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Permalink

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Journal

Substance Abuse, 35(3)

ISSN

0889-7077

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Publication Date

2014-07-01

DOI

10.1080/08897077.2014.890997

Peer reviewed



Published in final edited form as:

Subst Abus. 2014 ; 35(3): 245–253. doi:10.1080/08897077.2014.890997.

Alcohol and Associated Characteristics among Older Persons Living with HIV on Antiretroviral Therapy

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Abstract

Background—Alcohol use, and particularly unhealthy alcohol use, is associated with poor HIV-related outcomes among persons living with HIV (PLWH). Despite a rapidly growing proportion of PLWH > 50 years, alcohol use and its associated characteristics are under-described in this population. We describe alcohol use, severity, and associated characteristics using data from a sample of PLWH > 50 years who participated in a trial of a telephone-based intervention to improve adherence to ART.

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Contributions: Dr. Catz served as principal investigator of the study, guiding all stages of study design, analysis, interpretation and presentation. Dr. Williams wrote the manuscript and revised it iteratively according to contributions of all of the other authors. Mr. Grothaus analyzed the data and provided biostatistical expertise. Dr. McCoy and Ms. Rittmueller reviewed the literature and contributed to manuscript drafts. In addition to that of Dr. Catz, Drs. Bradley, McClure, and Balderson provided senior expertise at all phases of study design, execution, and interpretation. All authors contributed to study conception and design and data interpretation. All authors contributed to and have approved the final manuscript.

Disclaimer: Views expressed in this article are those of the authors and do not necessarily represent the views of the Department of Veterans Affairs, the University of Washington, Winston Salem State University or Group Health Research Institute.

Methods—Participants were recruited from AIDS Service Organizations in 9 states and included PLWH 50 years who were prescribed ART, reported suboptimal adherence at screening (missing >1.5 days of medication or taking medications 2 hours early or late on >3 days in the 30 days prior to screening), and consented to participate. The AUDIT-C alcohol screen, socio-demographic characteristics, substance use and mental health comorbidity were assessed at baseline. AUDIT-C scores were categorized into non-drinking, low-level drinking, and mild-moderate unhealthy, and severe unhealthy drinking (0, 1-3, 4-6, 7-12, respectively). Analyses described and compared characteristics across drinking status (any/none) and across AUDIT-C categories among drinkers.

Results—Among 447 participants, 57% reporting drinking alcohol in the past year, including 35%, 15% and 7% reporting low-level drinking, mild-moderate unhealthy drinking, and severe unhealthy drinking, respectively. Any drinking was most common among men and those who were LGBT, married/partnered, had received past-year alcohol treatment, and never used injection drugs (p-values all <0.05). Differences in race, employment status, past year alcohol treatment, and positive depression screening (p-values all <0.05) were observed across AUDIT-C categories.

Conclusions—In this sample of older PLWH with suboptimal ART adherence, a majority reported past-year alcohol use and 22% screened positive for unhealthy alcohol use. Any and unhealthy alcohol use were associated with demographics, depression, and substance use history. Further research is needed regarding alcohol use among older PLWH.

Keywords

Alcohol; HIV; Older adults

Introduction

Alcohol use, and specifically unhealthy alcohol use, is common among individuals with human immunodeficiency virus (HIV) (1-3) and associated with adverse HIV-related outcomes (4-6). Specifically, among persons living with HIV (PLWH), studies have demonstrated that those who use alcohol have poorer adherence to antiretroviral therapy (ART) (7, 8), increased HIV disease progression (4-6), and poorer survival (9) than those who do not.

While a substantial literature has described the prevalence of any and unhealthy alcohol use, as well as associations between alcohol use and demographic and clinical characteristics and HIV-related outcomes in PLWH (1-3, 8, 10-17), most have been conducted among younger samples (mean or median ages generally between 39 and 49). Therefore, little is known about alcohol use among *older* PLWH.

Understanding alcohol use and severity, as well as associated demographic and clinical characteristics, in this population may be important for several reasons. The proportion of older PLWH is growing (18, 19) and expected to reach 50% of the HIV-infected population in the United States by 2015 (19). This population may be more medically complex than younger PLWH, which could increase the potential negative impacts of alcohol use, particularly at higher levels of use. However, alcohol use and the severity of unhealthy alcohol use decrease markedly with age (20, 21), and therefore the prevalence of any and

unhealthy alcohol use, as well as the risks associated with alcohol use, may be lower or less strong, respectively, in this population.

As an initial step to understanding alcohol use and associated characteristics among older PLWH, this study sought to describe alcohol use, severity, and associated characteristics using data from a geographically diverse sample of PLWH 50 years who reported suboptimal ART adherence at screening and consented to participate in a trial of a telephone-based intervention to improve ART adherence.

Methods

Study Design and Sample

This study represents a secondary analysis of baseline data collected in the Self-Managing HIV and Chronic Disease (PRIME) randomized controlled trial (22). Briefly, PRIME tested a telephone-delivered self-management intervention for older PLWH and was aimed at improving adherence to ART and health-related quality of life. PRIME participants were recruited from AIDS Service Organizations in nine states (Wisconsin, Texas, Illinois, Pennsylvania, Michigan, Massachusetts, Arizona, California, and Washington) via posters, flyers, and direct mailings. Interested persons were asked to call a toll-free number and complete a brief telephone screen to assess eligibility for a study of “living well and aging with HIV.” Those 50 years or older who were HIV-positive, prescribed ART, reported sub-optimal ART adherence (missing >1.5 days of medication or taking medications 2 hours early or late on >3 days in the in the 30 days prior to screening), were able to hear on the telephone, were not cognitively impaired based on a brief screen (23), were willing to participate in the trial, and provided oral consent for the study (n=468 among 1,101 callers screened) were eligible. The majority of these (n = 452) completed a baseline telephone survey and provided written informed consent to enroll in the PRIME study. Participants were compensated \$30 for participating in the 30-minute baseline telephone assessment. The risks and benefits (including compensation for participation) of the study were described to participants during the informed consent process, and those who consented attested to understanding the risks and benefits. The analytic sample for the present study is comprised of the 447 PRIME participants for whom data on alcohol use were complete. All research activities were approved by the Institutional Review Board of the Group Health Research Institute.

Measures

Alcohol Use and Severity—The Alcohol Use Disorders Identification Test Consumption (AUDIT-C) questionnaire, which has been shown to perform well in persons with HIV (13), was administered to assess alcohol use. The AUDIT-C consists of three items that assess the quantity and frequency of average consumption and the frequency of heavy episodic drinking. Each item is scored 0-4 points (total score range from 0-12). Scores of 0 indicate no drinking in the past year, and higher scores are associated with increasing severity of unhealthy alcohol use (20, 24, 25). Based on AUDIT-C scores, participants were categorized as no past-year drinking (score = 0) versus any past-year drinking (score 1-12) and then categorized into groups reflecting alcohol use severity based on their scores: no

drinking in past year (0), low-level drinking (1-3), mild-moderate unhealthy drinking (4-6), and severe unhealthy drinking (scores ≥ 7) based on validation studies (26-29).

Socio-demographic Characteristics—Demographic information was assessed at baseline and included participant age, gender, race and ethnicity, educational level, sexual orientation, relationship status, employment and disability status. Age in years at baseline was categorized as 50-54 years, 55-59 years, and 60 or more years. Relationship status was categorized as married/partnered versus other. Sexual orientation was categorized as heterosexual versus lesbian, gay, bisexual, or transgender (LGBT). Race was categorized as African-American, white or other due to small numbers of participants reporting other races; and ethnicity was categorized as Hispanic or non-Hispanic. Education as the highest grade or year of school completed was ascertained and categorized as high school or less versus greater than or equal to one year of college or technical school. Two measures were derived from the available employment data: employment status categorized as full-time, part-time or other; and disability status indicating any report of currently being on Social Security Disability.

Substance Use—Two dichotomous measures were constructed to represent yes (versus no) responses to questions asking about ever and past three-month use of injection drugs.

Depression—Depression was assessed with the eight-item Patient Health Questionnaire (PHQ-8), a modified version of the nine-item PRIME-MD PHQ (PHQ-9) depression scale which omits one item assessing suicidal ideation (30) and performs well compared to the nine-item PHQ (22, 31). For this study, the PHQ scores were categorized into a dichotomous measure indicating positive (≥ 10) versus negative (<10) screen for depression (22, 31).

Substance Abuse and Mental Health Treatment—Participants were asked whether they had received any treatment in the past year for problems with emotions, nerves, mental health, or use of alcohol or drugs. If they responded affirmatively, they were asked specifically whether they received treatment for each emotional, alcohol and/or drug problems. Participants were considered to have received treatment for mental health, alcohol, or drug problems based on affirmative responses to the corresponding condition.

Other Comorbidity—Chronic conditions were assessed by asking whether participants had been diagnosed with or treated for any of 21 chronic health problems (22). Participants were also offered the opportunity to endorse other chronic conditions not included in the list. Based on responses, participants were categorized into groups of 0, 1-2 or ≥ 3 chronic conditions.

ART Adherence—Thirty-day adherence to ART was assessed by participant self-reported rating of their ability to take all HIV medications as prescribed (32). Though several adherence measures were collected, this measure had the most normal distribution of the collected adherence measures and allowed data categorization in two ways; one used a six-point categorization ranging from very poor to excellent adherence and the other used two categories of excellent and less than excellent adherence. Additionally, a 13-item scale measured self-efficacy for managing ART when faced with potential barriers to adherence.

Each item was scored on a 0 to 10 scale, with higher scores indicating higher self-efficacy. The self-efficacy measure was defined as high versus low self-efficacy based on the median split.

Analyses

Participant characteristics were described for the entire sample, as well as the sample stratified by past year drinking status (AUDIT-C=0 vs. AUDIT-C>1, or none vs. any) and categories of alcohol use severity (AUDIT-C = 0, 1-3, 4-6, and 7-12). Characteristics were then compared using two sets of Chi-square tests. The first set compared characteristics across drinking status (one degree of freedom), and the second set compared characteristics across the three groups of drinkers stratified by alcohol use severity (AUDIT-C 1-3, 4-6, and 7-12; two degrees of freedom). All analyses were conducted in SAS Version 9.2.

Results

Participant Characteristics and Alcohol Use

A majority of participants were between the ages of 50 and 54 years, black, and heterosexual. Half reported a high school education or less, and about a quarter reported being married or partnered (Table 1).

Most participants (n= 256; 57%) reported drinking alcohol in the past year, with 35% having AUDIT-C scores consistent with low-level drinking, 15% with mild-moderate unhealthy drinking, and 7% with severe unhealthy drinking.

Correlates of Non-Drinking and Drinking

Participants reporting no drinking in the past year were more likely to be female, heterosexual, and report ever use of injection drugs than drinkers (Table 2). Those reporting any drinking were more likely to be married or partnered and to have ever received alcohol treatment (Table 2). No other significant differences were observed between these groups.

Association between Alcohol Use Severity and Participant Characteristics

Analyses among participants reporting any past year drinking identified variation in race, employment status, past year alcohol treatment, and positive depression screening across AUDIT-C categories (Table 3). African-American and white race were equally represented in low-level drinkers, but African-American race was more prevalent than white race among participants reporting mild-moderate unhealthy drinking and severe unhealthy drinking (Table 3). The prevalence of full-time employment was less common among participants who reported mild-moderate and severe unhealthy drinking than those with low-level drinking (Table 3). The prevalence of past-year alcohol treatment increased with increasing severity of unhealthy drinking, and the prevalence of positive depression screening was most common among those with severe unhealthy drinking (Table 3). No other significant differences were observed in participant characteristics across unhealthy alcohol use among participants reporting past-year drinking.

Discussion

In this sample of older PLWH who reported suboptimal adherence to ART and consented to participate in a randomized controlled trial of self-management of HIV and chronic disease, alcohol use, and specifically unhealthy alcohol use, was common with a majority reporting past-year drinking and more than one-fifth screening positive for unhealthy alcohol use. Alcohol use and unhealthy alcohol use were associated with socio-demographic characteristics, as well as substance use and mental health comorbidity. However, in this sample, no other significant associations were observed between either alcohol use or unhealthy alcohol use and participant characteristics.

A number of previous studies of clinical samples have described the prevalence of unhealthy alcohol use among PLWH (1-3, 8, 10-17, 33). Using a large variety of measures and definitions of unhealthy alcohol use, these studies have reported prevalences ranging from 8% on the low end (1) to approximately 42% on the high end (12, 14). Studies specifically using the AUDIT-C have identified prevalences ranging from 14% – 27% (8, 11, 13, 15, 33). The prevalence of unhealthy alcohol use identified using the AUDIT-C in the present study—22%—falls well within the range of previous estimates among PLWH and is similar to the general prevalence in the U.S. population (22.6%) (29). However, different from previous studies, which were conducted among younger samples (mean or median ages generally between 39 and 49) (1, 2, 14-16), the sample in the present study was restricted to PLWH who were 50 years and older. Although unhealthy alcohol use is less prevalent among older than younger adults in the U.S. population (20, 29, 34), in this sample of PLWH, the prevalence of unhealthy alcohol use was generally consistent with estimates from younger samples. This finding suggests that, despite the age of these individuals, unhealthy alcohol use may be relatively common among older PLWH who are taking ART.

Because older adults are expected to be the majority of individuals living with HIV within the next five years (18, 19), and over a fifth of older adults with HIV in this sample screened positive for unhealthy alcohol use, findings from this line of research may have important clinical implications. Previous studies of PLWH have demonstrated that alcohol use is associated with delay to treatment (35), non-adherence to ART (5, 8, 10, 36), and faster HIV disease progression (3, 4, 6, 7, 16, 36, 37), as well as compromised general immune function (6), and increased comorbid medical disease (16, 38), including faster progression of liver disease related to hepatitis C (39). Moreover, unhealthy alcohol use may compromise the quality of HIV care received (11). Despite its substantial potential illness burden on HIV, alcohol use is an often overlooked factor in HIV care (2, 40). And, because unhealthy alcohol use is generally less common among older adults (34), providers of HIV care may be even less likely to identify and address unhealthy alcohol use among older adults with HIV. Policy recommendations support integrating care for unhealthy alcohol use into HIV medical care to improve patient outcomes, (41-43) and results of the present study support the integration of those recommendations into care for older PLWH. Specifically, population-based screening and evidence-based follow-up should be offered routinely to older adults with HIV (44, 45).

Findings from this study may also warrant further research regarding whether alcohol-related interventions targeted to subgroups of particularly vulnerable older populations with HIV may be warranted (46). Specifically, in this study, those who were LGBT, married/partnered, had received alcohol treatment, and had never used injection drugs were more likely to report past-year drinking compared to their relevant referent standard groups. And, among those who reported past-year drinking, black race and report of employment other than full-time were disproportionately represented in the more severe risk groups. While these findings are consistent with previous studies in younger populations of PLWH (1, 3, 14, 16, 17), further research should be conducted to assess whether these patterns are similar in other older samples of PLWH and whether interventions targeted to vulnerable groups, such as LGBT and black PLWH, are warranted.

Future research should also be conducted to assess associations between alcohol use and ART adherence in older PLWH. In the present study, ART adherence was not associated with alcohol use or severity. However, multiple previous studies have identified associations between alcohol use and non-adherence to ART (5, 8, 10, 36). Because ART prescription and suboptimal adherence were study eligibility criteria, the present findings may not be generalizable to other samples of older PLWH, especially those with more variable adherence to ART. In addition, the present study in this community-based sample of older PLWH only assessed participant-reported adherence to ART, which may have been biased by social desirability. However, it is possible that differences in results across studies could be specific to the older adult sample. Specifically, older adults who drink may be “healthy survivors,” such that those who drink in their older adulthood are those who have not experienced adverse outcomes related to alcohol use. Moreover, older adults may be more likely to exceed weekly than daily alcohol limits (47), and the mechanisms via which adherence is affected may relate more to heavy episodic than average consumption (48). Finally, the present study identified a significant difference in the prevalence of depression across groups based on severity of alcohol use among drinkers, with over half of those with the most severe unhealthy alcohol use screening positive for depression. In younger populations of PLWH, both depression and alcohol use are independently associated with non-adherence to ART (49-51), and, in one study of PLWH, depression was associated with ART discontinuation among patients with unhealthy alcohol use (52). Findings related to depression in this study are, thus, hypothesis-generating regarding the possibility of potential adverse effects on adherence to ART among older PLWH. Therefore, similar research should be conducted in general clinical samples of older PLWH for whom ART adherence may be more variable and among whom more objective HIV-related outcomes can be collected.

This study's secondary use of data collected from randomized controlled trial participants may impact the study beyond limitations related to assessing ART adherence in this population. Specifically, the parent study was not designed to answer the questions posed in the present study and therefore, our ability to detect associations may have been limited. In particular, the small number of participants with the highest AUDIT-C scores (i.e., the most severe unhealthy alcohol use) may have limited our ability to observe differences where they would be most expected. Similarly, the current sample included only participants who were accessing healthcare services and were willing to volunteer for a wellness-focused

behavioral study for which they were moderately compensated. Therefore, findings may not be generalizable to older PLWH who do not access health services or are not willing to volunteer for a study. In addition, several other limitations should be acknowledged. This study is cross-sectional and does not assess alcohol use over time among older PLWH, nor does it identify causal associations between patient characteristics and alcohol use and severity. One previous study found that older age was associated with decreasing consumption over time among PLWH with unhealthy alcohol use (53) and future studies should investigate patterns of drinking over time among older PLWH. Moreover, although alcohol use, severity, and associated characteristics vary based on gender and race (21, 29, 34), the small sample size was prohibitive for conducting analyses stratified by sub-groups.

This study also has notable strengths. Most importantly, it is the first study to our knowledge to describe the prevalence of unhealthy alcohol use, as well as the correlates of alcohol use and severity, in a geographically diverse sample of older PLWH who are taking ART. As such, this study makes a unique and meaningful contribution to the field. Findings from this secondary analysis of existing data suggest that alcohol use, as well as unhealthy alcohol use, is common among older PLWH with suboptimal ART adherence and should be routinely identified and addressed in clinical settings. Moreover, findings are hypothesis-generating regarding whether alcohol-related interventions targeted to subgroups of particularly vulnerable older populations with HIV may be warranted, as well as regarding what characteristics may be associated with alcohol use and severity among older PLWH. In this sample of older PLWH, alcohol use and severity were associated with socio-demographic characteristics, as well as substance use and mental health comorbidity. Further research is needed in other, more generalizable, populations of older PLWH in order to better understand alcohol use and its associated characteristics in this population.

Acknowledgments

This study was supported by NIMH grant R01-MH074380 (Catz, PI). Dr. Williams is supported by a Career Development Award from VA Health Services Research & Development (CDA 12-276). This work was additionally supported by resources from the Centers of Excellence for Substance Abuse Treatment and Education, and Health Services Research & Development, VA Puget Sound Health Care System, Seattle, Washington. A preliminary version of this work was submitted to the Addictions Health Services Research Conference 2011.

References

1. Galvan FH, Bing EG, Fleishman JA, et al. The prevalence of alcohol consumption and heavy drinking among people with HIV in the United States: Results from the HIV cost and services utilization study. *J Stud Alcohol*. 2002; 63(2):179–86. [PubMed: 12033694]
2. Conigliaro J, Gordon AJ, McGinnis KA, Rabeneck L, Justice AC. How harmful is hazardous alcohol use and abuse in HIV infection: do health care providers know who is at risk? *J Acquir Immune Defic Syndr*. 2003; 33(4):521–5. [PubMed: 12869842]
3. Chander G, Josephs J, Fleishman JA, et al. Alcohol use among HIV-infected persons in care: results of a multi-site survey. *HIV medicine*. 2008; 9(4):196–202.10.1111/j.1468-1293.2008.00545.x [PubMed: 18366443]
4. Samet JH, Cheng DM, Libman H, Nunes DP, Alperen JK, Saitz R. Alcohol consumption and HIV disease progression. *J Acquir Immune Defic Syndr*. 2007; 46(2):194–9.10.1097/QAI.0b013e318142aabb [PubMed: 17667330]

5. Samet JH, Horton NJ, Meli S, Freedberg KA, Palepu A. Alcohol consumption and antiretroviral adherence among HIV-infected persons with alcohol problems. *Alcohol Clin Exp Res.* 2004; 28(4): 572–7. [PubMed: 15100608]
6. Samet JH, Horton NJ, Traphagen ET, Lyon SM, Freedberg KA. Alcohol consumption and HIV disease progression: are they related? *Alcohol Clin Exp Res.* 2003; 27(5):862–7.10.1097/01.ALC.0000065438.80967.56 [PubMed: 12766632]
7. Chander G, Lau B, Moore RD. Hazardous alcohol use: a risk factor for non-adherence and lack of suppression in HIV infection. *J Acquir Immune Defic Syndr.* 2006; 43(4):411–7.10.1097/01.qai.0000243121.44659.a4 [PubMed: 17099312]
8. Broyles LM, Gordon AJ, Sereika SM, Ryan CM, Erlen JA. Predictive utility of brief Alcohol Use Disorders Identification Test (AUDIT) for human immunodeficiency virus antiretroviral medication nonadherence. *Substance abuse : official publication of the Association for Medical Education and Research in Substance Abuse.* 2011; 32(4):252–61.10.1080/08897077.2011.599255 [PubMed: 22014256]
9. Braithwaite RS, Conigliaro J, Roberts MS, et al. Estimating the impact of alcohol consumption on survival for HIV+ individuals. *AIDS Care.* 2007; 19(4):459–66.10.1080/09540120601095734 [PubMed: 17453583]
10. Cook RL, Sereika SM, Hunt SC, Woodward WC, Erlen JA, Conigliaro J. Problem drinking and medication adherence among persons with HIV infection. *J Gen Intern Med.* 2001; 16(2):83–8. [PubMed: 11251758]
11. Korthuis PT, Fiellin DA, McGinnis KA, et al. Unhealthy alcohol and illicit drug use are associated with decreased quality of HIV care. *J Acquir Immune Defic Syndr.* 2012.10.1097/QAI.0b013e31826741aa
12. Lefevre F, O'Leary B, Moran M, Mossar M, Yarnold PR, Martin GJ. Alcohol consumption among HIV-infected patients. *J Gen Intern Med.* 1995; 10:458–60. [PubMed: 7472704]
13. Strauss SM, Tiburcio NJ, Munoz-Plaza C, et al. HIV care providers' implementation of routine alcohol reduction support for their patients. *Aids Patient Care STDS.* 2009; 23(3):211–8. [PubMed: 19866539]
14. Samet JH, Phillips SJ, Horton NJ, Traphagen ET, Freedberg KA. Detecting alcohol problems in HIV-infected patients: use of the CAGE questionnaire. *AIDS Res Hum Retroviruses.* 2004; 20(2): 151–5.10.1089/088922204773004860 [PubMed: 15018702]
15. Crane HM, Lober W, Webster E, et al. Routine collection of patient-reported outcomes in an HIV clinic setting: the first 100 patients. *Current HIV research.* 2007; 5(1):109–18. [PubMed: 17266562]
16. Justice AC, Lasky E, McGinnis KA, et al. Medical disease and alcohol use among veterans with human immunodeficiency infection: A comparison of disease measurement strategies. *Med Care.* 2006; 44(8 Suppl 2):S52–60.10.1097/01.mlr.0000228003.08925.8c [PubMed: 16849969]
17. Bonacini M. Alcohol use among patients with HIV infection. *Annals of hepatology.* 2011; 10(4): 502–7. [PubMed: 21911892]
18. Mack KA, Ory MG. AIDS and older Americans at the end of the Twentieth Century. *J Acquir Immune Defic Syndr.* 2003; 33(Suppl 2):S68–75. [PubMed: 12853855]
19. High KP, Brennan-Ing M, Clifford DB, et al. HIV and aging: state of knowledge and areas of critical need for research. A report to the NIH Office of AIDS Research by the HIV and Aging Working Group. *J Acquir Immune Defic Syndr.* 2012; 60(Suppl 1):S1–18.10.1097/QAI.0b013e31825a3668 [PubMed: 22688010]
20. Rubinsky AD, Dawson D, Williams EC, Kivlahan D, Bradley KA. AUDIT-C Scores as a Scaled Marker of Mean Daily Drinking, Alcohol Use Disorder Severity, and Probability of Alcohol Dependence in a U.S. General Population Sample of Drinkers. *Alcohol Clin Exp Res.* In Press.
21. Dawson DA, Grant BF, Chou SP, Pickering RP. Subgroup variation in U.S. drinking patterns: results of the 1992 national longitudinal alcohol epidemiologic study. *J Subst Abuse.* 1995; 7(3): 331–44. [PubMed: 8749792]
22. Balderson BH, Grothaus L, Harrison RG, McCoy K, Mahoney C, Catz S. Chronic illness burden and quality of life in an aging HIV population. *AIDS Care.* 2013; 25(4):451–8.10.1080/09540121.2012.712669 [PubMed: 22894702]

23. Callahan CM, Unverzagt FW, Hui SL, Perkins AJ, Hendrie HC. Six-item screener to identify cognitive impairment among potential subjects for clinical research. *Med Care*. 2002; 40(9):771–81.10.1097/01.MLR.0000024610.33213.C8 [PubMed: 12218768]
24. Bradley KA, Kivlahan DR, Zhou XH, et al. Using alcohol screening results and treatment history to assess the severity of at-risk drinking in Veterans Affairs primary care patients. *Alcohol Clin Exp Res*. 2004; 28(3):448–55. [PubMed: 15084903]
25. Rubinsky AD, Kivlahan DR, Volk RJ, Maynard C, Bradley KA. Estimating risk of alcohol dependence using alcohol screening scores. *Drug Alcohol Depend*. 2010; 108(1-2):29–36.10.1016/j.drugalcdep.2009.11.009 [PubMed: 20042299]
26. Bush K, Kivlahan DR, McDonell MB, Fihn SD, Bradley KA. The AUDIT alcohol consumption questions (AUDIT-C): an effective brief screening test for problem drinking. Ambulatory Care Quality Improvement Project (ACQUIP). Alcohol Use Disorders Identification Test. *Arch Intern Med*. 1998; 158(16):1789–95. [PubMed: 9738608]
27. Bradley KA, Bush KR, Epler AJ, et al. Two brief alcohol-screening tests From the Alcohol Use Disorders Identification Test (AUDIT): validation in a female Veterans Affairs patient population. *Arch Intern Med*. 2003; 163(7):821–9. [PubMed: 12695273]
28. 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):1208–17.10.1111/j.1530-0277.2007.00403.x [PubMed: 17451397]
29. Dawson DA, Grant BF, Stinson FS, Zhou Y. Effectiveness of the derived Alcohol Use Disorders Identification Test (AUDIT-C) in screening for alcohol use disorders and risk drinking in the US general population. *Alcohol Clin Exp Res*. 2005; 29(5):844–54. [PubMed: 15897730]
30. Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. *J Gen Intern Med*. 2001; 16(9):606–13. [PubMed: 11556941]
31. Kroenke K, Strine TW, Spitzer RL, Williams JB, Berry JT, Mokdad AH. The PHQ-8 as a measure of current depression in the general population. *J Affect Disord*. 2009; 114(1-3):163–73.10.1016/j.jad.2008.06.026 [PubMed: 18752852]
32. Lu M, Safren SA, Skolnik PR, et al. Optimal recall period and response task for self-reported HIV medication adherence. *AIDS and behavior*. 2008; 12(1):86–94.10.1007/s10461-007-9261-4 [PubMed: 17577653]
33. McGinnis KA, Justice AC, Kraemer KL, Saitz R, Bryant KJ, Fiellin DA. Comparing alcohol screening measures among HIV-infected and -uninfected men. *Alcohol Clin Exp Res*. 2013; 37(3):435–42.10.1111/j.1530-0277.2012.01937.x [PubMed: 23050632]
34. Grant BF, Dawson DA, Stinson FS, Chou SP, Dufour MC, Pickering RP. The 12-month prevalence and trends in DSM-IV alcohol abuse and dependence: United States, 1991-1992 and 2001-2002. *Drug Alcohol Depend*. 2004; 74(3):223–34.10.1016/j.drugalcdep.2004.02.004 [PubMed: 15194200]
35. Samet JH, Freedberg KA, Savetsky JB, Sullivan LM, Stein MD. Understanding delay to medical care for HIV infection: the long-term non-presenter. *AIDS*. 2001; 15(1):77–85. [PubMed: 11192871]
36. Howard AA, Arnsten JH, Lo Y, et al. A prospective study of adherence and viral load in a large multi-center cohort of HIV-infected women. *AIDS*. 2002; 16(16):2175–82. [PubMed: 12409739]
37. Conigliaro J, Justice AC, Gordon AJ, Bryant K. Role of alcohol in determining human immunodeficiency virus (HIV)-relevant outcomes: A conceptual model to guide the implementation of evidence-based interventions into practice. *Med Care*. 2006; 44(8 Suppl 2):S1–6.10.1097/01.mlr.0000223659.36369.cf [PubMed: 16849963]
38. Conigliaro J, Madenwald T, Bryant K, et al. The Veterans Aging Cohort Study: observational studies of alcohol use, abuse, and outcomes among human immunodeficiency virus-infected veterans. *Alcohol Clin Exp Res*. 2004; 28(2):313–21. [PubMed: 15112939]
39. Cooper CL, Cameron DW. Effect of alcohol use and highly active antiretroviral therapy on plasma levels of hepatitis C virus (HCV) in patients coinfecting with HIV and HCV. *Clin Infect Dis*. 2005; 41(Suppl 1):S105–9.10.1086/429506 [PubMed: 16265607]

40. Metsch LR, Pereyra M, Colfax G, et al. HIV-positive patients' discussion of alcohol use with their HIV primary care providers. *Drug Alcohol Depend.* 2008; 95(1-2):37–44.10.1016/j.drugalcdep.2007.12.006 [PubMed: 18243580]
41. Center for Substance Abuse Treatment. *Treatment for HIV-Infected Alcohol and Other Drug Abusers.* Rockville, MD: Substance Abuse and Mental Health Services Administration; 1995.
42. Center for Substance Abuse Treatment. *Substance Abuse Treatment for Persons with HIV/AIDS.* Rockville, MD: Substance Abuse and Mental Health Services Administration; 2000.
43. Department of Veterans Affairs. HIV/Hepatitis C QUERI Strategic Plan. http://www.queri.research.va.gov/about/strategic_plans/hiv.pdf2010
44. Jonas DE, Garbutt JC, Amick HR, et al. Behavioral counseling after screening for alcohol misuse in primary care: a systematic review and meta-analysis for the U.S. Preventive Services Task Force. *Ann Intern Med.* 2012; 157(9):645–54.10.7326/0003-4819-157-9-201211060-00544 [PubMed: 23007881]
45. Institute of Medicine. *Monitoring HIV Care in the United States: Indicators and Data Systems.* Washington, DC: The National Academies Press; 2012.
46. Frohlich KL, Potvin L. Transcending the known in public health practice: the inequality paradox: the population approach and vulnerable populations. *Am J Public Health.* 2008; 98(2):216–21.10.2105/AJPH.2007.114777 [PubMed: 18172133]
47. Rubinsky AD, Dawson DA, Williams EC, Kivlahan DR, Bradley KA. AUDIT-C scores as a scaled marker of mean daily drinking, alcohol use disorder severity, and probability of alcohol dependence in a U.S. general population sample of drinkers. *Alcohol Clin Exp Res.* 2013 Epub ahead of print. 10.1111/acer.12092
48. Parsons JT, Rosof E, Mustanski B. Patient-related factors predicting HIV medication adherence among men and women with alcohol problems. *Journal of health psychology.* 2007; 12(2):357–70.10.1177/1359105307074298 [PubMed: 17284499]
49. Paterson DL, Swindells S, Mohr J, et al. Adherence to protease inhibitor therapy and outcomes in patients with HIV infection. *Ann Intern Med.* 2000; 133(1):21–30. [PubMed: 10877736]
50. Tucker JS, Burnam A, Sherbourne CD, Kung F, Gifford AL. Substance use and mental health correlates of nonadherence to antiretroviral medications in a sample of patients with Human Immunodeficiency Virus infection. *Am J Med.* 2003; 114:573–80. [PubMed: 12753881]
51. Azar MM, Springer SA, Meyer JP, Altice FL. A systematic review of the impact of alcohol use disorders on HIV treatment outcomes, adherence to antiretroviral therapy and health care utilization. *Drug Alcohol Depend.* 2010; 112(3):178–93.10.1016/j.drugalcdep.2010.06.014 [PubMed: 20705402]
52. Kim TW, Palepu A, Cheng DM, Libman H, Saitz R, Samet JH. Factors associated with discontinuation of antiretroviral therapy in HIV-infected patients with alcohol problems. *AIDS Care.* 2007; 19(8):1039–47.10.1080/09540120701294245 [PubMed: 17852002]
53. Bertholet N, Cheng DM, Samet JH, Quinn E, Saitz R. Alcohol consumption patterns in HIV-infected adults with alcohol problems. *Drug Alcohol Depend.* 2010; 112(1-2):160–3.10.1016/j.drugalcdep.2010.05.009 [PubMed: 20579819]

Table 1
Characteristics of 447 HIV+ Older Adults on Antiretroviral Therapy Who Enrolled in a Randomized Controlled Trial

	Total (n = 447)	
	N	(%)
Socio-demographic Characteristics		
Female	125	(28)
Age		
50-54	263	(59)
55-59	126	(28)
60	58	(13)
Race		
Black	244	(55)
White	166	(37)
Other*	37	(8)
Hispanic Ethnicity	29	(6)
Educational Level High School	222	(50)
Sexual Orientation		
Heterosexual	248	(56)
LGBT	196	(44)
Married/Partnered	107	(24)
Employment Status		
Full time	35	(8)
Part time	64	(14)
Other	348	(78)
Social Security Disability	325	(73)
Substance Use and Mental Health Comorbidity		
Injection Drug Use		
Ever	157	(35)
Past 3 Months	17	(4)
Past Year Mental Health Treatment	151	(34)
Past Year Alcohol Treatment	23	(5)
Past Year Drug Treatment	29	(7)
Positive Depression Screen	138	(31)
General Comorbidity		
Number of Chronic Conditions		
0	27	(6)
1-2	141	(32)
3	279	(62)

	Total (n = 447)	
	N	(%)
ART Adherence		
30 day adherence to ART		
Very poor	13	(3)
Poor	15	(3)
Fair	58	(13)
Good	100	(22)
Very Good	138	(31)
Excellent	122	(27)
High Self-efficacy for Adherence	221	(50)

* Other race category included 2 self-identified Asians, 11 self-identified Native Americans, and 24 participants who opted to self-identify as "Race-Other" in response to the survey.

Table 2
Characteristics of 447 HIV+ Older Adults Compared across Drinking Status

	No Past Year Drinking (n=191)		Any Past Year Drinking (n=256)		χ^2	p-value
	N	(%)	N	(%)		
Socio-demographic Characteristics						
Female	74	(38)	51	(20)	19.24	<.0001 ^a
Age					5.41	0.07 ^b
50-54	107	(56)	156	(61)		
55-59	64	(34)	62	(24)		
60	20	(10)	38	(15)		
Race					1.89	0.39 ^b
Black	110	(58)	134	(52)		
White	64	(34)	102	(40)		
Other	17	(9)	20	(8)		
Hispanic Ethnicity	12	(6)	17	(7)	0.02	0.88 ^a
Educational Level					2.42	0.12 ^a
High School	103	(54)	119	(46)		
1+ years College	88	(46)	137	(54)		
Sexual Orientation					14.74	<0.01 ^a
Heterosexual	126	(66)	122	(48)		
LGBT	64	(34)	132	(52)		
Married/Partnered	37	(19)	70	(27)	3.82	0.05 ^a
Employment Status					2.44	0.30 ^b
Full time	12	(6)	23	(9)		
Part time	32	(17)	32	(13)		
Other	147	(77)	201	(78)		
Social Security Disability	144	(75)	181	(71)	1.21	0.27 ^b
Substance Use and MH Comorbidity						

	No Past Year Drinking (n=191)		Any Past Year Drinking (n=256)		χ^2	p-value
	N	(%)	N	(%)		
Injection Drug Use						
Ever	80	(42)	77	(30)	6.69	0.01 ^a
Past 3 Months	6	(3)	11	(4)	0.40	0.53 ^a
Past Year Mental Health Treatment	59	(31)	92	(36)	1.25	0.26 ^a
Past Year Alcohol Treatment	5	(3)	18	(7)	4.37	0.04 ^a
Past Year Drug Treatment	11	(6)	18	(7)	0.29	0.59 ^a
Positive Depression Screen	59	(31)	79	(31)	0.00	0.99 ^a
General Comorbidity						
Number of Chronic Conditions						
0	7	(4)	20	(8)	4.77	0.09 ^b
1 to 2	56	(29)	85	(33)		
3	128	(67)	151	(59)		
ART Adherence						
30 day adherence to ART						
Very poor	4	(2)	9	(4)	4.81	0.44 ^d
Poor	5	(3)	10	(4)		
Fair	23	(12)	35	(14)		
Good	51	(27)	49	(19)		
Very Good	55	(29)	83	(33)		
Excellent	53	(28)	69	(27)		
High Self-efficacy for Adherence	92	(48)	129	(50)	0.17	0.68 ^a

^a One degree of freedom; Mantel-Haenszel Chi-square used for comparison

^b Two degrees of freedom

^c Four degrees of freedom

^d Five degrees of freedom

Table 3
Characteristics of HIV + Older Adult Trial Participants compared across alcohol screening categories among participants reporting past-year drinking (n=256)

Socio-demographic Characteristics	AUDIT-C 1-3 (n=157)		AUDIT-C 4-6 (n=69)		AUDIT-C 7-12 (n=30)		χ^2	p-value
	N	(%)	N	(%)	N	(%)		
Female	32	(20)	14	(21)	5	(17)	0.23	0.89 ^b
Age							1.56	0.82 ^c
50-54	93	(59)	42	(61)	21	(70)		
55-59	41	(26)	16	(23)	5	(17)		
60	23	(15)	11	(16)	4	(13)		
Race							10.25	0.04 ^c
Black	71	(45)	46	(67)	17	(57)		
White	71	(45)	21	(30)	10	(33)		
Other	15	(10)	2	(3)	3	(10)		
Hispanic Ethnicity	12	(8)	2	(3)	3	(10)	0.04	0.84 ^a
Educational Level							0.30	0.86 ^b
High School	71	(45)	33	(48)	15	(50)		
1+ years College	86	(55)	36	(52)	15	(50)		
Sexual Orientation							3.25	0.20 ^b
Heterosexual	69	(44)	35	(52)	18	(60)		
LGBT	88	(56)	32	(48)	12	(40)		
Married/Partnered	42	(27)	19	(28)	9	(30)	0.14	0.94 ^b
Employment Status							6.88	0.01 ^a
Full time	19	(12)	4	(6)	0	(0)		
Part time	22	(14)	7	(10)	3	(10)		
Other	116	(74)	58	(84)	27	(90)		
Social Security Disability	110	(70)	50	(72)	21	(70)	0.14	0.93 ^b

Substance Use and MH Comorbidity

	AUDIT-C 1-3 (n=157)		AUDIT-C 4-6 (n=69)		AUDIT-C 7-12 (n=30)		χ^2	p-value
	N	(%)	N	(%)	N	(%)		
Injection Drug Use								
Ever	42	(27)	21	(30)	14	(47)	4.76	0.09 ^b
Past 3 Months	6	(4)	2	(3)	3	(10)	1.18	0.28 ^a
Past Year Mental Health Treatment	64	(41)	18	(26)	10	(33)	4.59	0.10 ^b
Past Year Alcohol Treatment	1	(1)	8	(12)	9	(30)	35.22	<0.001 ^a
Past Year Drug Treatment	10	(6)	5	(7)	3	(10)	0.46	0.50 ^a
Positive Depression Screen	44	(29)	18	(27)	17	(57)	10.24	0.006 ^b
General Comorbidity								
Number of Chronic Conditions								
0	12	(8)	6	(9)	2	(7)	0.92	0.92 ^c
1 to 2	54	(34)	23	(33)	8	(27)		
3	91	(58)	40	(58)	20	(67)		
ART Adherence								
30 day adherence to ART								
Very poor	4	(3)	4	(6)	1	(2)	13.11	0.22 ^e
Poor	4	(3)	2	(3)	4	(13)		
Fair	22	(14)	8	(12)	5	(17)		
Good	32	(21)	15	(22)	2	(7)		
Very Good	49	(31)	24	(35)	10	(33)		
Excellent	45	(29)	16	(23)	8	(27)		
High Self-efficacy for Adherence	77	(49)	38	(55)	14	(47)	0.89	0.64 ^b

^aOne degree of freedom; Mantel-Haenszel Chi-square used for comparison

^bTwo degrees of freedom

^cFour degrees of freedom

^dFive degrees of freedom

