Loneliness and HIV-related stigma explain depression among older HIV-positive adults

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Abstract

Advances in the treatment of HIV have resulted in a large growing population of older adults with HIV. These aging adults face added social, psychological, and physical challenges associated with the aging process. Correlations between depression, loneliness, health, and HIV/AIDS-related stigma have been studied, but there is little evaluation of these associations among HIV-positive adults over the age of 50. Data for these analyses were taken from the Research on Older Adults with HIV (ROAH) study of 914 New York City-based HIV-positive men and women over the age of 50. In total, 39.1% of participants exhibited symptoms of major depression (CES-D ≥ 23). Multivariate modeling successfully explained 42% of the variance in depression which was significantly related to increased HIV-associated stigma, increased loneliness, decreased cognitive functioning, reduced levels of energy, and being younger. These data underscore the need for service providers and researchers to assert more aggressive and innovative efforts to resolve both psychosocial and physical health issues that characterize the graying of the AIDS epidemic in the United States. Data suggest that focusing efforts to reduce HIV-related stigma and loneliness may have lasting effects in reducing major depressive symptoms and improving perceived health.

INTRODUCTION

The number of people aged 50 and older living with HIV in the U.S. increased 77% between 2001–2005, accounting for 25% of all HIV cases and 29% of all persons living with AIDS in the U.S. (CDC, 2008a; Martin, Fain, & Klotz, 2008). This has been described as the "graying" of the HIV/AIDS epidemic (Gorman, 2006; Shah & Mildvan, 2006). In 2006, almost 38% of HIV-positive persons were between the ages of 40–49. As these individuals receive treatment allowing them to live longer, the numbers of HIV-positive persons over 50 will increase by 67% in the next decade (CDC, 2008b). This growth is paralleled by small increases in newly diagnosed HIV infections in the over 50 population; in 2007, 15% of new diagnoses occurred among adults 50 and older (CDC, 2008b).

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Older HIV-positive adults confront both the process of aging and managing their HIV/AIDS (Bhavan, Kampalath, & Overton, 2008; Emlet, 2006, 2004; Magalhaes, Greenberg, Hansen, & Glick, 2007; Vance, Farr, & Struzick, 2008). In older adults with HIV, as in their younger counterparts, high levels of psychological distress are common. Rabkin (2008) reported that depression was the second most prevalent behavioral health issues among HIV-positive adults, and Bing et al. (2001) estimated the prevalence of depression among HIV-positive adults at 36%. While a wide range of depression rates in HIV-positive adults have been reported (1–48%), Rabkin (2008) reported overall rates of major depressive disorder ranged from 5–10%.

The association between HIV and depression has been attributed to multiple factors, including poorer cognitive and physical function due to HIV or treatment side effects (Clifford, 2008; Hult, Chana, Masliah, & Everall, 2008; Nath, et al., 2008; Vance, et al., 2008), health induced anxiety and stress (Enriquez, Lackey, & Witt, 2008; Heckman, Kochman, & Sikkema, 2002), HIV/AIDS-related stigma (Galvan, Davis, Banks, & Bing, 2008; Vanable, Carey, Blair, & Littlewood, 2006), and social isolation/loneliness (McDowell & Serovich, 2007; Moneyham, et al., 2005; Simoni, Montoya, Huang, & Goodry, 2005). These factors may be exacerbated among older adults as they face physical and mental challenges inherent in aging processes (Emlet, 2004; Magalhaes, et al., 2007; Martin, et al., 2008; Valcour & Paul, 2006).

Depression and stress are inextricably linked to physical health outcomes, especially for HIV-positive persons. Vanable and colleagues' review (2006, p. 473) noted that, "…chronic depression, stressful events, and trauma may negatively affect HIV illness progression in terms of CD-4 T lymphocytes, increases in viral load, and greater risk for clinical decline and mortality". Similarly, the combined effects of HIV-related stigma and depression adversely affect HIV treatment adherence (Kalichman, Ramachandran, & Catz, 1999; Ware, Wyatt, & Tugenberg, 2006), limit HIV-positive individuals' use of social support due to rejection concerns (Berger, Ferrans, & Lashley, 2001), and influence HIV status disclosure to sex partners increasing risk for STIs (Courtenay-Quirk, Wolitski, Parsons, & Gomez, 2006; Frost, Parsons, & Nanín, 2007; Parsons, Halkitis, Wolitski, & Gomez, 2003).

Current Study

With few exceptions (e.g., Emlet, 2004), little is known about the associations between HIV-related stigma, loneliness, physical/social health, and depression symptoms in older HIV-positive adults. As the proportion of HIV-positive persons over 50 continues to rise, care and service providers need a better understanding of these factors as they develop optimal standards of care. This analysis assessed the role of perceived health, stigma, and loneliness in predicting depression among a community-based study of nearly one-thousand older HIV-positive adults in New York City (NYC). We hypothesized that (1) HIV-related stigma, (2) loneliness, and (3) perceived health would each have bivariate associations with depression. Further, we hypothesized these effects would be sustained in multivariate modeling (i.e., significant predictors of depression even after adjusting for other variable's overlapping effects).

METHOD

Participants and Procedures

In 2005, the AIDS Community Research Initiative of America (ACRIA) conducted the "Research on Older Adults with HIV" (ROAH) study, which sought to identify the characteristics and needs of the growing population of HIV-positive older adults in NYC (Brennan, Karpiak, Cantor, & Shippy, in press). ACRIA recruited participants through NYC

AIDS Services Organizations (ASOs), clinics, and the agency's client database using flyers, presentations by ACRIA staff, mail, and email contacts. Data were collected from 1000 persons. Removal of duplicate and unusable surveys resulted in an eligible data set of 914 participants. Participants were at least age 50, HIV-positive, not institutionalized, reside in or receive healthcare in NYC, and sufficiently fluent in English. ROAH utilized a self-administered pen-and-paper survey which took approximately one hour to complete. Surveys were completed at ACRIA, or at community recruitment sites. Participants were compensated $25. ROAH's Research Advisory Committee and an independent Institutional Review Board approved all procedures.

Measures

Depression—Depressive symptoms were assessed using the Center for Epidemiological Studies Depression Scale (CES-D) (Radloff, 1977), a widely used measure in HIV research. The 20-item measure assess the frequency of experiencing depressive symptoms in the past week (0-never or rarely, to 3-most of the time/all of the time). The CES-D includes few somatic indicators, thus reducing the likelihood of elevated depression scores due to the physical symptoms. Responses are summed (range 0–60) with higher scores indicating greater severity of depression ($\alpha = .87$). Researchers have used scores between 22 and 24 as validated sensitive cut-points to indicate high likelihood of current major depressive disorder (CDC, 2002; Lewinsohn, Seeley, Roberts, & Allen, 1997; Lyness, et al., 1997; Roberts, Lewinsohn, & Seeley, 1991). A score of 23 and higher was used to indicate a high likelihood of current major depressive symptoms.

HIV-Related Stigma—Participants completed the HIV Stigma Scale (Berger, et al., 2001). This 40-item measure of perceived stigma assessing four domains: personalized stigma, disclosure concerns, negative self-image, and concern with public attitudes toward people with HIV. Berger et al. (2001) extracted one higher-order factor for this scale. That score provided evidence of a single overall construct. Items are measured on a Likert-type scale (1-strongly disagree to 4-strongly agree, Range 40 – 160). Higher scores indicate greater perceived stigma ($\alpha = .96$).

Perceived Health Indicators—Participants completed a condensed version of the Medical Outcomes Scale – HIV (MOS-HIV) (Wu, Hays, Kelly, Malitz, & Bozzette, 1997; Wu, Jacobson, et al., 1997; Wu, Revicki, Jacobson, & Malitz, 1997). The MOS-HIV is a brief health assessment tool containing 35 questions measuring 10 health dimensions. Five dimensions were used in ROAH: pain (2-tems), physical functioning (6-items), social functioning (1-item), energy/fatigue (4-items), and cognitive function (4-items). Subscales of the MOS-HIV are scored as summated rating scales from 0 to 100; higher scores indicate better health.

Self-reported objective health indicators—Participants self-reported their most recent CD-4 count and whether they had ever been diagnosed with AIDS. Since CD-4 counts are skewed ($M = 468.2$, $SD = 282.1$, Range 5–2000), values were square root transformed (transformed: $M = 20.65$, $SD = 6.46$, Range 2.24–44.72).

Loneliness—Participants completed the Version 3 UCLA Loneliness Scale (Russell, 1996). This 20-item scale captures aspects of loneliness and feelings of isolation. Items are scripted on a Likert-type scale (1-Never to 4-Always, Range 20–80). This measure has demonstrated high internal consistency (α's .89–.94: For ROAH, $\alpha = .90$) in a variety of samples (Russell, 1996). Higher values correspond to greater loneliness.

Drug Use—Participants reported if they had used methamphetamine, cocaine, crack-cocaine, heroin, ecstasy/MDMA, GHB, ketamine, LSD, and marijuana in the last 90 days (1-yes, 0-no).

Analytic Plan

Where appropriate, statistical chi-square and *t*-tests were conducted to assess for differences between those with major depressive symptoms (CES-D ≥ 23) versus those without (CES-D < 23). A correlation matrix was generated to illustrate associations among independent variables. Finally, we conducted a three step logistic regression on presence/absence of major depressive symptomatology, to assess the independent contributions of variables significantly associated with depression in bivariate analyses, including socio-demographic factors (step 1: gender, sexual identity, age, race/ethnicity), perceived health status (step 2: MOS-HIV), and stigma and loneliness (step 3). This approach enabled the assessment of how additional variables impact model fit in addition to other variable's unique contributions to the model. Including demographic characteristics in the first step allowed assessment other variable's adjusted effects in the second and third step. Adding stigma and loneliness third allowed assessment of the independent yielded effect that stigma and loneliness have over-and-above perceived health.

RESULTS

Table 1 reports the socio-demographic characteristics. Median age was 54 (Range 50–78; IQR 52–58). Participants had been living with HIV for an average of 12.6 years (*SD* = 5.2) and 85% (*n* = 768) were currently taking antiretroviral medication. Major depressive symptoms were high, with 39.1% of participants scoring 23 or higher on the CES-D (*M* = 20.0, *SD* = 10.65, Range 0–52). The average Loneliness scale score was 43.9 (*SD* = 10.56, Range 21–73) and the average Stigma scale score was 88.9 (*SD* = 22.38, Range 41–154). MOS-HIV scales means were as follows: 63.4 for physical function (*SD* = 26.06), 71.6 for social function (*SD* = 29.84), 68.7 for cognitive function (*SD* = 23.57), 63.7 for pain (*SD* = 26.16), and 56.5 for energy (*SD* = 19.30). All ranged 0–100

Table 2 reports the bivariate associations between study variables and major depressive symptoms (CES-D < 23 v. CES-D ≥ 23) which were significantly more common among heterosexual participants (40.7% v. 33.0%), and highest among Latino/as (46.3%) and Whites (40.0%). In contrast, African Americans (34.5%) and participants of other/mixed races (36.1%) were the least likely to evidence major depressive symptoms. Participants exhibiting major depressive symptoms had significantly higher scores on the Loneliness and Stigma scales. Participants with major depressive symptoms scored significantly lower on the five subscales of perceived health, indicating poorer physical functioning, social functioning, cognitive functioning, more pain, and less energy. In contrast, major depressive symptoms was not significantly related to objective health indicators (i.e., previous AIDS diagnosis and CD-4 count), gender (males v. females), or recent drug use. Values are reported in Table 2.

Table 3 reports the correlation matrix of predictor variables hypothesized to be associated with depression. Significant negative correlations existed between HIV-related stigma and loneliness and all five measures of perceived health. But neither stigma nor loneliness was significantly related to either objective health indicator (CD-4 count, AIDS diagnosis).

Table 4 reports the three-step logistic regression the independent roles of variable sets associated with depression in bivariate analyses. We used logistic regression to focus on major depressive symptoms as the dependent variable. A multivariate linear regression analysis with depression as a continuous variable yielded almost identical results. In the first

step, demographic characteristics were considered. The second step considered perceived health indicators (five MOS-HIV sub-scales). The third step considered the Stigma and Loneliness scales. Neither of the objective health indicators were significant in bivariate analyses, and were not included in these multivariate analyses.

In the first step, identity as a sexual minority, age, and race were significantly related to major depressive symptoms. Adjusting for the effects of other demographic variables, sexual minorities (gays, lesbians, and bisexuals) were at reduced odds for major depression symptoms. Whites and Latinos were at significantly higher odds than African Americans to exhibit major depression symptoms. Lastly, the odds of major depressive symptoms decreased with age. Values are reported in Table 4.

The second model considered five subscales of the MOS-HIV index. These measures greatly improved the overall fit of the model, explaining an additional 29% of the variance in major depressive symptoms (R^2= .34). Unlike bivariate analyses, only three of the five perceived health indicators were significantly related to major depressive symptoms in multivariate analyses: cognitive function, pain, and energy/fatigue, with higher scores (i.e. better perceived health) associated with lower odds of major depressive symptoms.

In the third model, the inclusion of Stigma and Loneliness scales significantly improved the fit of the model, explaining an additional 8% of the variance in major depression symptomatology (R^2= .42). Controlling for the effects of demographics and perceived health status, both loneliness and HIV-related stigma were significantly and uniquely associated with major depressive symptoms. The addition of stigma and loneliness reduced the independent effects of perceived pain on depression, rendering its coefficient non-significant. Values are reported in Table 4.

With other factors constant, every one unit increase in the Loneliness scale resulted in a 6.4% increased odds of major depressive symptoms. Likewise, keeping other factors constant, every one unit increase in the Stigma scale resulted in a 1.3% increased odds of major depressive symptoms. Though the magnitude of these values is small per unit change in the independent variable, one must consider that values on the Loneliness scale ranged from 21 to 73, and that the Stigma scale ranged from 40 to 160. Were we to apply the present model to predict major depressive symptoms among ROAH participants, scoring 10 units higher on the Loneliness scale (holding other factors constant) would result in, an 86% increased odds of major depressive symptoms. Or, holding other factors constant, scoring 30 units higher on the Stigma Scale (plausible given its range) would result in a 47% increased odds of major depressive symptoms.

DISCUSSION

Advances in HIV treatments have increased interest in the quality of life of HIV-positive older adults age 50 and above (Luther & Wilkin, 2007; Martin, et al., 2008). Living with HIV has been connected to a variety of social, emotional, and physical challenges (Bhavan, et al., 2008), including stigma, loneliness, depression, and social/health consequences (Gore-Felton & Koopman, 2008; Jia, et al., 2007; Liu, Johnson, et al., 2006; Liu, Ostrow, et al., 2006; Rabkin, 2004, 2008). These may be exacerbated among older adults as they confront the process of aging. Over 39% of persons evidenced major depressive symptoms, higher than observed in other samples (c.f., Bing, et al., 2001; Rabkin, 2008) including other samples of older HIV-positive adults (c.f., Heckman, et al., 2002). Similarly, participants reported poorer perceived health (MOS-HIV) (c.f., Badia, Podzamczer, Garcia, Lopez-Lavid, & Consiglio, 1999; Ichikawa & Natpratan, 2004), greater stigma (c.f., Bunn, Solomon, Miller, & Forehand, 2007) and loneliness (c.f., Vance, 2006) compared to other

samples of HIV-positive persons. The cited studies included younger participants, suggesting that these variables may be specific problems for older HIV-positive adults.

This study found bivariate associations between depression and race and sexual orientation. However, these associations were not sustained in multivariate modeling. This was likely a function of the correlations these variables had with other independent variables, specifically perceived health (though multicollinearity was not a problem). In bivariate analyses, all perceived health subscales were significantly associated with major depressive symptoms, supporting our hypothesis. In the multivariate model, only two measures of perceived health – cognitive function and energy/fatigue – remained significant, partially supporting our hypothesis. It is unsurprising that major depressive symptoms were significantly related to these two perceived health indicators, as they can be considered symptoms of depression (Rabkin, 2004, 2008).

More important, controlling for both demographics and measures of perceived health in multivariate analyses, loneliness and HIV-related stigma emerged as significant independent predictors of major depressive symptoms, supporting our hypothesis. In other words, controlling for demographic differences and perceived health indicators, higher rates of HIV stigma and loneliness place older adults at increased risk for major depressive symptoms. Although the odds ratios appear to be small, the scale ranges and standard deviations translate these odds into clinically significant findings; for example, every 10 unit increase in loneliness increases the odds of major depressive symptoms by over 80%. Since neither HIV stigma nor loneliness was associated with objective indicators of health (i.e. CD-4 count, AIDS diagnosis), the magnitude of these psychosocial factors rather than physical symptoms of disease severity, are primary factors contributing to depression. Interestingly, all five measures of perceived health had stronger bivariate associations with HIV stigma and loneliness, compared to the two objective health indicators, suggesting that these factors may be decisive and critical in the association between perceived health and depression. Although other studies have identified objective indicators of disease progression as significant predictors of depression (Atkinson, et al., 2008), these data highlight the importance of looking beyond physical health indicators and focusing efforts to reduce HIV-related stigma and loneliness in order to reduce major depressive symptomatology and improve perceived health among older adults living with HIV. In total, our findings suggest that in developing a more nuanced approach toward treatment of HIV among older adults, the variables/associations from these analyses should be evaluated in tandem with each other.

This study has limitations. First, recruitment was conducted primarily via community-based care/service providers, and represents a sample linked to HIV service organizations. Though this sample is certainly not random, we believe it paints a fairly comprehensive picture of NYC HIV-positive older adults whom service and community providers likely encounter daily. Furthermore, the sample closely parallels the NYC HIV/AIDS epidemiology (NYC Department of Health and Mental Hygiene, 2006). However, this study cannot attest to the experiences of individuals who did not participate. Those not linked to care/services might experience greater degrees of isolation, in addition to other negative social, physical and health consequences. Although the negative outcomes reported on in this study were quite high, these numbers may be even higher among those not connected to care. Second, as these data are cross-sectional, some findings may be bidirectional (e.g., depression can trigger social isolation, and vice versa). Though we found HIV-related stigma and loneliness were significantly related to major depressive symptoms, this does not discount the potential for other explanatory models or analytic approaches. Though not shown, a parsimonious version of our final model (including the five significant predictors) explained 42% of the

variance in depressive symptoms. Meanwhile, using path analysis, Heckman et al. (2002) explained 41% of variance in depression in their sample of 83 HIV-positive older adults.

The findings indicate several areas to which health and community service providers of older HIV-positive adults should be attentive. These data highlight the need to develop programs that reduce loneliness and HIV-related stigma thereby reducing major depressive symptoms while improving perceived health. Older HIV-positive adults as they age need to be linked to healthcare, as well as social and emotional support.

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Table 1

Sample characteristics, older adults living with HIV (N = 914)

	n	*%*
Gender		
Male	640	70.0
Female	264	28.9
Transgender female (MTF)	7	0.8
Transgender male (FTM)	3	0.3
Race and ethnicity		
White	116	12.7
African American	455	49.8
Latino/a	299	32.7
Other	36	3.9
Missing	8	0.9
Sexual identity		
Heterosexual	577	63.1
Bisexual	74	8.1
Lesbian or gay	206	22.5
Other or missing	57	6.2
Living situation		
Alone	631	69.0
Partner	134	14.7
Relatives	80	8.8
Friends	33	3.6
Other or missing	36	3.9
Education		
< High school	195	21.3
High school graduate	270	29.5
Some college	248	27.1
College graduate	195	21.3
Missing	6	0.7
AIDS diagnosis		
Yes	463	50.7
No	440	48.1
Missing	11	1.2
Drug use < 3 months		
Marijuana	205	22.4
Crack	139	15.2
Cocaine	133	14.6
Heroin	64	7.0
Mehtamphetamine	21	2.3
LSD	8	0.9

	n	*%*
Ecstasy/MDMA	7	0.8
GHB	6	0.7
Ketamine	6	0.7
Any Illegal drug use < 3 months[a]		
Yes	314	34.4
No	546	59.7
Missing	54	5.9
Major depressive symptoms (within last seven days)		
Yes, CES-D total ≥ 23	357	39.1
No, CES-D total < 23	550	60.2
Missing	7	0.8

[a]Includes methamphetamine, cocaine, crack, heroin, ecstasy/MDMA, GHB, ketamine, LSD, or marijuana

Table 2

Bivariate associations with major depressive symptomology among older adults living with HIV (N = 914)

	n CES-D ≥ 23	% CES-D ≥ 23	χ²	df	p
Sexual identity					
Heterosexual	233	40.7	4.78	1	0.03
Gay, lesbian, bisexual	92	33.0			
Gender[a]					
Male	250	39.2	0.02	1	0.88
Female	101	38.7			
Previous AIDS diagnosis					
Yes	176	38.3	0.06	1	0.81
No	171	39.1			
Race and ethnicity					
White	46	40.0	10.58	3	0.01
African American	156	34.5			
Latino/a	137	46.3			
Other	13	36.1			
Recent illegal drug use[b]					
Yes	133	40.3	2.96	1	0.09
No	181	34.5			

	Group 1, CES-D < 23	Group 2, CES-D ≥ 23	t	df	p
	M (SD)	M (SD)			
Continuous measures					
Age	56.0 (4.98)	54.7 (4.54)	3.93	900	<.001
UCLA Loneliness Scale	40.1 (9.74)	49.8 (8.94)	−15.1	895	<.001
CD-4 count (square root transformed)	20.8 (6.49)	20.4 (6.45)	0.94	803	0.3473
Berger Stigma Scale	82.9 (20.2)	98.4 (22.6)	−10.7	895	<.001
Medical Outcomes Scale - HIV					
Physical function	68.0 (24.8)	56.6 (26.4)	6.61	903	<.001
Social function	77.9 (28.4)	61.6 (29.4)	8.17	874	<.001

	n CES-D ≥ 23	% CES-D ≥ 23	χ^2	df	p
Cognitive function	76.4 (21.3)	56.7 (21.9)	13.4	904	< .001
Pain	69.2 (25.0)	55.0 (25.7)	8.16	888	< .001
Energy/Fatigue	62.9 (17.6)	46.7 (17.6)	13.5	904	< .001

[a] Due to low cell counts transgender individuals (n = 10) were excluded from this test

[b] Includes methamphetamine, cocaine, crack, heroin, ecstasy/MDMA, GHB, ketamine, LSD, or marijuana

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Table 3

Correlation matrix of independent variables among older adults living with HIV (N = 914)

	Female	GLB	Age	White	Latino	Physical Function	Social Function	Cognitive Function	Pain	Energy/Fatigue	Stigma	Loneliness	CD-4	AIDS Diagnosis
Female, 1 = yes	1.00	-0.24 ***	-0.04	-0.16 ***	0.02	-0.05	-0.01	-0.02	-0.01	0.03	-0.08 *	-0.14 ***	0.17 **	-0.10 **
Gay, lesbian, or bisexual, 1 = yes		1.00	0.06	0.37 ***	-0.01	0.15 ***	0.06	0.12 ***	0.00	-0.03	-0.11 **	0.01	-0.06	0.13 ***
Age			1.00	0.10 **	-0.07 *	-0.05	0.02	0.08 *	0.11 **	0.03	-0.06	-0.03	-0.02	-0.03
White, 1 = yes				1.00	-0.28 ***	0.09 *	0.07	0.04	-0.06	-0.12 **	0.01	0.08 *	-0.02	0.12 ***
Latino, 1 = yes					1.00	-0.06	-0.03	-0.13 ***	-0.05	-0.05	0.06	0.06	-0.07	0.04
MOS-HIV Physical function						1.00	0.33 ***	0.23 ***	0.41 ***	0.40 ***	-0.09 *	-0.15 ***	0.00	-0.03
MOS-HIV Social function							1.00	0.32 ***	0.29 ***	0.32 ***	-0.23 ***	-0.22 ***	-0.01	-0.01
MOS-HIV Cognitive function								1.00	0.22 ***	0.37 ***	-0.27 ***	-0.31 ***	0.03	0.01
MOS-HIV Pain									1.00	0.52 ***	-0.23 ***	-0.25 ***	0.04	-0.13 ***
MOS-HIV Energy/Fatigue										1.00	-0.29 ***	-0.41 ***	0.08 *	-0.10 *
Berger Stigma scale total score											1.00	0.55 ***	0.00	-0.01
UCLA Loneliness scale total score												1.00	-0.05	0.05
CD-4 count (square root transformed)													1.00	-0.33 ***
Previous AIDS diagnosis, 1 = yes														1.00

Pearson r (2-tailed):

*
$p < .05$,

**
$p < .01$,

***
$p < .001$

Table 4

Logistic regression predicting major depressive symptomology (CES-D ≥ 23) among older adults living with HIV

	Step 1 Demographics				Step 2 Perceived Health				Step 3 Stigma and Lonliness			
	β	AOR	95% CI	Sig.	β	AOR	95% CI	Sig.	β	AOR	95% CI	Sig.
Model χ^2	26.3***				213.7***				276.8***			
df	5				10				12			
Nagelkerke R^2	0.05				0.34				0.42			
Constant	2.46	11.70		*	6.89	982		***	1.99	7.32		
Female, 1 = yes	−0.20	0.82	0.58 -- 1.16		−0.17	0.84	0.57 -- 1.24		0.05	1.06	0.70 -- 1.60	
Gay, lesbian, or bisexual, 1 = yes	−0.56	0.57	0.39 -- 0.82	**	−0.46	0.63	0.42 -- 0.97	*	−0.39	0.68	0.44 -- 1.06	
Age	−0.05	0.95	0.92 -- 0.98	**	−0.05	0.95	0.92 -- 0.99	*	−0.05	0.96	0.92 -- 0.995	*
White, 1 = yes[a]	0.65	1.92	1.17 -- 3.15	**	0.34	1.40	0.77 -- 2.55		0.23	1.25	0.68 -- 2.33	
Latino, 1 = yes[a]	0.41	1.50	1.08 -- 2.10	*	0.14	1.15	0.78 -- 1.68		0.06	1.06	0.71 -- 1.59	
MOS-HIV Physical function					0.00	1.003	0.995 -- 1.01		0.00	1.00	0.99 -- 1.01	
MOS-HIV Social function					−0.01	0.99	0.99 -- 1.001		0.00	1.00	0.99 -- 1.004	
MOS-HIV Cognitive function					−0.03	0.97	0.96 -- 0.98	***	−0.03	0.98	0.966 -- 0.98	***
MOS-HIV Pain					−0.01	0.99	0.98 -- 0.999	*	−0.01	0.99	0.99 -- 1.001	
MOS-HIV Energy/Fatigue					−0.04	0.96	0.95 -- 0.98	***	−0.03	0.97	0.96 -- 0.986	***
Berger Stigma Scale total score									0.01	1.013	1.002 -- 1.02	*
UCLA Loneliness Scale total score									0.06	1.06	1.04 -- 1.09	***

AOR: Adjusted Odds Ratio. Sig: Significance

*
$p < .05$,

**
$p < .01$,

***
$p < .001$

[a]Reference group is African Americans

Valid *n* (listwise) = 756