF Box 1224, San Francisco, CA 94158, U.S.A., Tel: +1 415 476 5815; Judy.Hahn@ucsf.edu.

Authors' contributions:

All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by Christine Ngabirano, Robin Fatch and Debbie Cheng. The first draft of the manuscript was written by Christine Ngabirano and Judith A. Hahn provided critical review of the manuscript. All authors commented on the previous versions and approved the final manuscript.

Conflict of interest: The authors declare no conflict of interest.

Ethical Approvals: The study was approved by the Institutional Review Boards of Mbarara University of Science and Technology (MUST) #03/05–05, Uganda National Council for Science and Technology (UNCST) #HS1075, University of California San Francisco (UCSF) #11–06825 and Boston University (BU) #H-31435

Consent to participate: Informed consent was obtained from all individual participants in the study.

Consent for publication: All participants signed informed consent regarding publishing their data and all authors consented to publication of the manuscript.

Ethical Considerations:

Participants provided written informed consent prior to enrollment into the study for all procedures. Approvals from the institutional review boards of the Mbarara University of Science and Technology (MUST), the University of California, San Francisco (UCSF), and Boston University were obtained, as well as the Uganda National Council for Science and Technology.

use. Social support may play no role or a minimal role in preventing PLWH from hazardous alcohol use.

Keywords

Social support; hazardous alcohol use; Uganda

Introduction

HIV infection and hazardous alcohol consumption are both common in sub-Saharan Africa (SSA), with Uganda ranked among the top per capita consumers of alcohol (1). The average pure alcohol consumption per capita in Uganda is 9.8 liters and the country suffers from a high HIV prevalence (6.2% among the adults) (2). Hazardous alcohol use is associated with an increased risk of acquiring HIV infection and with negative effects on persons living with HIV (PLWH) in terms of poorer treatment outcomes, reduced antiretroviral therapy (ART) adherence, increased morbidity, and increased mortality (3). A meta-analysis of 40 studies found a significant association between alcohol use and non-adherence to ART with the largest effect among those with hazardous drinking (4). Sub-Saharan Africa has the highest prevalence of hazardous drinking; several studies have shown an association between hazardous alcohol use and lack of viral suppression mediated by medication non-adherence in this setting (5),(6). Alcohol use is a significant problem in PLWH in Uganda. Studies from Uganda have found that 33% of PLWH in care report alcohol use in the past 6 months with 15% drinking heavily i.e., drinking 6 or more standard drinks on one occasion (7). Therefore it is important to reduce alcohol use in populations with a high prevalence of HIV and hazardous alcohol use, such as those in Uganda.

Social support is the perception that support resources such as material aid, emotional support, companionship, or information are available from one's social network if needed (8) and is generally viewed as a positive and important aspect in the promotion of healthy behaviors (9). High social support has been associated with decreased alcohol use in several studies (10). A study among PLWH showed that social support had both direct and indirect relationships with ART adherence, and social support was associated with decreased levels of alcohol use, which in turn was associated with higher ART adherence (11). Another study found that people who receive more social support possess higher levels of subjective well-being, which is linked to promoting abstinence (12). Large social networks that include more supportive relationships may also promote greater abstinence (10). An intervention study conducted among those with severe alcohol use disorders and those who smoke cigarettes found high social support to be a strong predictor of continued abstinence and lower rates of alcohol and substance use (13). Psychological distress and depression are both associated with increased alcohol consumption among PLWH (14) and several studies have demonstrated that emotional support may provide motivation to reduce hazardous alcohol use (15),(16),(17). Lastly, low social support has been associated with increased alcohol consumption, particularly because individuals with low social support receive less encouragement regarding alcohol abstinence, and are therefore at a greater risk of engaging in hazardous alcohol use (18).

There is limited data about low social support and its relationship with hazardous alcohol use in low resource settings. The primary objective of this study was to describe the proportions reporting low social support and examine its relationship to hazardous alcohol use among PLWH accessing care in south western Uganda. As a secondary aim, we also assessed the association of low social support with changes in alcohol use over 12 months. Finally, as an exploratory analysis, we assessed the association of emotional support with hazardous alcohol use (exploratory analysis). We hypothesized that low social support would be associated with hazardous alcohol use.

Methods

Study Design and Setting:

We analyzed baseline and 12 months data collected from a longitudinal cohort study of adults living with HIV recruited from the Immune Suppression Syndrome (ISS) clinic at Mbarara Regional Referral Hospital (MRRH) in south western Uganda. The parent study, the Alcohol Drinking Effects Prior to Treatment (ADEPT) study, examined the effect of hazardous alcohol use on HIV disease progression prior to initiation of ART (19). The ADEPT study is part of the Uganda-Russia-Boston Alcohol Network for Alcohol Research Collaboration on HIV/AIDS (URBAN ARCH) Consortium.

Study Participants:

The ADEPT study enrolled and followed participants from 2011 through 2015. Patients attending HIV care were eligible for the ADEPT study if they were ≥18 years old, lived within 60 kilometers of the clinic, were fluent in English or Runyankole (the local language), were not on ART, and were not eligible to initiate ART. From August 2011 through February 2014, those with a CD4 cell count below 350 cells/mm^3 were eligible for ART; after February 2014 this cutoff changed to 500 cells/mm^3, per Uganda, Ministry of Health ART initiation guidelines (20). During the final year of recruitment (2013 −2014), we selectively enrolled only participants who reported alcohol use in the past year at their initial clinic visit, to increase the number of alcohol consumers in the study. Potentially eligible participants were identified by clinic counselors and referred to research assistants during the clinic visits. We collected data at baseline and every 6 months until ART initiation or study end (whichever came first). A complete description of the study has been published elsewhere (19).

Specimen collection:

Blood specimens were collected at each visit. CD4 cell count was tested at the Mbarara University of Science and Technology (MUST) Clinical Research Laboratory in Mbarara, Uganda, while viral load testing was done at the UCSF Virology Core Laboratory in San Francisco, CA. Dried blood spot (DBS) cards were prepared from the venous blood draw to test for phosphatidylethanol (PEth), a highly sensitive and specific biomarker that was used to test for alcohol consumed in the last 2–3 weeks (21). PEth testing was conducted at the US Drug Testing Laboratories in Des Plaines, IL using established procedures (22). All baseline samples were tested for PEth.

Variables

Independent variables:

We measured social support using the modified 10-item Duke - University of North Carolina functional social support scale at the baseline visit (8). Social support is the perception that material aid, companionship, information, and emotional support are available from one's social networks when needed (8). Some of the items on the scale include; "I get visits from friends and relatives", "I get useful advice about important things in my life", "I get chances to talk to someone about problems at work or with my housework", "I get chances to talk to someone I trust about my personal and family problems". The 10 items were summed to create a continuous social support score. We defined low social support, the main independent variable of interest, as an average social support score of <3, while high social support was defined as an average score of ≥3 (8). We also created a continuous measure of *emotional* support for use in an exploratory analysis; emotional support was defined as the sum of the first six items of the scale. The emotional support sub-scale was hypothesized to be most closely associated with alcohol use based on previous literature (15),(16),(17). To further explore the potential nature of the relationship between social support and alcohol use, we examined quartiles of the full 10-item social support scale as well as the 6-item emotional support scale.

Outcome variables:

We measured self-reported alcohol consumption using the Alcohol Use Disorders Identification Test – Consumption (AUDIT-C) modified to reflect the past 3 months(23). The primary outcome of interest was hazardous alcohol use at baseline, defined as an AUDIT-C score of ≥3 for women and ≥4 for men, (24) and/or a PEth value ≥50ng/ml. The chosen cut-off value of ≥50 ng/mL has been used in prior research as an indicator of hazardous alcohol use (19),(21). We also created an alcohol use variable with a higher threshold ("highest level alcohol use"), defined as an AUDIT-C score of ≥6 or PEth value ≥200ng/ml, for use in an exploratory analysis. The secondary outcome of interest was change in AUDIT-C score between baseline and 12 months, a continuous variable.

Covariates:

Potential confounders, identified a priori based on the literature and clinical knowledge, were included in the regression models. These included demographic characteristics collected at baseline; i.e. sex, age, education, and marital status. We measured socioeconomic status using a household asset index based on ownership of durable goods, household quality, and available energy sources, and categorized those in the bottom 40% as "low", the middle 40% "middle" and the top 20% "high" (26). We measured spirituality and religiosity using the short version of the Ironson-Woods Spirituality and Religiosity Index (SRI), with higher scores indicating higher levels of spirituality and religiousness (alpha=0.95) (27). We assessed participants' health status using 2 scales: the MOS-HIV Physical Functional Scale (PFS) to assess physical functioning and the Centers for Epidemiologic Studies of Depression scale to assess symptoms of depression (a score ≥16 indicated positive for depression) (28).

Ethical Considerations:

Participants provided written informed consent prior to enrollment into the study for all procedures. Approvals from the respective institutional review boards were obtained.

Statistical analysis:

For the primary analysis, we conducted unadjusted and adjusted logistic regression models to assess the association between low social support and hazardous alcohol use at baseline. To explore whether the relationship between social support and alcohol use differed by participant sex, we tested for interaction and then stratified the main multivariable model by sex to describe the relationships. To further explore the relationship between social support and hazardous alcohol use, we used quartiles of social support. In addition, we conducted an exploratory analysis examining the association between emotional support and hazardous alcohol use using quartiles of emotional support. We also conducted an additional exploratory logistic regression model using a higher threshold for alcohol use (highest level alcohol use, defined above). Finally, we conducted a multivariable linear regression analysis to explore the association of low social support at baseline with changes in AUDIT-C score between baseline and 12 months (a continuous, secondary outcome), adjusting for the same covariates as above. Regression diagnostics suggested the linear model provided a reasonable fit. We did not adjust analyses for enrollment after change in eligibility criteria as we did not expect the change would impact the results. We conducted all analyses using the statistical package Stata 14.2 (StataCorp. 2015. *Stata Statistical Software: Release 14*. College Station, TX: StataCorp LP).

Results:

Socio-Demographic and behavioral characteristics

Four hundred and forty-three participants completed baseline interviews between September 2011 and August 2014. Two-thirds (68%) were females, the median age was 32 years (interquartile range (IQR): 27–40), 216 (49%) were married and 134 (30%) had an education beyond primary level. One hundred thirty-nine (33%) participants had symptoms of depression based on a CES-D score of ≥16 and the overall median score for spirituality and religiosity was 103 (IQR: 89–107). Of the 443 participants, 132 (30%) reported low social support (Table I). The median of the 10-item social support score was 32 (IQR: 28–36) (alpha = 0.83); the median of the 6-item emotional support score was 22 (IQR: 19–24) (alpha = 0.77). The prevalence of hazardous drinking was 44%. Descriptive statistics suggested that sex, level of education, socioeconomic status, marital status, symptoms of depression, and SRI score may differ by social support status.

Relationship between social support and hazardous alcohol use

We did not detect an association between low social support and hazardous alcohol use in the unadjusted analysis (odds ratio [OR] 1.12, 95% confidence interval [CI]: 0.74–1.68) or the adjusted analysis (adjusted OR [aOR] 0.97, 95% CI: 0.61–1.55) (Table II). In exploratory analyses, the interaction between sex and low social support was not statistically significant (z=−0.16; p=0.88). In stratified analyses, we did not observe notable differences

in the relationship between low social support and hazardous alcohol use by sex (aOR for males 0.90, 95% CI: 0.34–2.37, aOR for females 1.03, 95% CI: 0.59–1.79). In exploratory analyses using quartiles of social support, the relationships did not appear to be linear and we did not detect significant associations between the quartiles of social support and alcohol use. Compared to the highest quartile of social support, the aORs were as follows: 1.20 for the lowest quartile (95% CI: 0.65–2.21); 0.92 for the second-lowest quartile (95% CI: 0.51–1.64); and 0.88 for the second-highest quartile (95% CI: 0.48–1.61). In exploratory analyses using quartiles of emotional support, the association with hazardous alcohol use did not appear to be linear. The adjusted odds of hazardous alcohol use was higher for those in the second-highest quartile of emotional support versus those in the highest quartile of emotional support (reference group), no other differences were detected (aOR 1.30 for the lowest quartile [95% CI: 0.71–2.37]; 1.02 for the second-lowest quartile [95% CI: 0.57–1.81]; and 2.13 for the second-highest quartile [95% CI: 1.19–3.83]; all compared to the highest quartile. In exploratory analyses looking at highest level of alcohol use as the outcome, we did not detect an association between low social support and highest level alcohol use (aOR 1.07, 95% CI: 0.63–1.79).

The median change in AUDIT-C score from baseline to 12 months was 0 points (IQR: −1 – 0) and there was no apparent difference in the change in AUDIT-C between those reporting low and high social support, among 251 participants who had these data available at 12 months (Table I). Table III shows unadjusted and adjusted linear regression analyses for the outcome of change in AUDIT-C between baseline and 12 months. There was no evidence of an association between low social support and change in AUDIT-C score in either unadjusted or adjusted analyses (unadjusted mean difference β= −0.27, 95% CI: −0.89–0.34) and adjusted mean difference (β= −0.03, 95% CI: −0.72–0.65).

Discussion

We evaluated the prevalence of low social support among persons living with HIV in south western Uganda and its relationship to hazardous alcohol use. Findings showed that a relatively high proportion of participants (30%) reported low social support. In our sample of PLWH not yet on ART, which was enriched for those engaging in hazardous alcohol use, alcohol use remained constant over one year. Low social support did not appear to be associated with hazardous alcohol use at baseline (first study encounter). The results did not differ in analyses stratified by sex.

Our finding that nearly one-third reported low social support is consistent with another study from Uganda where 29% of PLWH reported low social support (29) although the study was done in an urban setting while our study had a mixed semi-urban and rural population. The levels of low social support reported by the PLWH may be attributed to HIV-related stigma as was reported in another study done in the same population as our study (30); however, it could also be that PLWH have a higher tendency to report low social support compared to persons without HIV as was noted in Nigeria (31). Another reason contributing to low social support may be the effect of marital status, given that over one-third of the population studied (mostly women) reported they were not married, and social support was lower among the unmarried participants. This was similar to what was reported in a Nigerian study

that compared social support in PLWH and persons without HIV that found that a higher proportion of PLWH reported low social support because they were either abandoned by their partners, separated, divorced, or widowed compared to their HIV negative counterparts (31).

We found that more women than men reported low social support in this study, the opposite of what was reported in a study from the United Kingdom (32). This might be because the social environment in Uganda differs from that in the UK. The women living with HIV in Uganda, especially those who are single, separated, or widowed due to HIV infection of partners, may lack sufficient social networks from whom to receive social support. Additionally, some married women stay at home to take care of the family and are not involved in active employment and therefore have fewer social interactions with the public, in contrast to the men who are active in employment and may have more social networks that may influence their high level of social support (31),(33).

We did not detect an association between low social support and hazardous alcohol use. This was consistent with a previous study among adults using alcohol where social support did not predict reduced frequency in alcohol use over time (34) and with a study reporting that using alcohol to cope with HIV and other co-infections was not significantly associated with social support (14). Our study findings however contrast with studies among PLWH in the US and Russia that showed that individuals with low social support were more likely to frequently use alcohol than those with high social support (35),(36). These studies were conducted among PLWH on treatment (35),(36) while our study was done among PLWH accessing HIV care but not yet on ART which may explain the discrepancy between our and their findings. This may be because persons on ART may receive more social support from family and friends to ensure adherence (37) and are usually targeted for counseling to reduce alcohol consumption at ART initiation (38). We recognize the complex and bidirectional relationship between alcohol use, social support, and HIV care in PLWH who use alcohol as a coping strategy to manage HIV related stigma and stress (39), however, if used in excess may be detrimental for hazardous alcohol use has been associated with poorer HIV treatment outcomes (19),(40).

In our study, low social support did not appear to be associated with changes in alcohol use between baseline and 12 months; however, there was little change in AUDIT-C score over this period. On the contrary, other studies found that high levels of social support may be associated with greater reductions in hazardous drinking over time (41),(42). The differences in the findings may be attributed to social desirability particularly because the population in our study setting is more likely to report socially desirable responses when asked about personal issues as reported elsewhere (43). We did not detect an association between emotional support and hazardous alcohol use when we examined emotional support separately. However, participants in the second-highest quartile of emotional support appeared to have higher odds of hazardous alcohol use compared to those in the highest quartile of emotional support, suggesting that the type of social support may be important. These findings are consistent with previous work done among PLWH in the US where smoking and hazardous drinking increased with decreasing levels of emotional support (44). Emotional support enhances the quality of life and provides a buffer to stressful life events

that come with HIV infection (45); it is therefore possible that low levels of emotional support may lead to hazardous drinking behavior as a coping mechanism among PLWH. We did not detect an association between low social support and highest level alcohol use contrary to prior work which demonstrated that low social support was associated with binge drinking among PLWH (36). Hazardous drinking may also reduce social support as friends and family tend to disassociate themselves from people with problematic drinking, and may offer social support if abstinence is being maintained (18). Conversely, high social support may also promote excessive drinking through socializing (46).

In our study, being male was associated with hazardous alcohol use, consistent with other published studies which found that men were more likely to engage in hazardous drinking than women (7),(47). It is possible that men may be embedded in pro-drinking social support networks that influence hazardous drinking as compared to women who tend to have sober networks for purposes of protecting social norms (48). However, in our study, we did not find a difference in the association between social support and alcohol use when we stratified by sex. This contradicts findings from studies in South Africa and the US which demonstrated that high social support decreased the risk of engaging in hazardous alcohol use and risky sexual behavior in women (42),(49).

Limitations

There are several limitations to this study. First, our sample of adult PLWH was not yet on ART, which may reduce the generalizability of our results to PLWH on treatment, particularly because alcohol use may change when patients start ART (38). Second, we collected information on social support only at baseline assuming that it would remain fairly constant; hence the study lacks evidence on whether social support changes over time and whether changes in social support are associated with changes in hazardous alcohol use. Although alcohol use was measured across all the follow-up visits, there was little change observed over the year. Third, the tool used to measure social support encompasses emotional, instrumental, and informational types of social support essential for PLWH (45); we did not measure alcohol-specific social support directed to a person's drinking behavior such as alcohol counseling which has been previously linked to abstinence (18), and our analyses of emotional support were post hoc. Lastly, we performed a post hoc power calculation that showed the study would have approximately 80% power to detect an odds ratio of 1.86 or greater for the association between low social support and hazardous alcohol use, based on the observed 45.5% with hazardous alcohol use among those with low social support. Thus, the study likely was not adequately powered to detect associations of the small magnitude observed in our study. Despite these limitations, the study had its strengths in the use of an objective alcohol biomarker (PEth) to complement self-report. PEth has been previously used by some studies in Uganda and confirmed under-reporting among PLWH (50)(51), thus including a specific alcohol biomarker enabled us to compensate for under-reporting.

In conclusion, we found that a relatively high proportion of PLWH had low social support in southwestern Uganda. We did not detect an association between low social support and

hazardous alcohol use. These data suggest that social support may play no role or a minimal role in preventing PLWH in south western Uganda from engaging in hazardous alcohol use.

Acknowledgements:

The Authors would like to extend appreciation to study participants, ISS clinic staff, and research assistants for their assistance in collecting the data and National Institute of Health for funding.

Funding:

This study was funded by the National Institute on Alcohol Abuse and Alcoholism (NIAAA) U01AA020776 (Hahn), K24AA022586 (Hahn), U24AA020779 (Cheng). The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Availability of data and material (data transparency):

The data analyzed for this manuscript will be made available via upload to the Dryad Digital Repository upon acceptance for publication.

References:

1. World Health Organisation. Global status report on alcohol and health. World Heal Organ. 2011;
2. UPHIA. Uganda Population-Based HIV Impact Assessment. SUMMARY SHEET: PRELIMINARY. 2017.
3. Woolf-King SE, Steinmaus CM, Reingold AL, Hahn JA. An update on alcohol use and risk of HIV infection in sub-Saharan Africa: Meta-analysis and future research directionos. Int J Alcohol Drug Res. 2013;
4. Hendershot CS, Stoner SA, Pantalone DW, Simoni JM. Alcohol use and antiretroviral adherence: Review and meta-analysis. Journal of Acquired Immune Deficiency Syndromes. 2009.
5. Velloza J, Kemp CG, Aunon FM, Ramaiya MK, Creegan E, Simoni JM. Alcohol Use and Antiretroviral Therapy Non-Adherence Among Adults Living with HIV/AIDS in Sub-Saharan Africa: A Systematic Review and Meta-Analysis. AIDS and Behavior. 2020.
6. Long JE, Richardson BA, Wanje G, Wilson KS, Shafi J, Mandaliya K, et al. Alcohol use and viral suppression in HIVpositive Kenyan female sex workers on antiretroviral therapy. PLoS One. 2020;
7. Wandera B, Tumwesigye NM, Nankabirwa JI, Kambugu AD, Parkes-Ratanshi R, Mafigiri DK, et al. Alcohol consumption among HIV-infected persons in a large urban HIV clinic in Kampala Uganda: A constellation of harmful behaviors. PLoS One. 2015;
8. Antelman G, Smith Fawzi MC, Kaaya S, Mbwambo J, Msamanga GI, Hunter DJ, et al. Predictors of HIV-1 serostatus disclosure: A prospective study among HIV-infected pregnant women in Dar es Salaam, Tanzania. Aids. 2001;15(14):1865–74. [PubMed: 11579250]
9. Namir S, Wolcott DL, Fawzy FI. Social support and HIV spectrum disease: clinical and research perspectives. Psychiatric medicine. 1989.
10. Groh DR, Leonard JA, Margaret DI, Olson BD. Friends, family, and alcohol abuse: An examination of general and alcohol-specific social support. Am J Addict. 20087;16(1):49–55.
11. Kekwaletswe CT, Jordaan E, Nkosi S, Morojele NK. Social Support and the Mediating Roles of Alcohol Use and Adherence Self-Efficacy on Antiretroviral Therapy (ART) Adherence Among ART Recipients in Gauteng, South Africa. AIDS Behav. 2017;
12. Beattie MC, Longabaugh R, Elliott G, Stout RL, Fava TJ, Noel NE. Effect of the social environment on alcohol involvement and subjective well-being prior to alcoholism treatment. J Stud Alcohol. 1993;
13. Havassy BE, Hall SM, Wasserman DA. Social support and relapse: Commonalities among alcoholics, opiate users, and cigarette smokers. Addict Behav. 1991;

14. Moitra E, Anderson BJ, Herman DS, Hayaki J, Pinkston MM, Kim HN, et al. Examination of using alcohol to cope, depressive symptoms, and perceived social support in persons with HIV and Hepatitis C. AIDS Care - Psychol Socio-Medical Asp AIDS/HIV. 2020;
15. Boateng-Poku A, Benca-Bachman CE, Najera DD, Whitfield KE, Taylor JL, Thorpe RJ, et al. The role of social support on the effects of stress and depression on African American tobacco and alcohol use. Drug Alcohol Depend. 2020;
16. Booth BM, Russell DW, Soucek S, Laughlin PR. Social support and outcome of alcoholism treatment: An exploratory analysis. Am J Drug Alcohol Abuse. 1992;
17. Brooks AT, Magaña Lòpez M, Ranucci A, Krumlauf M, Wallen GR. A qualitative exploration of social support during treatment for severe alcohol use disorder and recovery. Addict Behav Reports. 2017;
18. Beattie MC, Longabaugh R. General and alcohol-specific social support following treatment. Addict Behav. 1999;24(5):593–606. [PubMed: 10574299]
19. Hahn JA, Cheng DM, Emenyonu NI, Lloyd-Travaglini C, Fatch R, Shade SB, et al. Alcohol Use and HIV Disease Progression in an Antiretroviral Naive Cohort. J Acquir Immune Defic Syndr. 2018;77(5).
20. Health UM of. Addendum To the National Antiretroviral Treatment Guidelines. 2013; (December):24.
21. Hahn JA, Dobkin LM, Mayanja B, Emenyonu NI, Kigozi IM, Shiboski S, et al. Phosphatidylethanol (PEth) as a Biomarker of Alcohol Consumption in HIV-Positive Patients in Sub-Saharan Africa. Alcohol Clin Exp Res. 2012;
22. Jones J, Jones M, Plate C, Lewis D. The detection of 1-palmitoyl-2-oleoyl-sn-glycero-3-phosphoethanol in human dried blood spots. Anal Methods. 2011;
23. Bradley KA, McDonell MB, Bush K, Kivlahan DR, Diehr P, Fihn SD. The AUDIT Alcohol Consumption Questions. Alcohol Clin Exp Res. 1998;22(8):1842. [PubMed: 9835306]
24. Bradley KA, Debenedetti AF, Volk RJ, Williams EC, Frank D, Kivlahan DR. AUDIT-C as a brief screen for alcohol misuse in primary care. Alcohol Clin Exp Res. 2007;31(7):1208–17. [PubMed: 17451397]
25. Williams EC, Hahn JA, Saitz R, Bryant K, Lira MC, Samet JH. Alcohol Use and Human Immunodeficiency Virus (HIV) Infection: Current Knowledge, Implications, and Future Directions. Alcoholism: Clinical and Experimental Research. 2016.
26. Hotel C International Conference The many dimensions of poverty The Multidimensionality of Poverty : An Institutionalist Perspective. 2005;
27. Ironson G, Solomon GF, Balbin EG, O'Cleirigh C, George A, Kumar M, et al. The Ironson-Woods Spirituality/Religiousness Index is associated with long survival, health behaviors, less distress, and low cortisol in people with HIV/AIDS. Ann Behav Med. 2002;24(1):34–48. [PubMed: 12008793]
28. Radloff LS. The use of the Center for Epidemiologic Studies Depression Scale in adolescents and young adults. J Youth Adolesc. 1991;
29. Ezeamama AE, Woolfork MN, Guwatudde D, Bagenda D, Manabe YC, Fawzi WW, et al. Depressive and anxiety symptoms predict sustained quality of life deficits in HIV-positive ugandan adults despite antiretroviral therapy: A prospective cohort study. Med (United States). 2016;
30. Takada S, Weiser SD, Kumbakumba E, Muzoora C, Martin JN, Hunt PW, et al. The Dynamic Relationship Between Social Support and HIV-Related Stigma in Rural Uganda. Ann Behav Med. 2014;48(1):26–37. [PubMed: 24500077]
31. Folasire OF, Akinyemi O, Owoaje E. Perceived Social Support among HIV Positive and HIV Negative People in Ibadan, Nigeria. World J AIDS. 2014;
32. Matthews S, Stansfeld S, Power C. Social support at age 33: The influence of gender, employment status and social class. Soc Sci Med. 1999;
33. Perkins JM, Nyakato VN, Kakuhikire B, Tsai AC, Subramanian S, Bangsberg DR, et al. Food insecurity, social networks and symptoms of depression among men and women in rural Uganda: A cross-sectional, population-based study. Public Health Nutr. 2018;
34. Thompson WE. Social support, religious involvement and alcohol use among students at a conservative Religious University. Behav Sci (Basel). 2017;

35. Brick LAD, Nugent NR, Kahana SY, Bruce D, Tanney MR, Fernández MI, et al. Interaction Effects of Neighborhood Disadvantage and Individual Social Support on Frequency of Alcohol Use in Youth Living with HIV. Am J Community Psychol. 2018;
36. Amirkhanian YA, Kelly JA, Tarima SS, Kuznetsova AV., Difranceisco WJ, Musatov VB, et al. Prevalence of alcohol use and factors associated with problem drinking in social networks of people living with HIV infection in St. Petersburg, Russia. AIDS Educ Prev. 2019;
37. Ncama BP, McInerney PA, Bhengu BR, Corless IB, Wantland DJ, Nicholas PK, et al. Social support and medication adherence in HIV disease in KwaZulu-Natal, South Africa. Int J Nurs Stud. 2008;
38. Hahn JA, Emenyonu NI, Fatch R, Muyindike WR, Kekiibina A, Carrico AW, et al. Declining and rebounding unhealthy alcohol consumption during the first year of HIV care in rural Uganda, using phosphatidylethanol to augment self-report. Addiction. 2016;
39. Parcesepe AM, Nash D, Tymejczyk O, Reidy W, Kulkarni SG, Elul B. Gender Differences and Psychosocial Factors Associated with Problem Drinking Among Adults Enrolling in HIV Care in Tanzania. AIDS Behav. 2019;
40. Monroe AK, Lau B, Mugavero MJ, Mathews WC, Mayer KH, Napravnik S, et al. Heavy alcohol use is associated with worse retention in HIV care. In: Journal of Acquired Immune Deficiency Syndromes. 2016.
41. Mavandadi S, Helstrom A, Sayers S, Oslin D, Patts GJ, Cheng DM, et al. The moderating role of perceived social support on alcohol treatment outcomes. J Stud Alcohol Drugs. 2015;76(5):818–22. [PubMed: 26402363]
42. Velloza J, Watt MH, Abler L, Skinner D, Kalichman SC, Dennis AC, et al. HIV-Risk Behaviors and Social Support Among Men and Women Attending Alcohol-Serving Venues in South Africa: Implications for HIV Prevention. AIDS Behav. 2017;
43. Campbell JI, Musiimenta A, Burns B, Natukunda S, Musinguzi N, Haberer JE, et al. The importance of how research participants think they are perceived: results from an electronic monitoring study of antiretroviral therapy in Uganda. AIDS Care - Psychol Socio-Medical Asp AIDS/HIV. 2019;
44. Strine TW, Chapman DP, Balluz L, Mokdad AH. Health-related quality of life and health behaviors by social and emotional support. Soc Psychiatry Psychiatr Epidemiol. 2008;
45. Remor E. Social support and quality of life in the HIV infection. Aten Primaria. 2002;
46. Hunter-Reel D, McCrady BS, Hildebrandt T, Epstein EE. Indirect effect of social support for drinking on drinking outcomes: The role of motivation*. J Stud Alcohol Drugs. 2010;
47. Farley J, Miller E, Zamani A, Tepper V, Morris C, Oyegunle M, et al. Screening for hazardous alcohol use and depressive symptomatology among HIV-infected patients in Nigeria: Prevalence, predictors, and association with adherence. J Int Assoc Physicians AIDS Care. 2010;
48. Wolff B, Busza J, Bufumbo L, Whitworth J. Women who fall by the roadside: Gender, sexual risk and alcohol in rural Uganda. Addiction. 2006;
49. Villalonga-Olives E, Almansa J, Shaya F, Kawachi I. Perceived social capital and binge drinking in older adults: The Health and Retirement Study, US data from 2006–2014. Drug Alcohol Depend. 2020;
50. Muyindike WR, Lloyd-Travaglini CA, Emenyonu NI, Adong J, Ngabirano C, Fatch R, et al. Under-reporting of alcohol consumption among persons with HIV not yet on ART in Mbarara, Uganda. Alcohol Clin Exp Res. 2015;
51. Bajunirwe F, Haberer JE, Boum Y, Hunt P, Mocello R, Martin JN, et al. Comparison of self-reported alcohol consumption to phosphatidylethanol measurement among HIV-infected patients initiating antiretroviral treatment in Southwestern Uganda. PLoS One. 2014;

AIDS Behav. Author manuscript; available in PMC 2023 February 01.

Table I.

Participant characteristics and bivariate associations with low social support, ADEPT study, Mbarara, Uganda (n=443). [x]

	Overall	Low social support		
	N=443 no. (%) or median (IQR)	No N=311 no. (%) or median (IQR)	Yes N=132 no. (%) or median (IQR)	X^2 (p-value)*
Hazardous alcohol use (AUDIT-C positive or PEth >=50 ng/ml)				0.27 (0.60)
No	250 (56.4)	178 (71.2)	72 (28.8)	
Yes	193 (43.6)	133 (68.9)	60 (31.1)	
AUDIT-C (continuous) (n=440)	1 (0–3)	1 (0–3)	1 (0–3)	−0.10 (0.92)
Change in AUDIT-C from baseline to 12 months** (n=251)	0 (−1 – 0)	0 (−1 – 0)	0 (−1 – 0)	0.50 (0.62)
Age	32 (27–40)	32 (27–41)	32 (27–39)	0.89 (0.37)
Sex				3.90 (0.05)
Male	144 (32.5)	110 (76.4)	34 (23.6)	
Female	299 (67.5)	201 (67.2)	98 (32.8)	
More than a primary education				14.66 (<0.01)
No	309 (69.8)	200 (64.7)	109 (35.3)	
Yes	134 (30.3)	111 (82.8)	23 (17.2)	
Household Asset Index (n=442)				16.84 (<0.01)
Low	175 (39.6)	106 (60.6)	69 (39.4)	
Middle	177 (40.1)	128 (72.3)	49 (27.7)	
High	90 (20.4)	76 (84.4)	14 (15.6)	
Married?				19.71 (<0.01)
No	227 (51.2)	138 (60.8)	89 (39.2)	
Yes	216 (48.8)	173 (80.1)	43 (19.9)	
Lives with a spouse/partner				13.03 (<0.01)
No	265 (59.8)	169 (63.8)	96 (36.2)	
Yes	178 (40.2)	142 (79.8)	36 (20.2)	
Lives with any children				0.03 (0.86)
No	95 (21.4)	66 (69.5)	29 (30.5)	

	Overall	Low social support		
	N=443 no. (%) or median (IQR)	No N=311 no. (%) or median (IQR)	Yes N=132 no. (%) or median (IQR)	X^2 (p-value)*
Yes	348 (78.6)	245 (70.4)	103 (29.6)	
Physical Functioning Scale (PFS) (n=416)	100 (83.3–100)	100 (83.3–100)	100 (83.3–100)	1.11 (0.27)
Symptoms of depression (n=418)				7.60 (<0.01)
No	279 (66.8)	209 (74.9)	70 (25.1)	
Yes	139 (33.3)	86 (61.9)	53 (38.1)	
Spirituality and Religiosity Index (SRI): Overall score (n=426)	103 (89–107)	103 (89–108)	101 (88–106)	2.15 (0.03)
SRI: Sense of peace (n=426)	42 (36–45)	43 (37–45)	41 (36–44)	2.38 (0.02)
SRI: Faith in God (n=426)	29 (24–30)	29 (25–30)	29 (24–30)	1.70 (0.09)
SRI: Religious behaviors (n=426)	22 (20–25)	22 (20–25)	21 (20–24)	1.29 (0.20)
SRI: Compassionate view of others (n=426)	10 (8–10)	10 (8–10)	10 (8–10)	1.95 (0.05)

[x] limited to participants with social support and alcohol use data

[*] p-value from X^2 test (categorical variables) or Mann-Whitney test (continuous variables)

[**] negative values indicate a lower AUDIT-C at 12m

AIDS Behav. Author manuscript; available in PMC 2023 February 01.

Table II.

Unadjusted and adjusted* odds ratios (OR) and 95% confidence intervals (CI) for hazardous alcohol use, ADEPT study participants at baseline, Mbarara, Uganda. [x]

	Hazardous alcohol use?					
	No (n=250) N (%) or median (IQR)	**Yes (n=193) N (%) or median (IQR)**	**Unadjusted OR (95% CI)**	**z (p-value)**	**Adjusted OR (95%CI)**	**z (p-value)**
Low social support				0.52 (0.60)		−0.13 (0.90)
No	178 (57.2)	133 (42.8)	1.00		1.00	
Yes	72 (54.6)	60 (45.5)	1.12 (0.74, 1.68)		0.97 (0.61, 1.55)	
Age	32 (26–40)	32 (28–40)	1.01 (0.99, 1.03)	0.85 (0.40)	1.00 (0.98, 1.03)	0.43 (0.66)
Sex				4.50 (<0.01)		4.17 (<0.01)
Male	59 (41.0)	85 (59.0)	2.55 (1.70, 3.83)		2.66 (1.68, 4.20)	
Female	191 (63.9)	108 (36.1)	1.00		1.00	
More than a primary education				−0.70 (0.48)		−0.64 (0.52)
No	171 (55.3)	138 (44.7)	1.00		1.00	
Yes	79 (59.0)	55 (41.0)	0.86 (0.57, 1.30)		0.85 (0.52, 1.40)	
Household Asset Index [a]				0.49 (0.78)		0.01 (1.00)
Low	95 (54.3)	80 (45.7)	1.00		1.00	
Middle	102 (57.6)	75 (42.4)	0.87 (0.57, 1.33)		1.02 (0.64, 1.62)	
High	52 (57.8)	38 (42.2)	0.87 (0.52, 1.45)		1.00 (0.54, 1.87)	
Married?				0.36 (0.72)		−1.07 (0.28)
No	130 (57.3)	97 (42.7)	1.00		1.00	
Yes	120 (55.6)	96 (44.4)	1.07 (0.74, 1.56)		0.78 (0.50, 1.22)	
Physical Functioning Scale (PFS)	100 (83.3–100)	100 (83.3–100)	1.00 (0.99, 1.01)	−0.76 (0.45)	1.00 (0.98, 1.01)	−0.76 (0.45)
Symptoms of depression				−0.11 (0.91)		−0.13 (0.89)
No	157 (56.3)	122 (43.7)	1.00		1.00	
Yes	79 (56.8)	60 (43.2)	0.98 (0.65, 1.47)		0.97 (0.62, 1.52)	
Spirituality and Religiosity Index (SRI): Overall score	103 (89–108)	102 (88–107)	0.98 (0.96, 1.00)	−1.98 (0.05)	0.98 (0.96, 1.00)	−1.71 (0.09)

*multivariable model n = 407

[×]limited to participants with social support and alcohol use data

[α]Chi-square value listed not z-value

Table III.

Unadjusted and adjusted* linear regression models of change in AUDIT-C score from baseline to 12 months, ADEPT study participants, Mbarara, Uganda (n=251). [x]

	Unadjusted		Adjusted	
	β (95% CI)	**t (p-value)**	**β (95% CI)**	**t (p-value)**
Low social support		−0.88 (0.38)		−0.10 (0.92)
No	Ref		Ref	
Yes	−0.27 (−0.89, 0.34)		−0.03 (−0.72, 0.65)	
Age	−0.02 (−0.04, 0.01)	−1.13 (0.26)	−0.02 (−0.05, 0.01)	−1.20 (0.23)
Sex		−0.43 (0.67)		0.01 (1.00)
Male	−0.13 (−0.72, 0.46)		0.00 (−0.64, 0.65)	
Female	Ref		Ref	
More than a primary education		0.64 (0.53)		0.06 (0.95)
No	Ref		Ref	
Yes	0.20 (−0.42, 0.82)		0.02 (−0.69, 0.73)	
Household Asset Index[a]		0.67 (0.51)		0.62 (0.54)
Low	Ref		Ref	
Middle	−0.04 (−0.67, 0.59)		−0.08 (−0.76, 0.60)	
High	0.39 (−0.38, 1.16)		0.39 (−0.51, 1.28)	
Married?		−0.64 (0.52)		−0.60 (0.55)
No	Ref		Ref	
Yes	−0.18 (−0.74, 0.38)		−0.19 (−0.82, 0.44)	
Physical Functioning Scale (PFS)	−0.00 (−0.02, 0.01)	−0.38 (0.70)	−0.01 (−0.02, 0.01)	−0.83 (0.41)
Symptoms of depression		−1.15 (0.25)		−1.44 (0.15)
No	Ref		Ref	
Yes	−0.35 (−0.94, 0.25)		−0.48 (−1.13, 0.18)	
Spirituality and Religiosity Index (SRI): Overall score	0.01 (−0.03, 0.04)	0.34 (0.74)	−0.00 (−0.03, 0.03)	−0.04 (0.97)

[*] multivariable model n = 230

[x] limited to participants with social support and alcohol use data

* Beta represents the mean difference between groups

* Continuous variables represent 1 unit increase in the variable

α Chi-square value listed not t-value