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Generalized Anxiety Disorder Symptoms among Persons with Diagnosed HIV in the United States—2015–2016, Medical Monitoring Project

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Abstract

Objective: To estimate the prevalence of Generalized Anxiety Disorder (GAD) symptoms among adults with diagnosed HIV (PWH) in the United States in order to inform effective HIV prevention and care efforts.

Design: The Medical Monitoring Project (MMP) is a complex sample survey of adults with diagnosed HIV in the United States.

Methods: We used MMP data collected during 6/2015–5/2016 to calculate the weighted prevalence of GAD symptoms among PWH (N=3654) and prevalence ratios with predicted marginal means to evaluate significant differences between groups.

Results: The estimated prevalence of GAD symptoms among PWH was 19%. GAD symptoms were associated with significantly lower antiretroviral therapy prescription and adherence, medical HIV care engagement, and sustained viral suppression. Persons with GAD symptoms were over 3 times as likely to have an unmet need for mental health services (23% vs. 7%) and had significantly more emergency room visits and hospitalizations than those without these symptoms. GAD symptoms were associated with significantly higher prevalence of condomless sex while not sustainably virally suppressed with a person not known to be taking preexposure prophylaxis (9% vs. 6%).

Conclusions: GAD symptom prevalence among PWH was considerably higher than among the U.S. general adult population, indicating an excess burden of anxiety among PWH. Outcomes along the HIV care continuum were poorer, and risk for HIV transmission was higher, among persons with symptoms. Incorporating routine screening for GAD in HIV clinical settings may help improve health outcomes, reduce HIV transmission, and save healthcare costs.

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Keywords

Human Immunodeficiency Virus; HIV; Generalized Anxiety Disorder; HIV care continuum; mental health

Introduction

Anxiety disorders are the most common mental disorders in the United States, and are associated with significant physical, mental, and social costs [1, 2]. Generalized Anxiety Disorder (GAD) is a type of anxiety disorder characterized by persistent and excessive worry that is difficult to control [3]. Evidence suggests that GAD may be more common among persons living with HIV (PWH) compared with others and, among PWH, is associated with nonadherence to HIV medications, which can lead to virologic rebound and subsequent increased morbidity and HIV transmission [4, 5]. Despite the importance of assessing need for anxiety disorder treatment in order to ensure effective HIV prevention and care, we lack national prevalence estimates of symptoms consistent with a diagnosis of GAD among PWH in the United States. Moreover, little is known about the associations between these symptoms and sociodemographic, clinical, and behavioral characteristics among this population, which can inform delivery of needed treatment. In order to fill these gaps, we analyzed data from the Medical Monitoring Project (MMP), a national population-based HIV surveillance system that produces annual, cross-sectional estimates of behavioral and clinical characteristics of adults with diagnosed HIV in the United States.

Methods

Detailed methods for MMP data collection are reported elsewhere [6], but briefly, MMP used a 2-stage sampling design. During the first stage, 23 jurisdictions were sampled from all U.S. states, the District of Columbia, and Puerto Rico. During the second stage, simple random samples of persons with diagnosed HIV aged 18 years and older were drawn for each participating state/territory from the National HIV Surveillance System (NHSS), a census of persons with diagnosed HIV in the United States. Data were collected via phone or face-to-face interviews and medical record abstractions during June 2015 through May 2016. Response rates were 100% at the state/territory level and 40% at the person level. Data were weighted on the basis of known probabilities of selection and were adjusted for non-response [7]. For the non-response adjustment, weighting classes were based on variables related to person-level response: sex at birth, HIV exposure category, and the person's frequency of receipt of care (as indicated by HIV-related laboratory test results in NHSS). Further, the data were post-stratified to NHSS population totals by age, race/ethnicity, and gender. MMP data collection is part of routine public health surveillance and was determined to be non-research. Informed consent was obtained from all interviewed participants.

We calculated the weighted prevalence and associated 95% confidence interval of symptoms consistent with a GAD diagnosis among PWH (N=3654), overall and by selected sociodemographic characteristics. The Generalized Anxiety Disorder Scale (GAD-7), a validated 7-item scale used to screen for and measure the severity of GAD symptoms over

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the past 2 weeks, was administered to participants by a trained interviewer. The GAD-7 asks the following questions: “Over the last 2 weeks, how often have you been bothered by any of the following problems?” for problems such as “feeling nervous, anxious, or on edge” and “not being able to stop or control worrying”. Response categories were “not at all”, “several days”, “more than half the days” and “nearly every day”, with points 0–3 assigned to each response category, respectively. Scores were summed to produce a total score between 0 and 21. GAD symptoms reflecting moderate to severe anxiety were defined as a score of ≥10, consistent with GAD-7 scoring recommendations [8].

We compared the prevalence of clinical and behavioral characteristics among those with and without GAD symptoms using prevalence ratios with predicted marginal means to evaluate significant differences between groups. Statistical significance for all tests was defined as $p<0.05$. All analyses accounted for the complex sample design and weights.

All examined covariates were self-reported and measured over the 12 months prior to interview, except where otherwise noted. Homelessness was defined as living on the street, in a shelter, in a single room occupancy hotel, or in a car. Persons were classified as men who have sex with men (MSM), women who only have sex with men (WSM) and men who only have sex with women (MSW) based on sexual behavior among the sexually active and reported sexual orientation among the non-sexually active. All persons not classified as MSM, WSM, or MSW were grouped into the “other” category. Household poverty level was determined using Health and Human Services poverty guidelines. Disability included physical, mental, and emotional disabilities. Intimate partner violence (IPV) was defined as having been slapped, punched, shoved, kicked, choked, or otherwise physically hurt by a romantic or sexual partner. Sexual violence was defined as having been threatened with harm or physically forced to have unwanted vaginal, anal, or oral sex. HIV stigma was based on a ten-item scale ranging from 0 (no stigma) to 100 (high stigma) that measures 4 dimensions of HIV stigma: personalized stigma, disclosure concerns, negative self-image, and perceived public attitudes about people living with HIV [9]. Responses to the items on the Patient Health Questionnaire (PHQ-8) were used to define “major or other depression” according to criteria from the DSM-IV [10]. Ancillary services for which unmet needs were assessed included dental care, HIV case management services, medicine through the AIDS Drug Assistance Program (ADAP), Supplemental Nutrition Assistance Program (SNAP) or Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), mental health services, adherence support services, transportation assistance, meal or food services, shelter or housing services, HIV peer group support, patient navigation services, drug or alcohol counseling or treatment, interpreter services, and domestic violence services. Binge drinking was defined as having ≥5 alcoholic beverages in a single sitting (≥4 for women) on at least 1 day during the 30 days before the interview. Sex that increases the risk of HIV transmission was defined as vaginal or anal sex with at least 1 HIV-negative or unknown status partner while not sustainably virally suppressed, a condom was not used, and the partner was not known to be taking PrEP (PrEP use was only measured among the 5 most recent partners and was reported by the PWH). Information from NHSS was used to determine whether the person had ever reached HIV disease stage 3, defined according to CDC’s 2014 revised surveillance case definition for HIV infection [11]. Clinical characteristics captured by medical record abstraction at the person’s most frequent source

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of HIV care included documentation of antiretroviral therapy (ART) prescription and sustained viral suppression (all viral load measurements documented undetectable or <200 copies/mL). HIV care engagement was defined as having received at least two elements of outpatient HIV care at least 90 days apart. Receipt of outpatient HIV care was measured through medical record abstraction and defined as any documentation of the following: encounter with an HIV care provider (could also be self-reported), viral load test result, CD4 test result, HIV resistance test or tropism assay, ART prescription, PCP prophylaxis, or MAC prophylaxis. Persons currently taking ART were asked about their adherence to ART in the 30 days before the interview using questions from a 3-item scale that ranges from 0-100, with a score of 100 indicating perfect adherence [12].

Results

The estimated prevalence of GAD symptoms among persons with diagnosed HIV in the United States was 19% (Table 1). Symptom prevalence was significantly higher among women compared with men, and among those with a high school education or less, living in poverty, and recently homeless. One-third of persons experiencing recent homelessness reported GAD symptoms. Persons with a disability were over four times as likely to have GAD symptoms compared with those with no disability (33% vs. 8%). Persons who had experienced recent intimate partner violence and those who experienced recent sexual violence were each over twice as likely to have GAD symptoms as those who did not recently experience that form of violence (41% vs. 18% and 43% vs. 19%, respectively). Persons with GAD symptoms also reported significantly higher median HIV-related stigma scores (55%, 95% confidence interval [CI] 52-59) than those with no symptoms (35%, CI 33-36) (data not shown in table).

GAD symptoms were associated with significantly lower antiretroviral therapy prescription and adherence, HIV care engagement, and sustained viral suppression (Table 2). Persons with GAD symptoms were over 7 times as likely to report depression symptoms (75% vs. 11%) and over 3 times as likely to have an unmet need for mental health services (23% vs. 7%) compared with those without GAD. Persons with GAD symptoms also had significantly more emergency room visits and hospitalizations than those without these symptoms.

Persons with GAD symptoms reported significantly higher levels of smoking and injection and non-injection drug use compared with those without symptoms. Persons with GAD symptoms were nearly twice as likely to inject drugs as those without symptoms. GAD symptoms were associated with significantly higher prevalence of condomless sex while not sustainably virally suppressed with an HIV-negative or unknown status partner who was not known to be taking preexposure prophylaxis (9% vs. 6%).

Discussion

We estimate that nearly 1 in 5 PWH in the United States experienced recent symptoms consistent with a diagnosis of GAD. This is the first estimate of the national prevalence of GAD symptoms among persons with HIV. Other U.S.-based estimates of GAD among PWH have ranged between 0-60%, although these studies vary widely in measurement, geography,

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and population coverage [4]. Our estimate is similar to a recent estimate of the prevalence of GAD in one U.S. HIV clinic (23%) [13], and is considerably higher than the estimated 2.7% of U.S. adults estimated to have GAD in the past year [3], indicating an excess burden of anxiety among PWH compared with the general population.

The significance of the excess burden of anxiety among PWH is compounded by our finding that GAD symptoms are related to suboptimal HIV care engagement and outcomes in this population, which few studies have examined. Similar to other studies, we found that GAD symptoms were associated with lower ART prescription, adherence, and viral suppression [5, 13], which in addition to increasing morbidity can also increase the risk of HIV transmission. Further, this is the first analysis we are aware of to document that persons with GAD were more likely to have a disability, experience HIV-related stigma, be less engaged in HIV care, utilize the ER, and be hospitalized compared with persons without GAD. Given the elevated prevalence of GAD symptoms among PLW and the association between symptoms and poorer HIV outcomes, sex that increases the risk of HIV transmission, and higher use of ER care and hospitalizations, incorporating routine screening for GAD in clinical settings and assessing its effect on adherence may help improve health outcomes, reduce HIV transmission, and save healthcare costs. Comorbid depression was common among PWH reporting GAD symptoms, as has commonly been found among the general population [1]. Although anxiety and depression symptoms often co-occur, they have been found to have distinct dimensions and independent effects on health [8]. This may be a valuable area for future research on anxiety and depression among PWH. Importantly, we found that nearly one quarter of persons with GAD symptoms reported an unmet need for mental health treatment, indicating a substantial need to improve delivery of these services for this group.

Our analysis supports the findings of others on the relationship between GAD and social determinants of health such as poverty and housing instability [14–16]. Strategies to address anxiety among disadvantaged populations can involve interventions to increase resilience and stress management skills [14], although some have argued for the development of more robust anti-poverty interventions that could have more widespread and sustained effects [17]. We found a strong association between lifetime and recent experiences of sexual violence and intimate partner violence with GAD symptoms. Adverse life experiences such as these have often been found to be related to GAD [15, 16, 18, 19]. Healthcare providers, particularly those providing primary care, can play an important role in screening for partner abuse and comorbid anxiety [20]. Because most HIV care providers also provide primary care [21] and many work in settings with on-site ancillary services [22], they can identify patients in need of support and provide referrals to treatment and services.

We also documented the association between GAD symptoms and behaviors that increase the risk of HIV transmission such as injection drug use and sex without a condom while not sustainably virally suppressed. Studies have generally found a positive association between substance use and anxiety [4], although the causal pathways have yet to be fully determined and causality may be cyclical. Regardless, improving access to substance use treatment and HIV/STD risk reduction services could be beneficial for persons experiencing anxiety symptoms.

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Collaborative care models—in which medical, mental health, and case management staff partner to provide comprehensive care—have been found to be more effective than usual care in improving anxiety in patients [23]. The Ryan White HIV/AIDS Program (RWHAP) provides such collaborative care in “medical home” settings for un- and under-insured persons with HIV, which may help alleviate GAD symptoms and improve health outcomes. The RWHAP-funded AIDS Education and Training Centers (AETCs) National HIV Curriculum stresses the importance of clinician screening for anxiety and the integration of mental health into HIV primary care, and supports co-located services, embedded mental health providers, collaborative care, and decision support tools to achieve these aims [24]. The AETC National Resource Center developed a resource, the “Integrating Mental Health and Substance Use Care into HIV Primary Care Toolkit,” that can help organizations increase their capacity to provide these services in an HIV clinical care setting [25].

The limitations of this analysis include that the GAD-7 is not equivalent to a clinical diagnosis. However, the GAD-7 is one of the few anxiety measures that is linked to the Diagnostic and Statistics Manual of Mental Health Disorders 4th Edition (DSM-IV), and has been found to have good criterion validity with a clinical diagnosis of GAD using DSM-IV diagnostic criteria. Nevertheless, recommendations are that persons with a GAD-7 score indicating anxiety should be administered a formal diagnostic interview [24]. Our estimates of persons with moderate to severe GAD symptoms may underreport GAD diagnoses, since successfully treated persons may be free of symptoms. In addition, due to MMP’s cross-sectional design, we cannot assess causality. Given our findings on the associations between anxiety and intimate partner and sexual violence, future research could explore the causal links between these phenomena and possible overlap with post-traumatic stress disorder among PWH. In addition, elucidation of the causal pathways linking anxiety symptoms to conditions such as homelessness and poverty could be promising areas for further research.

Almost 1 in 5 PWH in the United States experienced recent symptoms indicative of GAD. GAD symptoms were associated with greater socioeconomic, physical, and mental health challenges and experiences of violence. Outcomes along the HIV care continuum were poorer among persons with symptoms, and these persons were more likely to engage in sexual behaviors that carry a risk of HIV transmission. Our findings suggest a need to improve access to mental health counseling and treatment for this population to improve their health outcomes and decrease the likelihood of HIV transmission.

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References

1. Bandelow B, Michaelis S. Epidemiology of anxiety disorders in the 21st century. Dialogues in clinical neuroscience 2015; 17:327–35. [PubMed: 26487813]

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2. Hoffman DL, Dukes EM, Wittchen HU. Human and economic burden of generalized anxiety disorder. Depression and anxiety 2008; 25:72–90. [PubMed: 17146763]

3. National Institute of Mental Health. Generalized Anxiety Disorder. Available at: https://www.nimh.nih.gov/health/statistics/generalized-anxiety-disorder.shtml. Accessed October 18 2018.

4. Brandt C, Zvolensky MJ, Woods SP, Gonzalez A, Safren SA, O'Cleirigh CM. Anxiety symptoms and disorders among adults living with HIV and AIDS: A critical review and integrative synthesis of the empirical literature. Clinical psychology review 2017; 51:164–84. [PubMed: 27939443]

5. Tucker JS, Burnam MA, Sherbourne CD, Kung FY, Gifford AL. Substance use and mental health correlates of nonadherence to antiretroviral medications in a sample of patients with human immunodeficiency virus infection. The American journal of medicine 2003; 114:573–80. [PubMed: 12753881]

6. Centers for Disease Control and Prevention. HIV Surveillance Report, 2015; vol. 27 Available at: https://www.cdc.gov/hiv/library/reports/hiv-surveillance.html. Accessed October 16 2018.

7. Heeringa S, West BT, Berglund PA. Applied survey data analysis. Boca Raton, FL: Taylor & Francis, 2010.

8. Spitzer RL, Kroenke K, Williams JB, Lowe B. A brief measure for assessing generalized anxiety disorder: the GAD-7. Archives of internal medicine 2006; 166:1092–7. [PubMed: 16717171]

9. Wright K, Naar-King S, Lam P, Templin T, Frey M. Stigma scale revised: reliability and validity of a brief measure of stigma for HIV+ youth. The Journal of adolescent health : official publication of the Society for Adolescent Medicine 2007; 40:96–8. [PubMed: 17185215]

10. 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. Journal of affective disorders 2009; 114:163–73. [PubMed: 18752852]

11. Centers for Disease Control and Prevention. Revised surveillance case definition for HIV infection--United States, 2014. MMWR Recommendations and reports : Morbidity and mortality weekly report Recommendations and reports / Centers for Disease Control 2014; 63:1–10.

12. Wilson IB, Lee Y, Michaud J, Fowler FJ Jr, Rogers WH. Validation of a New Three-Item Self-Report Measure for Medication Adherence. AIDS and behavior 2016; 20:2700–8. [PubMed: 27098408]

13. Shacham E, Morgan JC, Onen NF, Taniguchi T, Overton ET. Screening anxiety in the HIV clinic. AIDS and behavior 2012; 16:2407–13. [PubMed: 22718040]

14. Baer JC, Kim M, Wildenfeld B. Is it Generalized Anxiety Disorder or Poverty? An Examination of Poor Mothers and Their Children. Child and Adolescent Social Work Journal 2012; 29:345–55.

15. Moreno-Peral P, Conejo-Ceron S, Motrico E, et al. Risk factors for the onset of panic and generalised anxiety disorders in the general adult population: a systematic review of cohort studies. Journal of affective disorders 2014; 168:337–48. [PubMed: 25089514]

16. Zhang X, Norton J, Carriere I, Ritchie K, Chaudieu I, Ancelin ML. Risk factors for late-onset generalized anxiety disorder: results from a 12-year prospective cohort (the ESPRIT study). Translational psychiatry 2015; 5:e536. [PubMed: 25826111]

17. Silverman K, Holtyn AF, Jarvis BP. A potential role of anti-poverty programs in health promotion. Preventive medicine 2016; 92:58–61. [PubMed: 27235603]

18. Kendler KS, Hettema JM, Butera F, Gardner CO, Prescott CA. Life event dimensions of loss, humiliation, entrapment, and danger in the prediction of onsets of major depression and generalized anxiety. Archives of general psychiatry 2003; 60:789–96. [PubMed: 12912762]

19. Newman SC, Bland RC. Life events and the 1-year prevalence of major depressive episode, generalized anxiety disorder, and panic disorder in a community sample. Comprehensive psychiatry 1994; 35:76–82. [PubMed: 8149733]

20. Tait L, Berrisford G. Generalised anxiety disorder: the importance of life context and social factors. The British journal of general practice : the journal of the Royal College of General Practitioners 2011; 61:378–9. [PubMed: 21801521]

21. Weiser J, Beer L, West BT, Duke CC, Gremel GW, Skarbinski J. Qualifications, Demographics, Satisfaction, and Future Capacity of the HIV Care Provider Workforce in the United States, 2013–2014. Clinical infectious diseases : an official publication of the Infectious Diseases Society of America 2016; 63:966–75. [PubMed: 27358352]

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22. Weiser J, Beer L, Frazier EL, et al. Service Delivery and Patient Outcomes in Ryan White HIV/AIDS Program-Funded and -Nonfunded Health Care Facilities in the United States. JAMA internal medicine 2015; 175:1650–9. [PubMed: 26322677]

23. Archer J, Bower P, Gilbody S, et al. Collaborative care for depression and anxiety problems. The Cochrane database of systematic reviews 2012; 10:Cd006525.

24. University of Washington and the AETC National Coordinating Resource Center. National HIV Curriculum: Screening for Mental Disorders. Available at: https://www.hiv.uw.edu/go/basic-primary-care/screening-mental-disorders/core-concept/all#models-integrating-screening-mental-disorders-neurocognitive-disorders-into-hiv-primary-care. Accessed November 29 2018.

25. AETC National Coordinating Resource Center Mental Health Committee. Integrating Mental Health and Substance Use Care into HIV Primary Care Toolkit. Available at: https://aidsetc.org/resource/integrating-mental-health-and-substance-use-care-hiv-primary-care-toolkit. Accessed November 29 2018.

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Table 1.

Prevalence of Generalized Anxiety Disorder (GAD) symptoms among persons with diagnosed HIV by sociodemographic characteristics--Medical Monitoring Project, 2015-2016 (N=3,654)

	GAD			
Characteristics	**n**[a]	**Row % (95% CI)**[b]	**Prevalence Ratio (95% CI)**	***p* value**
Total	654	19.2 (17.1–21.3)		
Age (years)				0.051
18-29	51	19.9 (13.7–26.1)	1.18 (0.84-1.66)	
30-39	137	26.6 (20.1–33.1)	1.58 (1.13-2.20)	
40-49	187	18.8 (16.1–21.6)	1.12 (0.89-1.41)	
>=50	279	16.8 (14.0–19.7)	Reference	
Race and ethnicity				0.140
White (non-Hispanic)	208	20.8 (18.0–23.6)	1.26 (0.99-1.61)	
Black (non-Hispanic)	265	19.1 (15.2–22.9)	1.16 (0.87-1.54)	
Hispanic or Latino	135	16.5 (13.5–19.5)	Reference	
Other/Multiracial[c]	46	22.6 (15.9–29.3)	1.37 (0.96-1.95)	
Gender				0.013
Male	437	18.0 (15.8–20.2)	Reference	
Female	205	23.0 (19.8–26.1)	1.28 (1.09-1.51)	
Transgender[d]	12	22.9* (6.6–39.2)	1.27 (0.64-2.52)	
Sexual behavior/orientation[e]				0.023
Men who have sex with men	290	17.9 (15.4–20.5)	1.02 (0.85-1.24)	
Men who have sex only with women	133	17.5 (14.8–20.2)	Reference	
Women who have sex only with men	196	22.5 (19.3–25.7)	1.28 (1.06-1.55)	
Others	35	26.2 (13.5–38.9)	1.49 (0.92-2.42)	
Education				<0.001
<High school	177	26.4 (21.6–31.2)	1.66 (1.30-2.12)	
High school diploma or equivalent	169	20.9 (16.9–25.0)	1.31 (1.04-1.66)	
>High school	308	15.9 (13.6–18.3)	Reference	
Healthcare coverage				<0.001

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Characteristics	GAD n[a]	GAD Row % (95% CI)[b]	GAD Prevalence Ratio (95% CI)	GAD *p* value
Any private insurance	136	11.8 (9.6–14.1)	Reference	
Public insurance only	458	23.3 (20.3–26.4)	1.97 (1.59-2.45)	
Ryan White coverage only/Uninsured	48	19.7 (13.9–25.5)	1.66 (1.19-2.33)	
Household poverty level[f]				<0.001
Above poverty level	238	13.9 (12.0–15.8)	Reference	
At or below poverty level	371	24.5 (20.6–28.3)	1.76 (1.43-2.16)	
Country or territory of birth				<0.001
Born in United States	602	20.8 (18.6–23.1)	2.19 (1.57-3.05)	
Born in Foreign Country	52	9.5 (6.5–12.5)	Reference	
Time since HIV diagnosis				0.208
<5 years	100	17.6 (11.9–23.3)	Reference	
5-9 years	145	21.8 (17.7–25.9)	1.24 (0.91-1.69)	
>=10 years	406	18.6 (16.9–20.4)	1.06 (0.77-1.45)	
Homeless				<0.001
Yes	103	33.3 (24.3–42.2)	1.86 (1.44-2.40)	
No	551	17.9 (16.1–19.7)	Reference	
Any disability[g]				<0.001
Yes	506	32.6 (29.1–36.1)	4.14 (3.43-5.00)	
No	144	7.9 (6.4–9.4)	Reference	
Lifetime intimate partner violence[h]				<0.001
Yes	277	29.3 (25.8–32.8)	1.92 (1.67-2.21)	
No	372	15.3 (13.2–17.3)	Reference	
Last year intimate partner violence[h]				<0.001
Yes	67	40.7 (29.6–51.7)	2.26 (1.71-3.00)	
No	581	18.0 (16.0–20.0)	Reference	
Lifetime sexual violence[i]				<0.001
Yes	188	31.7 (27.3–36.0)	1.91 (1.57-2.31)	
No	456	16.6 (14.2–19.0)	Reference	

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Characteristics	GAD n[a]	GAD Row % (95% CI)[b]	GAD Prevalence Ratio (95% CI)	GAD *p* value
Last year sexual violence[i]				0.004
Yes	20	42.8 (23.6–61.9)	2.28 (1.43-3.63)	
No	624	18.7 (16.6–20.9)	Reference	

Notes: HIV, human immunodeficiency virus; CI, confidence interval; all variables measured by self-report over the past 12 months except where otherwise noted; estimates marked with an asterisk have a coefficient of variation > 0.30 and may be unstable.

[a]Numbers are unweighted

[b]Percentages and corresponding CIs are weighted percentages

[c]Includes American Indian/Alaska Native, Asian, Native Hawaiian/Other Pacific Islander, or multiple races

[d]Persons were classified as transgender if sex at birth and gender reported by the person were different, or if the person chose “transgender” in response to the question about self-identified gender.

[e]Persons were classified based on sexual behavior among the sexually active and reported sexual orientation among the non-sexually active.

[f]Poverty guidelines as defined by the HHS; the 2014 guidelines were used for persons interviewed in 2015 and the 2015 guidelines were used for persons interviewed in 2016. More information regarding the HHS poverty guidelines can be found at http://aspe.hhs.gov/frequently-asked-questions-related-poverty-guidelines-and-poverty.

[g]Includes physical, mental, and emotional disabilities

[h]Slapped, punched, shoved, kicked, choked or otherwise physically hurt by a romantic or sexual partner

[i]Threatened with harm or physically forced to have unwanted vaginal, anal, or oral sex

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Table 2.

Associations between Generalized Anxiety Disorder (GAD) symptoms and clinical and behavioral characteristics among persons with diagnosed HIV by clinical and behavioral characteristics--Medical Monitoring Project, 2015–2016 (N=3,654)

Characteristics	GAD		No GAD		Prevalence Ratio (95% CI)	*p* value
	n[a]	Col % (95% CI)[b]	n[a]	Col % (95% CI)[b]		
ART prescription[c]	564	81.6 (76.9–86.3)	2650	86.5 (84.6–88.3)	0.94 (0.89-1.00)	0.030
100% ART dose adherence, past 30 days[d]	291	50.8 (45.2–56.5)	1720	61.5 (59.3–63.7)	0.83 (0.74-0.92)	<0.001
Score of 100 on ART adherence scale[de]	208	35.4 (30.2–40.5)	1268	46.3 (43.8–48.8)	0.76 (0.66-0.88)	<0.001
ART adherence scale median score[de]	589	91.7 (90.4–92.7)	2794	98.0 (95.8–98.6)		
Sustained viral suppression[cf]	394	56.2 (50.9–61.4)	2003	64.3 (61.7–67.0)	0.87 (0.80-0.95)	0.001
HIV care engagement[cg]	415	59.0 (53.2–64.8)	2036	65.3 (61.4–69.2)	0.90 (0.82-0.99)	0.024
Depression	467	74.9 (70.0–79.7)	296	10.5 (9.0–11.9)	7.16 (6.12-8.39)	<0.001
At least 1 unmet ancillary service need	489	75.1 (71.4–78.7)	1484	51.1 (47.8–54.4)	1.47 (1.35-1.60)	<0.001
ER visits						
0	323	48.1 (43.1–53.2)	1979	67.6 (64.2–71.0)	0.71 (0.64-0.79)	<0.001
1	118	19.3 (15.9–22.8)	524	17.1 (15.5–18.7)	1.13 (0.94-1.36)	0.193
2-4	166	26.0 (22.5–29.5)	382	13.1 (10.8–15.4)	1.99 (1.63-2.43)	<0.001
5+	42	6.5 (4.3–8.8)	72	2.2 (1.4–3.0)	2.96 (1.80-4.86)	<0.001
Hospitalizations						
0	500	78.8 (74.3–83.3)	2509	85.6 (84.1–87.1)	0.92 (0.86-0.98)	0.005
1	77	12.5 (9.3–15.7)	265	8.3 (7.1–9.4)	1.51 (1.17-1.95)	0.002
2-4	62	7.1 (4.6–9.6)	149	4.9 (3.4–6.3)	1.46 (0.86-2.47)	0.160
5+	12	1.6 (0.9–2.2)	35	1.3 (0.7–1.9)	1.24 (0.74-2.08)	0.407
Received mental health services						
Needed, but did not receive	131	22.7 (18.5–26.8)	215	6.9 (6.0–7.8)	3.27 (2.61-4.11)	<0.001
Received	339	49.4 (44.5–54.2)	859	27.0 (23.9–30.1)	1.83 (1.63-2.05)	<0.001
Did not need and did not receive	182	28.0 (24.1–31.8)	1875	66.1 (62.8–69.3)	0.42 (0.37-0.49)	<0.001
Current cigarette smoking	312	50.6 (45.6–55.6)	922	32.2 (30.1–34.3)	1.57 (1.41-1.75)	<0.001
Noninjection drug use	248	39.4 (34.2–44.6)	801	27.0 (24.5–29.5)	1.46 (1.26-1.69)	<0.001

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Characteristics	GAD n[a]	GAD Col % (95% CI)[b]	No GAD n[a]	No GAD Col % (95% CI)[b]	Prevalence Ratio (95% CI)	*p* value
Injection drug use	36	4.9 (2.1–7.7)	77	2.5 (1.5–3.4)	1.99 (1.24-3.17)	0.005
Any drug use	253	40.0 (34.6–45.5)	813	27.3 (24.7–29.8)	1.47 (1.27-1.70)	<0.001
Binge drinking (during past 30 days) [h]	104	15.0 (12.1–17.9)	436	15.4 (13.8–16.9)	0.98 (0.80-1.20)	0.846
Sex that increases the risk of HIV transmission[i]	50	9.0 (6.2–11.8)	164	6.0 (5.0–7.0)	1.50 (1.08-2.09)	0.018

Notes: HIV, human immunodeficiency virus; CI, confidence interval; ART, antiretroviral therapy; all variables measured by self-report over the past 12 months except where otherwise noted.

[a] Numbers are unweighted

[b] Percentages and corresponding CIs are weighted percentages

[c] Assessed by medical record abstraction

[d] Among those taking ART

[e] Persons currently taking ART were asked about their adherence to ART in the 30 days before the interview using questions from a 3-item scale that ranges from 0-100, with a score of 100 indicating perfect adherence

[f] All HIV viral load measurements documented undetectable or <200 copies/mL

[g] HIV care engagement was defined as having received at least two elements of outpatient HIV care at least 90 days apart. Receipt of outpatient HIV care was measured through medical record abstraction and defined as any documentation of the following: encounter with an HIV care provider (could also be self-reported), viral load test result, CD4 test result, HIV resistance test or tropism assay, ART prescription, PCP prophylaxis, or MAC prophylaxis.

[h] Binge drinking was defined as having ≥5 alcoholic beverages in a single sitting (≥4 for women) on at least 1 day during the 30 days before the interview.

[i] Vaginal or anal sex with at least 1 HIV-negative or unknown status partner while not sustainably virally suppressed, when a condom was not used, and the partner was not known to be on preexposure prophylaxis (PrEP).

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