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ORIGINAL PAPER

Burden and Correlates of Mental Health Symptoms Among Young Black Gay, Bisexual, and Other Men Who Have Sex with Men Engaged in HIV Care in Atlanta

Sophia A. Hussen[1,2] · Kamini Doraivelu[1] · Daniel M. Camp[1] · Shamia J. Moore[1] · Ameeta S. Kalokhe[1,2] · Ryan Wade[3] · Traci Leong[4] · Mohammed K. Ali[1,5] · Eugene W. Farber[6]

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Abstract

Mental health comorbidities are prevalent among young Black gay, bisexual, and other men who have sex with men (YB-GBMSM) living with HIV and can adversely impact HIV-related outcomes. We conducted a cross-sectional survey study with 100 YB-GBMSM recruited from two HIV care centers in Atlanta, and constructed multivariable logistic and linear regression models to examine correlates of depression, anxiety, trauma symptoms, and general well-being. In adjusted models, full-time employment was associated with fewer depressive symptoms, while HIV stigma and substance use were associated with higher levels of depressive symptoms. Younger age and full-time employment were negatively associated with severe anxiety, while HIV stigma was positively associated with severe anxiety and trauma symptoms. Trust in physicians, lower HIV stigma, full-time employment, and lack of substance use were associated with higher average general well-being scores. In conclusion, we found high frequency of depressive, anxiety, and trauma-related symptoms among this sample of YB-GBMSM living with HIV. Unemployment, substance use, and HIV stigma emerged as particularly salient correlates of psychological morbidity, suggesting a need for structural and community-level interventions to address mental health in this population.

Keywords HIV · Depression · Mental health · African American · Sexual and gender minorities

Introduction

HIV disproportionately impacts young Black gay, bisexual, and other men who have sex with men (YB-GBMSM) in the United States (US). According to projections, an estimated 40% of YB-GBMSM could be living with HIV by the time they turn 30 years of age [1]. Although current HIV treatments effectively prevent morbidity and mortality [2, 3], YB-GBMSM are at high risk for disengagement across the HIV care continuum, leading to lower rates of viral suppression than other demographic groups [4, 5], and increased risk of downstream adverse health outcomes.

YB-GBMSM who are living with HIV, particularly in the Southern US, face myriad obstacles to their health and well-being. Myers' Lifespan Biopsychosocial Model of Cumulative Vulnerability and Minority Health postulates that race/ethnicity and socioeconomic factors shape exposure to psychosocial adversities (e.g., life events and stressors), which in turn operate through psychosocial reserve capacity, health behaviors, and healthcare access to influence health status

✉ Sophia A. Hussen
sophia.ahmed.hussen@emory.edu

1 Hubert Department of Global Health, Emory University Rollins School of Public Health, 1518 Clifton Road NE, Mailstop 1518-002-7BB, Atlanta, GA 30322, USA

2 Division of Infectious Diseases, Department of Medicine, Emory University School of Medicine, Atlanta, GA, USA

3 School of Social Work, University of Illinois at Urbana-Champaign, Urbana, IL, USA

4 Department of Biostatistics, Emory University Rollins School of Public Health, Atlanta, GA, USA

5 Department of Family and Preventive Medicine, Emory University School of Medicine, Atlanta, GA, USA

6 Department of Psychiatry and Behavioral Sciences, Emory University School of Medicine, Atlanta, GA, USA

among minority populations [6]. In line with this model, key barriers known to deter sustained HIV care engagement and contribute to compromised health outcomes among YB-GBMSM include structural factors such as systemic racism within and outside of healthcare settings, and conservative cultural norms that promote pervasive stigma against sexual minorities and/or people living with HIV [7–9]. The US South also has higher rates of poverty and lower health service accessibility relative to the rest of the country, with Black communities often experiencing a disproportionate burden of these problems. Collectively, structural barriers and intersectional stigmas also contribute to the psychological stress burden of YB-GBMSM living with HIV, thereby increasing vulnerability to co-occurring mental health conditions that may further complicate their engagement in HIV care [9–13].

Mental health comorbidities, including depression, anxiety, and trauma and stress-related symptoms, are prevalent among people living with HIV [14–17]. These problems can adversely affect clinical management of HIV disease across the continuum of care. For example, depression impedes medication adherence [18–20], retention in care [21], and viral suppression [20, 22–24]. Anxiety and trauma/stress-related symptoms similarly complicate HIV care engagement and health outcomes [16, 17]. To date, most of the research in this area has focused on general adult HIV populations, with comparatively little systematic investigation of mental health problems specifically among YB-GBMSM living with HIV [25–27]. Given the unique challenges and barriers affecting HIV care engagement among YB-GBMSM, and the importance of addressing co-occurring mental health conditions as a component of comprehensive HIV health service delivery for this population, we sought to quantify prevalence and correlates of depression, anxiety, traumatic stress, and general psychological distress and well-being in a sample of YB-GBMSM engaged in HIV care.

A secondary study aim was to explore potential correlates of mental health outcomes in our population of interest. For this purpose, we examined factors relating to the major constructs of the lifespan biopsychosocial model, including socioeconomic status (SES), psychosocial adversities, psychosocial reserve capacity, health behaviors, and factors relating to healthcare access. We hypothesized that lower SES (including income, employment, and education factors) and/or housing instability as well as HIV stigma would expose YB-GBMSM to psychological adversity, which along with substance use (as a health behaviors factor), and discrimination in medical settings and low trust in physicians (as healthcare access factors) would be associated with adverse mental health outcomes (depressive symptoms, anxiety symptoms, trauma symptoms) and negatively associated with general well-being (see Fig. 1). We also hypothesized that religious involvement as a psychosocial reserve capacity factor would serve as a potential buffer associated with positive mental health outcomes.

Methods

We conducted a cross-sectional survey among 100 YB-GBMSM living with HIV recruited from two HIV care centers in Atlanta, Georgia between November 2019 and July 2020. YB-GBMSM patients were recruited from the two clinics by either: (1) directly approaching them in the clinic before or after appointments, with the permission of their clinical providers; or (2) by phone when referred to us by clinic staff, or (3) contacting individuals who had participated in prior studies and expressed interest in future research involvement. Eligible individuals were between 18 and 29 years of age and self-reported Black race, male gender identity, any history of consensual sex with men, living with HIV, and receiving care at one of the two participating clinics. Patients recruited by phone were screened and, if eligible, e-mailed a link to a REDCap [28] survey for self-administration at their convenience. Those recruited and screened in-person completed electronic informed consent and self-administered the survey on a study laptop or tablet. All participants received a $25 gift card upon completion

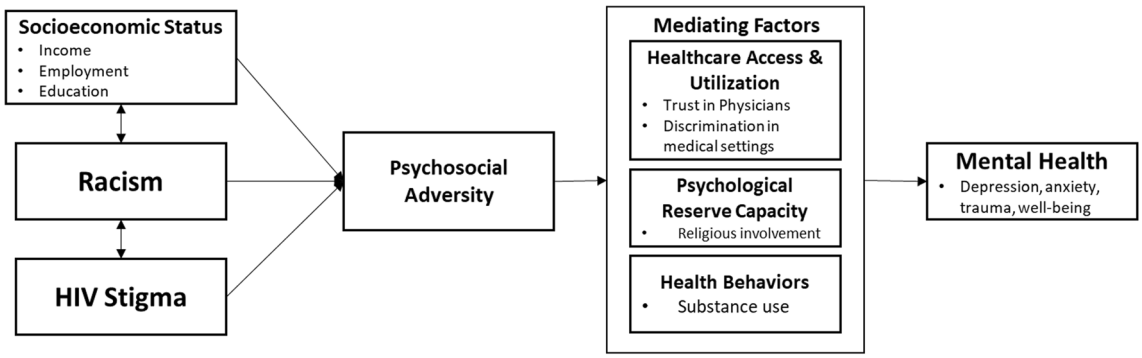

Fig. 1 Conceptual model (based on lifespan biopsychosocial model)

of the survey. The study received institutional review board approval.

Mental Health Symptom Measures

Depressive Symptoms

We measured depressive symptoms using the Centers for Epidemiologic Studies Depression-Revised (CESD-R) scale [29, 30]. The CESD-R is a 20-item self-report index that requires participants to characterize their frequency of depressive symptoms in nine different symptom groups. A CESD style score was calculated using a 4-point Likert scale ranging from 0 (*not at all or less than 1 day last week*) to 3 (*5–7 days* or *nearly every day for 2 weeks*). A score of ≥ 16 is consistent with clinically significant depressive symptoms. The CESD-R has demonstrated sound reliability and validity in many studies of ethnic minority youth [31] and people living with HIV [22, 23], and was found to be reliable in our sample as well (Cronbach's $\alpha = 0.97$).

Anxiety Symptoms

We measured anxiety using the Generalized Anxiety Disorder-7 (GAD-7) scale [32]. The GAD-7 is a 7-item Likert scale instrument with response options ranging from 0 (*not at all*) to 3 (*nearly every day*). A total score (the sum of item scores) of 0–4 is characterized as minimal anxiety, 5–9 is mild anxiety, 10–14 is moderate, and 15–21 is severe anxiety. The GAD-7 has been used in similar populations [23] and reliability was excellent in our sample (Cronbach's $\alpha = 0.94$).

Trauma and Stress-Related Symptoms

We used the abbreviated post-traumatic stress disorder (PTSD) Checklist- civilian version (PCL-C) to assess symptoms of PTSD. Specifically, we used a two-item version that has been demonstrated to perform well as a short screening instrument in primary care clinic settings [33]. Participants are asked two questions (one about repeated, disturbing thoughts or memories; and the other about feeling upset when reminded of a stressful event from the past) on a Likert scale ranging from 1 (*not at all*) to 5 (*extremely*). A score of ≥ 4 corresponds to a positive screen for trauma-/stress-related symptoms. Reliability was very good in this study sample (Cronbach's $\alpha = 0.82$).

General Well-Being

The General Well-Being Schedule (GWB) includes 18 items assessing feelings of psychological well-being and distress over the past month [34]. The first 14 items use a six-point Likert scale, while the last four items use a 0–10 rating scale. Lower sum scores represent greater distress, and established cutoffs for total scores include 0–25 for *severe distress*, 26–40 for *serious distress*, 41–55 for *distress*, 56–70 for *stress problem*, 71–75 for *marginal*, 76–80 for *low positive*, and 81–110 for *positive well-being*. The GWB has previously been used in research with diverse populations, including Black women [35]. Reliability was very good in our study sample (Cronbach's $\alpha = 0.84$).

Measures—Demographics and Covariates

Socio-Demographic Factors

The lifespan biopsychosocial model emphasizes the central role of demographic and socioeconomic factors in influencing health status of minority populations. We therefore asked participants to provide their date of birth and to report their sexual orientation, education level, incarceration history, and income range. Participants characterized their current employment status as employed full-time, employed part-time, or unemployed. Housing instability was assessed in two different ways. We asked participants whether or not they had been homeless in the last 3 months, and also asked them how many times they had moved within the last 6 months.

HIV Stigma

Given the well-documented effects of HIV stigma on health outcomes in YB-GBMSM [36–38], we added HIV stigma as a factor in our model, proposed to predispose to psychological adversity. HIV stigma was measured using the revised HIV stigma scale for youth [39], a 10-item index that asks participants to rate their agreement with statements about attitudes towards people with HIV, disclosure concerns, and negative self-image. The scale utilizes a 4-point Likert response ranging from 1 (*strongly agree*) to 4 (*strongly disagree*) and was reliable in our sample (Cronbach's $\alpha = 0.90$).

Health Behaviors: Substance Use

Substance use was assessed using the NIDA-Modified Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST) V2.0 for participants reporting substance use in the past year. In the NIDA-Modified ASSIST, participants report use of cannabis, cocaine, prescription stimulants, methamphetamine, inhalants, sedatives, hallucinogens, street opioids, prescription opioids, and other not-listed substances in the past 3 months. *Positive* substance use was coded for

participants that endorsed use of any substance in the past 3 months.

Psychosocial Reserve Capacity: Religious Involvement

Religious involvement was construed as a psychosocial reserve capacity factor and measured using the Duke University Religion Index (DUREL), a five-item instrument meant to capture three dimensions: organizational religious activity, non-organizational religious activity, and intrinsic or subjective religiosity. Two items are rated on a 6-point Likert scale, and the other three items are coded on a 5-point Likert scale and summed to provide the intrinsic or subjective religiosity subscale score. Reliability in our sample was adequate (Cronbach's $\alpha = 0.74$).

Healthcare Access: Trust in Physicians and Discrimination in Medical Settings

Based on the assumption that acceptability is a key component of access to care, we examined trust in physicians and discrimination in medical settings as healthcare access factors. The Trust in Physician scale is an 11-item instrument that asks participants to rate their agreement with statements about their feelings towards their physicians on a 5-point Likert scale (from 1 = *totally disagree* to 5 = *totally agree*). Although the measure was developed in a predominantly white and middle-aged sample, reliability was adequate in our sample (Cronbach's $\alpha = 0.76$).

The widely used Every Day Discrimination Scale has been adapted to specifically focus on discrimination in medical settings among Black Americans [40, 41]. We used this Discrimination in Medical Settings (DMS) scale, which is a 7-item measure asking respondents to rate the frequency of their experiences of mistreatment in medical settings using a 5-point Likert scale from 1 (*never*) to 5 (*always*). Reliability was very high in our sample (Cronbach's $\alpha = 0.95$).

Data Analysis

We used SAS v 9.4 (Cary, NC) to conduct all analyses. Some surveys contained single-item non-responses, skewing total scale scores. To reduce non-response bias, we used hot deck imputation to address these missing data and replaced the value of an item non-response with a response from a similar participant [42]. We used univariate (descriptive), bivariate, and multivariable analyses to examine distributions and associations between demographic, psychosocial, and mental health outcome measures. Descriptive analyses included frequencies and measures of central tendency and variability (Table 1). Bivariate analyses included linear and logistic regression. Associations that were significant at $p < 0.20$ in bivariate analyses were retained in the multivariable models. Separate multivariable regression models were developed for each mental health outcome (depressive symptoms, anxiety symptoms, trauma symptoms, and general well-being; Tables 2, 3, 4 and 5). Based on previous analyses using our outcome measures, we developed multivariable linear regression models of predictors of depressive symptoms and general well-being, and multivariable logistic regression models of predictors of anxiety and trauma symptoms, using no symptoms as the referent group.

Results

Demographics and Covariate Measures

The mean age of our sample was 25 years (SD = 3 years). Seventy-eight percent (78%) identified as gay, homosexual, or same gender loving, with the remainder self-identifying as bisexual (18%), and straight or questioning (3%). A large majority (93%) had at least a high school diploma/GED. Thirty-nine percent reported a household income of less than $10,000 annually. Thirty-eight percent of the sample had full-time employment, 22% were employed part time, and 39% were unemployed. Nearly half (49%) had moved at least once in the last 6 months, and 15% reported homelessness in the past 3 months. Half of the sample had ever been incarcerated, with 13% incarcerated within the last 3 months. Additional demographic details are presented along with summary statistics for religious involvement, trust in physicians, discrimination in medical settings, and HIV stigma scales in Table 1.

Depressive Symptoms

Forty-one percent (41%) of the sample reported significant depressive symptoms, defined as a CESD-style CESD-R score ≥ 16 (Table 2). In unadjusted linear regression analyses, being unemployed, having an incarceration history, experiencing higher levels of discrimination in medical settings, higher levels of HIV stigma, and substance abuse were associated with higher CESD-R scores (data not shown). In adjusted linear regression analyses, full-time employment and lack of substance use were significantly associated with lower depression scores, while higher HIV stigma lead to higher depression scores (Table 3).

Anxiety Symptoms

Forty-eight percent (48%) had symptoms of anxiety: 19% were categorized as mild anxiety, 15% with moderate anxiety, and 14% with severe anxiety symptoms (Table 2). No covariates were significantly associated with mild anxiety symptoms in unadjusted and adjusted logistic regression

Table 1 Participant demographics and covariate measures

Demographics	
Variable	N (%)
Age	
18–25	51 (51.0)
26–30	49 (49.0)
Sexual orientation	
Gay/homosexual/same gender loving	78 (78.0)
Bisexual/straight/other	22 (22.0)
Currently enrolled in school	
Yes	75 (75.0)
No	25 (25.0)
Highest education level	
High school diploma or less	52 (52.0)
Some college or tech school	33 (33.0)
Bachelor's degree or higher	15 (15.0)
Employment status	
Full time	38 (38.0)
Part time	20 (20.0)
Unemployed	42 (42.0)
Annual income	
< $10,000	39 (39.0)
$10,000–$19,999	16 (16.0)
$20,000–$29,999	20 (20.0)
$30,000 or more	25 (25.0)
Homelessness in past 3 months	
Yes	15 (15.0)
No	85 (85.0)
Frequency of moves in past 6 months	
Zero	51 (51.0)
One	24 (24.0)
Two or more	25 (25.0)
Ever been incarcerated	
Yes	51 (51.0)
No	49 (49.0)
Substance use	
Yes	87 (87.0)
No	13 (13.0)
Covariate measures	
Variable	Mean ± SD (range)
HIV stigma	2.3 ± 0.8 (1.0–4.0)
Organizational religious involvement	2.3 ± 1.3 (1.0–6.0)
Non-organizational religious involvement	2.3 ± 1.3 (1.0–6.0)
Intrinsic religious involvement	11.2 ± 3.3 (3.0–15.0)
Trust in physicians scale	3.9 ± 0.9 (1.7–5.0)
Discrimination in medical settings	1.6 ± 0.9 (1.0–5.0)

analyses (data not shown). Higher educational attainment, discrimination in medical settings, and HIV stigma were associated with severe anxiety symptoms in unadjusted logistic regression analyses. Full-time employment was negatively associated with both moderate and severe anxiety symptoms (data not shown). In adjusted logistic regression analyses, younger age predicted lower odds of severe anxiety, while HIV stigma and having a bachelor's degree or more was associated with higher odds of severe anxiety. Multivariable logistic regression analyses are presented in Table 4.

Trauma-Related Symptoms

Forty-three percent (43%) screened positive for trauma/stress-related symptoms (Table 2). In unadjusted logistic regression analyses, employment status (OR 0.31, 95% CI 0.12–0.81) and HIV stigma (OR 1.87; 95% CI 1.10–3.17) were associated with trauma/stress-related symptoms; however, only HIV stigma remained significantly associated (OR 1.95, 95% CI 1.01–3.79) in multivariable logistic regression analyses (data not shown).

General Well-Being

In our sample, 35% of respondents were categorized as being in distress, serious distress, or severe distress, 37% as having a stress problem, 13% as marginal, and 15% as positive well-being. In unadjusted linear regression analyses, higher income, part-time employment, and trust in physicians lead to higher general well-being scores, while HIV stigma and discrimination in medical settings lead to lower general well-being scores. In adjusted logistic regression analyses, trust in physicians, lower HIV Stigma, full-time employment, and lack of substance use increased average general well-being scores (Table 5).

Discussion

We found a high frequency of depressive, anxiety, and trauma-related symptoms in this sample of YB-GBMSM living with HIV recruited from two Ryan White clinics in Atlanta, Georgia. We also found a high frequency of unemployment and criminal justice system involvement, as more than 40% of the study sample reported being unemployed at the time of the study, and nearly half of study sample reported having even been incarcerated. Biopsychosocial factors including employment, substance use, and HIV stigma emerged as correlates of depression,

Table 2 Mental health outcomes

Mental health outcomes	
Variable	N (%)
Depressive symptoms (CESD-R)	
No depression	59 (59.0)
Depressive symptoms	41 (41.0)
Anxiety symptoms (GAD)	
No symptoms	52 (52.0)
Mild anxiety	19 (19.0)
Moderate anxiety	15 (15.0)
Severe anxiety	14 (14.0)
Trauma related symptoms (PTSD Checklist-Civilian version)	
Positive screen for trauma	57 (57.0)
Negative screen for trauma	43 (43.0)
General well being	
Severe/serious/distress	35 (35.0)
Stress problem	37 (37.0)
Marginal/low positive	13 (13.0)
Positive well-being	15 (15.0)

anxiety, and trauma-related symptoms, while employment and trust in physicians were significantly associated with general well-being. Our study is among the first to focus on mental health symptoms in a sample consisting exclusively of YB-GBMSM living with HIV. We believe that this focus is an important contribution to the literature, as this group faces unique challenges due to the intersecting stigmas and socio-demographic stressors encountered across their lifespans.

The high burden of mental health symptoms in our sample suggests an urgent need for interventions among YB-GBMSM that target not only HIV-related outcomes (e.g., viral suppression), but also mental health and general well-being. Although rates of psychological symptoms in our sample were high, they were also consistent with prior studies in similar populations. Other studies of YB-GBMSM living with HIV have found rates of depressive symptoms (similarly defined as CESD > 16) ranging from 47 to 58% [22, 23]. Anxiety was reported with higher frequency in our cohort than by that reported in other studies [19]; in general, anxiety and trauma are infrequently assessed in previous studies specific to YB-GBMSM. In previous studies of trauma experiences among slightly older samples of Black GBMSM living with HIV, 60% had experienced at least one interpersonal trauma and 40% met screening criteria for PTSD [43, 44]. Another study of behaviorally bisexual Black GBMSM reported PTSD in 20% of the sample. Our results in this younger cohort of Black GBMSM suggest that trauma experiences may be accrued at a young age, and should be investigated further in more detailed trauma inventories as well as qualitative studies.

The consistent association of employment with mental health outcomes was a main finding in our analysis, and highlights the important role of socioeconomic factors for

Table 3 Multivariable linear regression analysis of variables potentially associated with depression symptoms

Variable	Coefficient (B)	β1 ± SE	Model based mean (95% CI)	P-value	P-value (overall)
Overall	10.31	–	− 3.62 (− 13.78–6.55)	–	–
Age					
18–25	10.31	− 4.12 ± 2.96	9.23 (2.95–15.52)	0.167	0.132
26–30	Ref	Ref	13.35 (7.22–19.48)	Ref	
Employment status					
Full time employed	**10.31**	**− 9.44 ± 3.39**	**6.28 (− 0.62–13.18)**	**0.007**	**0.024**
Part time employed	10.31	− 3.85 ± 3.89	11.87 (3.98–19.77)	0.325	
Unemployed	ref	Ref	15.72 (9.77–21.68)	Ref	
Substance use					
Yes	Ref	Ref	17.43 (13.33–21.53)	Ref	**0.005**
No	**10.31**	**− 6.97 ± 3.74**	**5.15 (− 3.77–14.08)**	**0.005**	
Homelessness in past 3 months					
Yes	Ref	Ref	14.47 (6.24–22.69)	Ref	0.871
No	10.31	0.52 ± 4.12	13.78 (9.83–17.73)	0.899	
Ever been incarcerated					
Yes	Ref	Ref	12.84 (6.34–19.35)	Ref	0.223
No	10.31	− 3.11 ± 2.89	9.74 (3.90–15.57)	0.285	
Medical discrimination	10.31	1.44 ± 2.04	5.24 (− 21.42–31.89)	0.453	0.578
HIV stigma	**10.31**	**5.43 ± 2.12**	**37.30 (11.81–62.79)**	**0.012**	**0.012**

Bold results indicate statistical significance

Table 4 Relative adjusted odds of anxiety symptoms

Variable	Moderate anxiety		Severe anxiety	
	Adjusted odds ratio	P-value	Adjusted odds ratio	P-value
Age				
18–25	0.59 (0.16–2.17)	0.424	**0.11 (0.02–0.60)**	**0.011**
26–30	Ref	Ref	Ref	Ref
Education level				
Bachelor's degree or more	1.28 (0.11–14.43)	0.843	**20.40 (2.05–203.18)**	**0.01**
Tech school or some college	1.53 (0.42–5.56)	0.52	0.92 (0.14–5.91)	0.929
High school or less	Ref	Ref	Ref	Ref
Frequency of moves in past 6 months				
Two or more	1.26 (0.22–7.22)	0.796	1.01 (0.21–4.87)	0.995
One	**13.56 (2.18–82.25)**	**0.005**	< 0.001 (< 0.001–> 999.99)	0.958
Zero	Ref	Ref	Ref	Ref
Employment status				
Full time employed	0.26 (0.06–1.19)	0.082	0.22 (0.03–1.46)	0.116
Part time employed	0.84 (0.19–3.80)	0.821	1.15 (0.18–7.30)	0.880
Unemployed	Ref	Ref	Ref	Ref
Medical discrimination	0.74 (0.32–1.72)	0.481	0.58 (0.25–1.32)	0.195
HIV stigma	2.34 (0.87–6.27)	0.092	**10.90 (3.01–39.43)**	**0.0003**

Bold results indicate statistical significance

Table 5 Multivariable linear regression analysis of variables potentially associated with general well being

Variable	Coefficient (B)	β1 ± SE	Model based mean (95% CI)	P-value	P-value (overall)
Overall	30.97	–	51.38 (26.91–75.85)	–	–
Sexual orientation					
Gay/homosexual/same gender loving	30.97	1.61 ± 4.73	67.85 (60.53–75.17)	0.734	0.734
Straight/bisexual/other	Ref	Ref	66.23 (54.93–77.54)	Ref	
Annual income					
$30,000 or more	30.97	− 0.79 ± 5.49	67.82 (56.30–79.34)	0.855	0.858
$20,000–$29,999	30.97	− 0.45 ± 5.85	68.16 (56.06–80.26)	0.939	
$10,000–$19,999	30.97	− 5.04 ± 5.95	63.57 (52.52–74.62)	0.399	
< $10,000	Ref	Ref	68.61 (59.05–78.17)	Ref	
Homelessness in past 3 months					
Yes	Ref	Ref	69.33 (56.87–81.79)	Ref	0.404
No	30.97	− 4.58 ± 5.46	64.75 (58.35–71.15)	0.404	
Employment status					
Full time employed	**30.97**	**15.99 ± 5.17**	**75.44 (65.43–85.46)**	**0.003**	**0.011**
Part time employed	30.97	6.78 ± 5.37	66.23 (54.57–77.89)	0.211	
Unemployed	Ref	Ref	59.45 (50.06–68.85)	Ref	
Trust in physicians	**30.97**	**6.83 ± 2.34**	**92.24 (76.31–108.18)**	**0.004**	**0.004**
Discrimination in medical settings	30.97	1.20 ± 2.85	42.77 (− 11.28–96.81)	0.675	0.675
HIV stigma	**30.97**	**− 5.64 ± 2.73**	**99.91 (39.68–160.13)**	**0.042**	**0.042**
Substance use					
Yes	Ref	Ref	60.17 (53.71–66.62)	Ref	**0.018**
No	**30.97**	**13.75 ± 5.68**	**73.92 (61.29–86.54)**	**0.018**	

Bold results indicate statistical significance

mental health in this population. Many epidemiological studies control for employment as a demographic variable, but relatively few explore its role in-depth. Some studies have examined the importance of employment for Black GBMSM and/or young GBMSM more broadly—however, most of these observations have been related to associations between employment and HIV-related outcomes (e.g., sexual risk behavior or HIV status) as opposed to mental health outcomes such as those we describe here [45–47]. Several studies point specifically to risk pathways linking unemployment and/or financial hardship to engagement in transactional sex as a mechanism for increased HIV risk among GBMSM [48, 49]. The associations found in our analysis bring up another potential pathway—unemployment could be causing depression and anxiety that in turn adversely impact HIV care outcomes. Alternatively, those suffering from mental health challenges may be less likely to secure employment, and also to less likely to meet HIV clinical goals. Future longitudinal studies that include measures of employment, socioeconomic status, transactional sex, and mental health may help to elucidate the causal pathways between these constructs. Novel interventions to enhance employment opportunities as a means of HIV prevention among sexual minority youth of color also need to be developed and tested [50].

HIV stigma also emerged as a key predictor across mental health outcomes, supporting our addition of this construct as an antecedent of psychological adversity (along with race and SES) in our modified lifespan biopsychosocial model. This finding is consistent with many other studies demonstrating associations between HIV stigma and psychological distress, including among YB-GBMSM living with HIV [51]. Prior work suggests that the internalization of negative feelings about oneself is the most important component of HIV stigma for mental health [47, 52]. Although our current study did not specifically measure other concurrent types of minority stressors (e.g., internalized racism or homonegativity), other work has suggested that multiple minority statuses can interact synergistically to cause negative effects on physical and mental health [52]. Interventions to decrease internalized HIV stigma must be prioritized in order to optimize mental health outcomes for YB-GBMSM living with HIV.

It was notable that religious involvement was not associated with any of our mental health outcomes in adjusted analyses. One possibility is that religion may have mixed effects on mental health in this population. We initially hypothesized this effect to be primarily positive (with religion and spirituality serving as a coping mechanism), building on research demonstrating that Black Americans often utilize church-based support in dealing with mental health problems [53, 54] and that church involvement can sometimes support mental health service use [55]. However, research specifically among Black GBMSM has also demonstrated negative effects of conservative religious institutions which may exacerbate internalized homophobia and resultant psychological distress [9, 56, 57]. This complex and sometimes conflicting role of religion in our sample of young, Southern Black men, may have obscured any statistical relationship between religiosity and mental health in our sample.

Lack of substance use in our sample was associated with lower risk of depressive symptoms, and higher self-rating of general well-being. This finding is consistent with an established evidence base confirming the negative impact of substance use on depression among youth more generally [58]. Programming to prevent or treat problematic substance use in YB-GBMSM may, therefore, have dual impacts in addressing the negative ramifications for mood as well as the deleterious effects of substance use itself.

The addition of a measure of positive psychological symptoms (e.g., general well-being) was somewhat novel in our study, as studies of mental health among other sexual minority youth of color often focus primarily on negative psychological outcomes [59]. General well-being, like depression and anxiety, was associated with employment and substance use. However, trust in physicians was significantly associated with general well-being, but not with symptoms of depression, anxiety, or trauma. Related to this finding, others have found associations between trust in physicians and positive attitudes about HIV medications among YB-GBMSM living with HIV and other people living with HIV [7, 60]. Encouragingly, prior work has shown that the majority of patients trust their physicians even if they espouse mistrust towards the government or biomedical science more generally [61]. Interventions designed to enhance and build upon the patient-physician relationship are, therefore, promising avenues for enhancing general well-being, as well as medication use, among YB-GBMSM.

Limitations

As our study was conducted exclusively in clinical settings, the burden of symptoms may have been different (and potentially higher) among YB-GBMSM who are living with HIV but not engaged in HIV care. Our sample size was relatively small, so that we may have been underpowered to observe some associations that could emerge in larger studies in the future. It should be noted that positive screening tests do not all correspond to clinical diagnoses, and future studies should incorporate more rigorous diagnostic interviewing to help determine the true burden of psychological disorders in this population. Additionally, we did not include survey questions about time since HIV diagnosis, an established correlate of mental health comorbidities and would have provided additional context for our findings. Finally,

the cross-sectional nature of the study precludes definitive assessment of the directionality of associations noted here. More in-depth exploration of the lifespan model in the future should also include assessment of these demographics and stressors from childhood, as well as examination of protective factors such as social support and resilience. Qualitative research would also be useful for helping to understand cultural factors with particular relevance for interventions targeting mental health among YB-GBMSM.

Conclusions

YB-GBMSM living with HIV bear a high burden of mental health symptoms, including symptoms of depression, anxiety, and trauma. Structural interventions to address sociodemographic vulnerabilities may be particularly impactful for improving mental health in this population. Additionally, HIV stigma remains a critically important barrier to optimal mental health for this group, and should be targeted in culturally-informed interventions.

Author Contributions SAH, KD, DMC, SJM, MKA and EWF contributed to the initial conceptualization, design, and implementation of the study. SAH, KD, and DMC conducted data analysis. SAH led the writing of the initial draft of the paper. KD, DMC, SJM, ASK, RW, TL, MKA, and EWF all reviewed the paper, made revisions, and approved the final version.

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Data Availability Data will be made available upon request.

Code Availability Not applicable.

Declarations

Conflict of interest The authors declare no competing interests or relevant disclosures.

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Consent to Participate All participants provided informed consent.

Consent for Publication Not applicable.

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