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Black and White Racial Disparities in Depression and Anxiety Among a Cohort of HIV+ MSM in Atlanta, GA

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Global Epidemiology

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B.S.

University of California, Los Angeles

2015

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An abstract of

A thesis submitted to the Faculty of the
Rollins School of Public Health of Emory University

in partial fulfillment of the requirements for the degree of
Master of Public Health
in Global Epidemiology

2018

Abstract

Black and White Racial Disparities in Depression and Anxiety Among a Cohort of HIV+ MSM in Atlanta, GA

By Emily Smith

Introduction: In the United States, MSM (men who have sex with men) have been shown to have higher rates of both HIV and depression/anxiety than the general population. Compared to white MSM in the US, black MSM are disproportionately affected by these comorbidities. Studies have linked depression and anxiety among HIV+ individuals to poorer continuity of care and suboptimal adherence to ART treatment.

Methods: To examine racial disparities in depression and anxiety among HIV+ MSM in Atlanta, GA, a prospective, longitudinal cohort study was conducted with a sample size of 400 HIV+ MSM. All measures were collected through a baseline CASI (computer-assisted self-interview) behavior survey. SAS statistical software was used to perform both univariate and bivariate analyses in order to produce a multivariable logistic regression model.

Results: After assessment of the three different depression/anxiety screening scales of PHQ-4, PHQ-8, and GAD-7 scales, there were 316 (79.00%) participants considered for presence of depression/anxiety in the combined scale. According to the combined scale, 121 (38.29%) participants were characterized as having depression and/or anxiety while 195 (61.71%) participants did not. There were no differences in race, length of time since HIV diagnosis, or sexual orientation for those characterized as depressed/anxious versus those who were not, but there were statistically significant differences in age, education, income, and insurance status. After adjusting for these variables, the adjusted odds ratio of depression/anxiety among black HIV+ MSM compared to white HIV+ MSM was 1.11 (95% CI=0.93,1.33) and was not significant.

Discussion: When comparing depression/anxiety levels between black and white HIV+ MSM, no association was observed. Our study helps fill the gap in the current research area of racial disparities in depression and anxiety among HIV+ MSM in Atlanta in order to contribute knowledge to further develop appropriate interventions. Depression and anxiety's detrimental effects on HIV care and treatment indicate the importance of uncovering the disparities and causes from this harmful comorbidity.

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Table of Contents

INTRODUCTION

In the United States, HIV is a significant public health issue, especially among men who have sex with men (MSM) [1]. Although overall rates of HIV continue to decline in the United States, the number of new infections per year within certain subgroups, predominantly MSM, are still increasing as the national progress of decreasing HIV rates is evidently unequal. In 2016 alone, there were over 25,000 new HIV diagnoses among MSM in the United States [2]. MSM account for 56% of all new HIV cases and have HIV rates that are 44 times higher than those of other males in the US [3]. This difference may be explained in part due to risky sexual behaviors and decreased access to care among MSM [4]. Additionally, differences may be partially associated with increased rates of poor mental health outcomes, specifically anxiety and depression, among MSM [5] [6], which have been shown to be strongly associated with increased risk episodes [7]. The increased rates of HIV among MSM continues to play a large role on a personal level and can have community-wide impacts, especially related stigma, as well in the United States.

Globally, depression is a leading cause of disease burden and can greatly affect the health status of an individual [8]. Compared to the general population, MSM have been shown to have increased rates of depression [1]. In the United States, the outcomes of depression and anxiety are present in between 6.7% and 19.1% of individuals 18 years or older [9, 10]. However, multiple studies conducted throughout the United States found significantly higher rates of depression and anxiety among MSM, including a prevalence rate of 33% among a sample in Massachusetts [11] and 23% among a sample in Seattle [12]. This difference of prevalence rates among HIV+ individuals is equally pronounced in those who are HIV+, as depression among HIV+ individuals in the United States receiving care was a

staggering 25.6% [13]. As treatments become more effective and HIV infection transitions into a chronic disease, depression can be a common comorbidity with potential adverse effects on the quality of life of infected individuals [13].

Compared to white MSM in the US, black MSM are disproportionately affected. These higher rates may be explained in part by a greater prevalence of STD's among black MSM, disparities in testing, and social and structural barriers [14]. Additionally, multiple studies examining the prevalence of depressive symptoms by race and ethnicity have shown that black MSM are at a statistically significant higher risk for depression than heterosexual black males and MSM of other races [15, 16]. Studies have also shown that there are statistically significant differences in the prevalence of depression across racial group, with the highest prevalence of 5% seen among black individuals [13]. In addition to increased rates of illness, black HIV+ MSM have also been shown to be less likely to have access to care, including antiretroviral therapy (ART) and viral suppression, than all other HIV+ MSM groups [17].

As numbers of infected individuals increase, as the diseases becomes chronic, and as rates of HIV among MSM remain resilient, it is necessary to study the common comorbidities of depression and anxiety. Although there have been previous studies exploring the estimates of depression among HIV+ individuals [18] or MSM [19], current knowledge of depression and anxiety among HIV+ MSM is very limited [13] and understanding is not well characterized. Additional research on the excess burden of depression and anxiety among HIV+ MSM is critical in order to take specific actions to effectively minimize the disease burden associated with HIV risk behaviors while maximizing HIV treatment effectiveness [13]. As HIV affects the MSM population disproportionately, with black MSM making up 44% of new HIV infections in the US [20], understanding the effect of racial disparities on

poor mental health outcomes will allow for the creation of appropriate strategies to address specific predictors.

Studies have linked depression and anxiety among HIV+ individuals to poorer continuity of care and suboptimal adherence to ART treatment [21]. Data from Engage[men]t, a cohort of black and white HIV+ MSM in Atlanta, will be used to examine racial disparities for depression and anxiety among HIV+ MSM.

METHODS

Study overview

In March 2017, the Engage[men]t study was created and conducted by PRISM Health (Programs, Research, & Innovation in Sexual Minority Health) based within the Rollins School of Public Health at Emory University and sponsored by the National Institutes of Health, whose mission is to conduct quality science and innovative research to improve the sexual health and well-being among sexual minority populations. PRISM Health actively collaborates with community-based organizations to produce effective sexual health interventions and programs. The Engage[men]t study aims to understand the disparities in effective HIV treatment and intervention among black and white MSM [22]. Prospectively collected data and a multilevel framework were used to collect data on HIV care and prevention outcomes through use of quantitative, qualitative, and laboratory data collection methods.

Study design and sampling

To examine racial disparities in depression and anxiety among HIV+ MSM in Atlanta, GA, a prospective, longitudinal cohort study was conducted with a sample size of 400 HIV+ MSM. Eligibility screening occurred in two steps, once at the recruitment site and again at the baseline study visit, from which ineligible men received $20 for their time. Using quota sampling, 200 black and 200 white participants were enrolled, with 160 previously diagnosed and 40 newly diagnosed individuals in each group. Additionally, quotas were set for each recruitment modality to reduce selection biases. Sample size was based on the primary outcome of HIV viral suppression and to provide sufficient numbers for analyses of time to initial attainment of HIV care outcomes.

Men in Engage[men]t were followed for two years after enrollment, but this analysis focused on cross-sectional baseline data. All participants were financially compensated for their time. Inclusion criteria included self-reported HIV+ status, sex, age >16 years, self-report of black or white race, English-speaking, Atlanta based, sexually active, and plan to receive care in Atlanta in the next two years.

Data collection

Recruitment was completed in various physical venues and online venues. Frequency matching of black to white enrollment within each recruitment modality was done to reduce selection biases.

Data collection included interviews, medical record abstraction, laboratory data, surveillance data, and a computer-assisted self-interview (CASI) behavioral survey using SurveyGizmo.com to collect data including demographics, sociocontextual factors, healthcare access, and mental health surveys.

Variables

All measures were collected through the baseline CASI behavior survey.

Exposure and confounders

The exposure variable of race was self-reported as either black or white and viewed as a dichotomous variable. Confounding variables were decided a priori and statistically significant associations between the potential confounder and both the exposure and outcome variables. Age was left as a continuous variable due to normality of data. New/old diagnosis status and insurance status were left as dichotomous variables for simplicity.

Education was categorized as less than or equivalent to a high school education, some college education, or completed college or professional schooling. Lastly, income was considered as a dichotomous variable, with a yearly annual salary cutpoint of <$20,000 or >=$20,000 to increase cell size.

Statistical methods

SAS statistical software was used to perform analyses at a significance level of alpha=0.05.

Outcomes: Depression and anxiety scales

In order to measure depression and anxiety, the Engage[men]t Cohort utilized three distinct self-reported scales as brief screening tools, measuring depression exclusively, anxiety exclusively, and lastly depression and anxiety concurrently. All scales were considered in analyses for more comprehensive and valid results and assessed dichotomously (absent or present anxiety and/or depression), and later categorically (levels: normal, mild, moderate, severe). Participants were asked to score up to a total of 15 questions regarding the number of days in the past two-week period that the respondent has experienced a specific depressive or anxious symptom. Scoring categories were "not at all", "several days", "more than half the days", and "nearly every day", and coded as 0, 1, 2, and 3, respectively, and a sum score was created for each scale. Depending on whether or not depression or anxiety were present based on the PHQ-4 scale, participants could continue to the PHQ-8 or GAD-7 questions.

To assess depression exclusively, eight questions were summed to comprise the eight-item patient health questionnaire depression scale (PHQ-8). Questions included lack of pleasure, feelings of hopelessness, lack of sleep, lack of energy, eating habits, bad feelings,

concentration, and movement. Categorically, sum scores were calculated and cut-points for mild, moderate, and severe anxiety were respectively 5, 10, and 20, based on tested and qualified cut-point scheme [23]. A threshold sum score of five was used when categorizing absence or presence of anxiety exclusively.

To assess anxiety exclusively, seven questions were summed to comprise the seven-item General Anxiety Disorder (GAD-7) scale to assess anxiety. Questions included feelings of anxiousness, worry, control, lack of relaxation, restlessness, irritability, and fear. Sum scores were calculated and cut-points for mild, moderate, and severe anxiety were respectively 5, 10, and 15 [24]. A threshold sum score of 5 was used when dichotomizing anxiety as absent or present.

An assessment based on the scores from the previous three scales was created to dichotomously categorize participants as having or not having any form of anxiety and/or depression. This was done to allow for a more comprehensive and generalizable analysis.

Univariate and Bivariate Analyses

A priori, it was decided to investigate adjustment for: age, previous/new diagnoses, education, income, sexual orientation, and insurance status. Collinearity diagnostics were completed to assess potentially highly correlated variables, utilizing results from condition indices and variance decomposition proportions. Collinearity did not exist and all variables were included in future model consideration. For all variables, univariate analyses were completed using chi-square tests to assess the expected frequencies and the population distribution. Bivariate regressions were then completed using chi-square or Fisher's Exact tests as well as maximum likelihood ratio tests to determine if each of the predictors were

significantly associated with the exposure variable of race and the different dichotomous and categorical outcome variables. Sexual orientation was dropped from future analysis due to insignificant p-values, lack of literature evidence, and skewness of data. All other variables appeared significant through literature reviews or a p-value <0.05 in bivariate analyses and were retained for further analyses.

Confounding assessment using likelihood ratio testing began with a comparative model consisting of the exposure only. Possible subsets controlling for one covariate at a time were assessed and p-values were recorded to decide inclusion.

Multivariable logistic regression model

Due to missingness of outcomes in the PHQ-8 and GAD-7 scales, only the dichotomous PHQ-4 scale and the dichotomous combined scale were assessed for associations. Multivariable logistic regression modeling was done using backwards elimination methodology for both of those outcome scales. From each scale, a final model was chosen and assessed using Hosmer-Lemeshow goodness of fit test.

RESULTS

Demographics

Among the 400 Engage[men]t study participants, 316 (79.00%) completed the necessary depression/anxiety sections of the CASI baseline survey. There were little missing data for any of the covariates (0-3.5%). Participants were black (51.58%) or white (48.42%), had a previous HIV diagnosis (96.52%), had at least some college education (83.55%), earned >=$20,000 annually (57.70%), identified as homosexual/gay (91.46%), and had health insurance (72.17%) (Table 1).

Depression Prevalence

After assessment of PHQ-4, PHQ-8, and GAD-7 scales, there were 316 (79.00%) participants considered for presence of depression/anxiety in the combined scale (Figure 1). According to the combined scale, 121 (38.29%) participants were characterized as having depression and/or anxiety while 195 (61.71%) participants did not. There were no differences in race, length of time since HIV diagnosis, or sexual orientation for those characterized as depressed/anxious versus those who were not. However, depressed/anxious participants were statistically significantly younger (mean= 38 vs. 41.82 years of age, p=0.0012), have less education (no more than a high school education, 20.66% vs. 13.85%, p=0.0048), make a lower income (annual salary <$20,000, 52.63% vs. 36.13%, p=0.0048), and be uninsured (40.52% vs. 20.21%, p=0.0001) (Table 1).

By comparison, the PHQ-4 scale, generally considered a screener scale, categorized a higher percentage of participants with having depression/anxiety [191 (50.13%) vs 121 (38.29%). Using the PHQ-4 scale, depressed/anxious participants were statistically significantly more likely to be younger (mean=38.8 vs. 41.86 years of age, p=0.0067), have lower education (18.32% vs. 13.16%, 0.0159), and be uninsured (33.51% vs. 20.21%, p=0.0037) (Table 2).

The PHQ-4 scale was also analyzed categorically (Table 3). Participants were categorized as "none", "mild", "moderate", and "severe" and were characterized with a distribution of 49.87%, 27.03%, 13.91%, and 9.19% respectively. A statistically significant trend existed displaying that as the severity of depression/anxiety increased, the participants' likelihood to be younger, less educated, have a lower income, and be uninsured increased.

Results from the PHQ-8 and GAD-7 scales (data not shown) were less conclusive due to the large numbers of missing data. The data were heavily skewed to 97.70% and 93.88% of participants being in the depressed and anxious categories respectively. This resulted in a majority of cells possessing a count <5 and all chi-square and Fisher's exact test results were not significant.

Multivariate Analysis

Among the Engage[men]t cohort, age, education, income, and insurance were univariately associated with depression/anxiety and included in the logistic regression model. In multivariate analysis however, while there was no evidence of confounding present for any of the covariates, they were retained in the model as a priori variables. After adjusting for age, education, income, and insurance, the adjusted odds ratio of depression/anxiety among black HIV+ MSM compared to white HIV+ MSM was 1.11 (95% CI=0.93,1.33) (Table 4)

and were not significant. Only the insurance variable proved to be statistically significant, with an OR of 0.501 (95% CI=0.284,0.884). Using only the PHQ-4 results and after adjusting for the same above variables, black MSM were 1.03 times more likely to be anxious or depressed than white MSM (95% CI =0.889,1.204) (Table 4). Similarly, these results were not significant.

DISCUSSION

In this report we present data on depression and anxiety among black and white HIV+ MSM in Atlanta, GA from the Engage[men]t study. This study is among the first to examine this association in an HIV+ MSM population. Based on previous data, HIV remains a significant public health issue among the MSM community, even though the national progress of decreasing HIV rates in the United States is improving [1]. HIV+ MSM account for 56% of all new HIV cases [3], with black MSM disproportionately affected due to various disparities and barriers. This study contributes new data exploring the relationship between race and mental health using different depression and anxiety measurement scales, PHQ-4, PHQ-8, GAD-7, and the combination of these scales.

In our cohort, the prevalence of depression/anxiety was found to be 38.29% using the combined scale (Table 1) and 50.26% using the PHQ-4 scale (Table 2). These results indicate a much higher burden of disease, ranging from 2-8 times that of the general population, which has a prevalence of depression/anxiety fluctuating from 6.7-19.1% [9, 10]. Among participants who completed the PHQ-8 survey and/or the GAD-7, 85 (97.7%) had depression present and 92 (93.88%) had anxiety present. While these rates are quite high, it is important to note that participants must have had scores indicative of depression or anxiety present in the PHQ-4 questionnaire in order to advance to these more specialized questionnaires. This indicates the high sensitivity of the PHQ-4 scale in correctly identifying depression/anxiety in participants. Previous studies has shown that the burden of depression and anxiety are often high among HIV+ populations and MSM populations, with prevalence rates ranging from 23-33% [11-13]. Our elevated prevalence rates of depression and anxiety may be due to the additive effect of participants being both HIV+ and MSM. Additionally, it

is important to note that certain demographics in general tend to have higher rates of depression/anxiety, including individuals with low socioeconomic status, which was common in our HIV+ cohort [13].

When comparing depression/anxiety levels between black and white HIV+ MSM, no association was observed. According to univariate and bivariate analysis, any differences based on race were not statistically significant. Studies in the 1990's showed black MSM being at a statistically significant higher risk for depression than heterosexual black males and MSM of other races [15, 16]. Furthermore, a more recent study also observed statistically significant higher depression prevalence among black MSM [13]. While we found no difference based on race, we did find the average age, education, income, and insurance coverage for those with depression/anxiety were statistically lower than those without depression/anxiety.

This study explored the use of these depression/anxiety brief screening tools: PHQ-4, PHQ-8, GAD-7, and a combined scale incorporating these three scales. This collection of scales allowed for more comprehensive and valid analyses. Moreover, we were interested in determining which scale was most efficient and accurate in measuring depression/anxiety within our population. The PHQ-8 and GAD-7 scales were disregarded as primary outcomes of interest due to their heavy skewness of participants being in the depressed/anxious category, indicating that the PHQ-4 was very accurate in categorizing participants in an efficient way. This skewness was caused by PHQ-4's requirement of the presence of depression/anxiety in order to advance to the two other scales. Our primary outcome was determined to be the scores received from the combined scale, as it seemed to be the most valuable. However, the combined outcome was not appreciably more sensitive

than the PHQ-4 scale. 38.29% were considered depressed/anxious utilizing the combined outcome scales, while the PHQ-4 estimated this number to be 50.26%. The 12% disparity between the two scales may be caused by an excess of false positives when using the PHQ-4 scale as it is meant to be more sensitive and less specific.

Multiple limitations must be considered when interpreting the results of the study. Our study is limited in that the data studied was cross-sectional and inferences regarding causality and temporarily were not possible. Selection bias was present as the nonprobability sampling technique of convenience sampling was used at several MSM and HIV+ dense locations throughout Atlanta. Thus our results are representative of HIV+ MSM who are more likely to be active in the gay community or who are already seeking care, but not the entire HIV+ MSM population within Atlanta. This reduces generalizability pertaining to the entire population and makes the study population more vulnerable to hidden biases [25]. Selection bias was minimized through frequency matching black and white participants and quota setting within each recruitment modality in order to find a racial balance.

Limitations also involve misclassification, including the overestimation or underestimation of depression and anxiety, which may result from the fact that none of the scales used are equivalent to a full diagnostic interview. Depressive or anxious symptoms may have been overlooked in individuals whose symptoms recur episodically [13] and were not present at the time of the interview, underestimating the prevalence of depression or anxiety. However, misclassification would appear to be non-differential and race should not be an influence in the misclassification rates, increasing prediction capabilities [26].

Despite the limitations in our study, it is evident that depression and anxiety are prevalent and important comorbities in the HIV+ MSM population in Atlanta. The main objective of

this study was to compare prevalence of depression and anxiety between black and white MSM groups to determine if there were differences by race. No difference by race was found.

Our study aimed to fill the gap in the current research area of racial disparities in depression and anxiety among HIV+ MSM in Atlanta in order to contribute knowledge to further develop appropriate interventions. Depression and anxiety's detrimental effects on HIV care and treatment indicate the importance of uncovering the disparities and causes from this harmful comorbidity. It is critical for the health care community to recognize the comorbid effects of depression/anxiety and health care providers to improve integration of depression and anxiety screenings and treatments into HIV care in a consistent manner [13]. Researchers must also continue to delve further into the associations between depression/anxiety and race, as well as other potential factors, in order to minimize disparities in care and management of HIV.

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TABLES

Table 1. Presence of Depression/Anxiety (Combined Scale) in HIV-Infected MSM in Atlanta, Engage[men]t, 2015.

	Overall		**No Anxiety/Depression Present**		**Anxiety/Depression Present**		**P-Value**
	n	%	*n*	%	*n*	%	
Total	316	100	195	61.71	121	38.29	
Race							0.4064
Black	163	51.58	97	49.74	66	54.55	
White	153	48.42	98	50.26	55	45.45	
Age at Baseline							**0.0012**
Years, mean (SD)	40.47(11.16)		41.82(11.16)		38(10.60)		
Diagnosis							0.7541
New (≤90 days)	11	3.48	6	3.08	5	4.13	
Previous (>90 days)	305	96.52	189	96.92	116	95.87	
Education							**0.0048**
< High School	52	16.46	27	13.85	25	20.66	
Some college, associate degree, and/or technical school	134	42.41	74	37.95	60	49.59	
College, post graduate, or professional school	130	41.14	94	48.21	36	29.75	
Annual Income							**0.0048**
<$20,000	129	42.3	69	36.13	60	52.63	
>=$20,000	176	57.7	122	63.87	54	47.37	
Sexual Identity							0.2877
Homosexual/gay	289	91.46	182	93.33	107	88.43	
Bisexual	23	7.28	11	5.64	12	9.92	
Other	4	1.27	2	1.03	2	1.65	
Health Insurance							**0.0001**
Yes	223	72.17	154	79.79	69	59.48	
No	86	27.83	39	20.21	47	40.52	

*Bold values indicate significant Chi-Square and Fisher's Exact test statistics (P<0.05)

Table 2. Presence of Depression/Anxiety (PHQ-4) in HIV-Infected MSM in Atlanta, Engage[men]t, 2015.

	Overall		No Anxiety/Depression Present		Anxiety/Depression Present		P-Value
	n	%	*n*	%	*n*	%	
Total	381	100	190	49.87	191	50.26	
Race							0.2391
Black	198	51.97	93	48.95	105	54.97	
White	183	48.03	97	51.05	86	45.03	
Age at Baseline							**0.0067**
Years, mean (SD)	40.47 (11.16)		41.86 (11.06)		38.88 (11.00)		
Diagnosis							0.7852
New (≤90 days)	13	3.41	6	3.16	7	3.66	
Previous (>90 days)	368	96.59	184	96.84	184	96.34	
Education							**0.0159**
< High School	60	15.75	25	13.16	35	18.32	
Some college, associate degree, and/or technical school	164	43.04	73	38.42	91	47.64	
College, post graduate, or professional school	157	41.21	92	48.42	65	34.03	
Annual Income							0.2021
<$20,000	144	39.02	67	35.83	77	42.31	
>=$20,000	225	60.98	120	64.17	105	57.69	
Sexual Identity							0.8289
Homosexual/gay	352	92.39	177	93.16	175	91.62	
Bisexual	24	6.3	11	5.79	13	6.81	
Other	5	1.31	2	1.05	3	1.57	
Health Insurance							**0.0037**
Yes	273	73.19	150	79.79	123	66.49	
No	100	26.81	38	20.21	62	33.51	

*Bold values indicate significant Chi-Square and Fisher's Exact test statistics (P<0.05)

Table 3. Severity of Depression/Anxiety (PHQ-4) in HIV-Infected MSM in Atlanta, Engage[men]t, 2015.

	Overall		No Anxiety/ Depression		Mild Anxiety/ Depression		Moderate Anxiety/ Depression		Severe Anxiety/ Depression		P-Value
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	
Total	381	100	190	49.87	103	27.03	53	13.91	35	9.19	
Race											0.4908
Black	198	51.97	93	48.95	59	57.28	26	49.06	20	57.14	
White	183	48.03	97	51.05	44	42.72	27	50.94	15	42.86	
Age at Baseline											**0.0352**
Years, mean (SD)	40.47 (11.16)		41.86 (11.06)		39.74 (11.12)		38.28 (10.71)		37.29 (11.29)		
Diagnosis											0.7902
New (≤90 days)	13	3.41	6	3.16	3	2.91	2	3.77	2	5.71	
Previous (>90 days)	368	96.59	184	96.84	100	97.09	51	96.23	33	94.29	
Education											**0.0235**
< High School	60	15.75	25	13.16	17	16.5	8	15.09	10	28.57	
Some college, associate degree, and/or technical school	164	43.04	73	38.42	47	45.63	25	47.17	19	54.29	
College, post graduate, or professional school	157	41.21	92	48.42	39	37.86	20	37.74	6	17.14	
Annual Income											
<$20,000	144	39.02	67	35.83	34	33.66	24	49.98	19	59.38	**0.022**
>=$20,000	225	60.98	120	64.17	67	66.34	25	51.02	13	40.63	
Sexual Identity											0.9129
Homosexual/gay	352	92.39	177	93.16	95	92.23	48	90.57	32	91.43	
Bisexual	24	6.3	11	5.79	6	5.83	4	7.55	3	8.57	
Other	5	1.31	2	1.05	2	1.94	1	1.89	0	0	
Health Insurance											**0.0011**
Yes	273	73.19	150	79.79	74	74.75	30	58.82	19	54.29	
No	100	26.81	38	20.21	25	25.25	21	41.18	16	45.71	

*Bold values indicate significant Chi-Square and Fisher's Exact test statistics (P<0.05)

Table 4. Multivariate analysis of total depression/anxiety using the combined and PHQ-4 scale with respective odds ratio and significance findings after adjustment.

	Adjusted Models							
	Combined Outcome				PHQ-4			
Covariates	OR	95% CI		P-Value	OR	95% CI		P-Value
Race								
Black vs. white	1.112	0.931	1.329	0.2427	1.034	0.889	1.204	0.662
Age (continuous)	0.982	0.959	1.007	0.152	0.984	0.964	1.005	0.1312
Education								
Some college, associate degree, and/or technical school vs. < high school	0.79	0.349	1.79	0.572	0.658	0.323	1.339	0.2481
College, post graduate, or professional school vs. < high school	1.173	0.551	2.497	0.679	0.991	0.507	1.936	0.9779
Income								
≥ $20,000 vs. <$20,000	0.656	0.381	1.128	0.1275	1.05	0.649	1.698	0.8427
Insurance								
Insurance vs. no insurance	0.501	0.284	0.884	**0.017**	0.606	0.363	1.012	0.0554

*Bold values indicate significant ORs (P<0.05)

FIGURES

Figure 1. Number of participants who completed each of the three distinct self-reported depression and anxiety scales, including the PHQ-4, PHQ-8, and GAD-7 among the Engage[men]t cohort.