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IMPACTS OF HIV STIGMA ON PSYCHOSOCIAL WELL-BEING AND SUBSTANCE USE BEHAVIORS AMONG PEOPLE LIVING WITH HIV/AIDS IN CHINA: ACROSS THE LIFE SPAN

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Abstract

To date, existing studies have indicated that stigma against people living with HIV/AIDS (PLWHA) negatively affects their psychosocial well-being, and the impact may differ by age. In the current study, we aim to assess the impact of various types of stigma on PLWHA's psychological status and concomitant substance use. We explored different types of HIV stigma with psychosocial well-being and substance use employing mixed effect models among 2,987 Chinese PLWHA. Multivariate analyses revealed that each type of HIV stigma is positively associated with psychosocial distress, but negatively related to resilience and self-esteem across all age groups of PLWHA, with enacted stigma showing the strongest impact. Stigmatized PLWHA are more likely to smoke and use drugs, especially among the < 35 and 35–49-year-old groups. Age-specific interventions should be implemented to enhance PLWHA's stigma coping skill for improving their psychological health and reducing substance use in China and worldwide.

The advent and scale-up of antiretroviral therapy (ART) in the past two decades has significantly reduced HIV-related mortality and prolonged the life expectancy among people living with HIV/AIDS (PLWHA). Between 2001 and 2016, the total number of PLWHA has increased from 28.6 million to 37 million, with 4.2 million aged 50 years or older (Mahy,

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Autenrieth, Stanecki, & Wynd, 2014; World Health Organization, 2015). AIDS has become a manageable chronic disease. In the meantime, many comorbidities and high-risk behaviors are prominent among PLWHA at different age-groups, including HIV/AIDS imposed psychosocial comorbidities (e.g., depression, anxiety, isolation, and suicidal ideation) and concomitant substance use (Lin, Wu, & Li, 2013; H. Liu, He, Levy, Xu, & Zang, 2014; Vance, 2013). Studies suggested that PLWHA's psychosocial distress and behaviors of substance use may be associated with encountered stigmatized experience in their life context (C. Zhang et al., 2016).

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To date, three types of HIV related stigma have been identified (Berger, Ferrans, & Lashley, 2001). Perceived stigma refers to awareness of discriminatory and prejudicial attitudes from uninfected people (Phillips, Moneyham, & Tavakoli, 2011). PLWHA experiencing perceived stigma are more likely to report depression (Wolitski, Pals, Kidder, Courtenay-Quirk, & Holtgrave, 2009) and lower satisfaction with life (Greeff et al., 2010). Internalized stigma is the degree to which people endorse a negative belief toward themselves after incorporating negative views from others (Phillips et al., 2011). PLWHA with internalized stigma reported poor quality of life and prevalent depression problems (Phillips et al., 2011). Enacted stigma refers to the degree to which people believe that they have experienced others' discriminatory behaviors (Phillips et al., 2011). Existing studies have suggested an association between enacted stigma and decreased HIV voluntary disclosure (Wolitski et al., 2009) as well as delayed HIV-related care-seeking behaviors among PLWHA (Kennedy et al., 2013).

CONCEPTUAL FRAMEWORK

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Age may play a key role in the association between HIV/AIDS and psychosocial well-being because a variety of stressors, goals, and health conditions may vary across different stages of their life span (Chittleborough, Winefield, Gill, Koster, & Taylor, 2011; Richter et al., 2015). Mechanisms on how stigma affects psychosocial distress of PLWHA at different age-group may be explained by a series of biological, individual, social and cultural factors (Lin et al., 2013; H. Liu et al., 2012, 2014). Younger people are usually more sensitive to prejudice attitudes from their peers and other people with less well-adaptive coping strategies (Chittleborough et al., 2011; Geist, Grdisa, & Otley, 2003; Kokkonen, Kokkonen, & Moilanen, 2001). In addition to dealing with their infection, young PLWHA may also need to cope with stressors from physical changes, financial balance, and self-identity (Chittleborough et al., 2011; Geist et al., 2003; Kokkonen et al., 2001). Middle-aged people might bear the responsibility of taking care of their families/parents, and endure job-related pressures, which is particularly evident in Chinese settings. Thus, being HIV-infected may impose further psychological burden to their family and career obligations. For older people, in addition to dealing with burden from the HIV infection, they have to face non-AIDS related conditions as a result of physical decline of an aging body, such as multiple chronic diseases or conditions, the use of multiple medications, changes in physical and cognitive abilities, and increased vulnerability to stressors (AIDS.GOV, 2015; H. Liu et al., 2012, 2014). In China, the elderly people may have more difficulties compared to their counterparts in the western world, as most HIV-infected elderly people may lack sufficient retirement income and have low socio-economic status (H. Liu et al., 2012, 2014). Although

they may be taken care of by their adult children, the HIV-marker has been considered as a shame for the whole family and may risk them to be isolated (Zhou, 2006, 2007).

Under the individual or joint effects of the HIV stigma and age-specific burdens, PLWHA may suffer psychosocial distress (e.g., anxiety, depression). Meanwhile, protective buffers, such as resilience, self-efficacy, social support, and appropriate coping strategies, may help PLWHA to adapt to any encountered difficulties (L. Liu et al., 2013; Sherbourne et al., 2000). As a consequence of psychosocial distress and protective buffers, PLWHA may use substance (e.g., drugs, alcohol, and tobacco) as a coping strategy (Cosci, Pistelli, Lazzarini, & Carrozzi, 2011). Meanwhile, the use of substances may work backward to aggregate PLWHA's problems of psychosocial distress.

RESEARCH QUESTIONS

Although a more nuanced understanding of mechanisms between HIV stigma and psychosocial well-being among PLWHA at different age groups is the key to guide future interventions, no studies have specifically examined the age-specific associations to date. Therefore, by conducting the current study, we would examine age-specific associations between different types of HIV stigma and psychosocial well-being as well as behaviors of substance use among a group of PLWHA recruited from Chinese settings. Our hypotheses are that HIV stigma is positively associated with psychological distress and problems of substance use among PLWHA, and such impacts may differ by age groups.

METHODS

SETTINGS AND STUDY DESIGN

The current study was conducted in Guangxi Zhuang Autonomous Region (Guangxi) from 2012 to 2013 in China. With the collaboration of Guangxi Center for Disease Control and Prevention (Guangxi CDC), we selected 12 sites including two cities and ten counties with the highest number of cumulative HIV incidence in Guangxi. Based on the global literature and findings from our pilot study, we developed a structured questionnaire to collect information including demographics, stigmatized experience, psychosocial distress and history of substance use among participants.

PARTICIPANTS

Our eligibility criteria included participants who were at least 18 years of age, diagnosed as HIV-positive from local health care facilities, and willing and able to provide written informed consent. A total of 29,606 HIV/AIDS cases were identified from the selected 12 sites. Based upon the pre-established sampling scheme, we randomly selected approximately 10% of cases from the sampling pool (stratified by cities vs. counties) and finally recruited 3,002 HIV patients in the study, with about 10% refusal rate. Among the 3,002 patients, 2,987 (99.5%) of them completed the cross-sectional survey and were included in the current analysis. Specifically about 80% of the included participants completed the questionnaire assisted by the well-trained local CDC staff and health care workers. The rest of the participants completed the questionnaire on their own.

MEASUREMENTS

Demographic information included participants' gender, years of age, years of school, ethnicity, religious beliefs, marital status, residence registration, residence of the current place. In order to assess age-specific effects among PLWHA, we further divided participants into three age groups (e.g., younger group: 18–34; middle-aged group: 35–49; and older group: 50 and older) based upon established categories (Conover et al., 2009; Grierson, Koelmeyer, Smith, & Pitts, 2011).

HIV stigma including perceived, internalized, and enacted stigma, was measured by the validated Berger HIV Stigma Scale (Berger et al., 2001; Qiao et al., 2015; C. Zhang et al., 2016). Each stigma item was measured by a Likert-type scale (e.g., strongly disagree, disagree, agree, strongly agree) with a higher values indicating a greater agreement with the statement. A total of 16 items were included in the scale with an overall Cronbach's α of 0.927 in the current study. Three subsets of the scale included Perceived stigma ($\alpha=0.91$), Internalized stigma ($\alpha=0.92$), and Enacted stigma ($\alpha=0.63$). For the purpose of data analysis, we divided the total stigma score by its quartiles in order to assess if there were any trends of psychosocial status changed with the increased stigma scores.

Indicators of psychosocial well-being included validated measures for psychosocial distress (e.g., anxiety [Zung Self-Rating Anxiety Scale with 20 items; $\alpha=0.91$] and depression [short version of the Center for Epidemiological Studies Depression Scale; $\alpha=0.76$]) and protective buffers (e.g., resilience [Connor-Davidson Resilience Scale with 10 items; $\alpha=0.96$], self-esteem [$\alpha=0.94$], social support [Multidimensional Scale of Perceived Social Support and Medical Outcomes Study Social Support Survey with 28 items; $\alpha=0.98$], and coping strategies [Family Coping Project Coping Scale with 25 items; $\alpha=0.93$]). Substance use behaviors were measured by questions asking if participants ever had used tobacco, drugs (e.g., ecstasy, methamphetamine and ketamine) or alcohol in the past 6 months (yes vs. no).

ANALYTICAL PLAN

First, we compared the demographic characteristics, psychosocial well-being indicators and substance use behaviors using ANOVA (for continuous variables) and chi-square tests (for categorical variables) among PLWHA at different age groups. Second, we assessed the psychosocial well-being indicators and substance use by quartiles of the HIV stigma score using bivariate analyses (e.g., ANOVA and chi-square tests) and trend-tests, "*nptrend*" in STATA, it performs a non-parametric test of trend for the ranks of across-ordered groups (Cuzick, 1985). Third, we explored how different types of HIV stigma impacted psychosocial well-being and substance use behaviors using mixed effect models to account for intra-class correlations (ICC) while adjusting for association-specific confounders based on directed acyclic graphs (DAG) analyses and a priori knowledge that showed in the conceptual framework (Rothman, Greenland, & Lash, 2008). In addition, age-stratified analyses were conducted. All data analyses were conducted using Stata 12.0 (StataCorp LP, College Station, TX).

RESULTS

DEMOGRAPHICS, PSYCHOSOCIAL WELL-BEING, AND SUBSTANCE USE BY AGE GROUPS

In the current sample, majority of participants were of Han-ethnicity (70.8%), married (66.5%), without a religious belief (92.2%), having rural residence registration (84.4%), living in rural areas (80.2%), working as peasants (58.5%), having an average of seven years of schooling ($SD = 3.0$), and having monthly income less than 1,000 yuan (53.2%; one USD = 6 yuan at the time of survey). When examining by different age groups (Table 1), we found older PLWHA were more likely to have a religious belief, live in rural areas, work as peasants, get married and have less years of education with significant differences ($p < .05$).

There were significant differences by age group for most indicators of psychosocial well-being and substance use behaviors. Specifically, PLWHA at the middle-aged group had highest depression and anxiety problems; while younger people had higher self-esteem and social support but higher prevalence of drug and alcohol use behaviors compared to their older counterparts ($p < 0.05$). Older PLWHA had the lowest scores for resilience, coping strategy, self-esteem, and social support. Meanwhile, PLWHA at the middle-aged group had highest prevalence of smoking and drug use behaviors, with the highest perceived and internalized HIV stigma compared to other age groups ($p < .05$; Table 2).

PLWHA experiencing higher stigma reported worse psychosocial distress and higher prevalence of substance use behaviors across different age groups. Specifically, among younger PLWHA, significantly increasing trends of higher prevalence of smoking and drug use were observed. On the contrary, a significantly decreasing trend of alcohol use across the quartile of the HIV stigma score was observed among the younger PLWHA, but not among the middle-aged and older PLWHA (Table 3).

AGE-SPECIFIC IMPACTS OF HIV STIGMA

Mixed effect models revealed that each type of HIV stigma is positively associated with psychosocial distress (e.g., depression and anxiety), but negatively related to protective buffers (e.g., resilience and self-esteem) of PLWHA across all age groups with enacted stigma having the strongest impact. HIV stigma had the strongest impact for older PLWHA's psychosocial distress. For instance, enacted stigma was significantly associated with increased anxiety among younger ($\beta = 2.72$, 95% CI [1.71, 3.73]), middle-aged ($\beta = 3.60$, 95% CI [2.72, 4.48]), and older PLWHA ($\beta = 5.57$, 95% CI [4.08, 7.05]), but with decreased resilience among younger ($\beta = -0.16$, 95% CI [-0.22, -0.09]), middle-aged ($\beta = -0.13$, 95% CI [-0.24, -0.01]), and older PLWHA ($\beta = -0.25$, 95% CI [-0.39, -0.01]) at different magnitudes but towards the same direction.

Stigma is positively associated with smoking and drug use behaviors, especially among the younger and middle-aged groups. Specifically, younger people reporting higher enacted stigma were 1.84 times more likely to smoke compared to their peers (aOR = 1.84, 95% CI [1.21, 2.81]). Among middle-aged PLWHA, higher perceived stigma was positively significantly associated with drug use behaviors (aOR = 1.07, 95% CI [1.01, 1.13]). However, higher perceived (aOR = 0.94, 95% CI [0.90, 0.98]) and internalized stigma (aOR

= 0.93, 95% CI [0.90, 0.97]) was slightly negatively associated with alcohol use among younger people (Table 4). While accounting for the ICC using mixed effect models, ICCs were pretty low (< 0.2) across all models (data not present).

DISCUSSION

Our findings have supported our hypotheses that stigma was positively associated with psychological distress and substance use among PLWHA, and the impacts differed by ages. Our data revealed that each type of HIV stigma was positively associated with psychosocial distress, but negatively related to resilience and self-esteem across all age groups of PLWHA, with enacted stigma showing the strongest impact.

Compared to a previous study in Guangxi (H. Liu et al., 2014), which suggested higher prevalence of depression among older PLWHA, we found middle-aged PLWHA had the highest psychosocial distress including both depression and anxiety. It is likely that middle-aged PLWHA had to fulfill more social responsibilities in addition to their HIV infection than their younger or older counterparts in the current sample. Compared to PLWHA in Yunnan province, the prevalence of tobacco and alcohol use in the current study was relatively lower (62% vs. 52% for current smokers; 62% vs. 43% for current drinkers; Luo et al., 2013, 2014). Furthermore, the prevalence of smoking and alcohol use was relatively high among the younger age group. Perhaps younger PLWHA were more likely to use substances due to their maladaptive coping strategy compared to their older peers.

The prevalence of drug use among older PLWHA in the current sample was much less than their western counterparts (2.1% vs. 24.1%; Siconolfi et al., 2013). In addition, the prevalence of drug use behaviors among older groups (2.1%) was much lower compared to middle-aged (27.6%) and younger age groups (21.9%) in the current sample. It can be explained that older people might be unfamiliar with or more conservative to use these illicit drugs that were recently introduced to China than their younger counterparts (Yang & Xia, 2010). It is also likely that as these older PLWHA lived in rural areas working as low-income peasants, they might be more financially constrained than their younger peers in China (H. Liu et al., 2012; Xing et al., 2014; Y. Zhang, Fuller-Thomson, Anne Mitchell, & Zhang, 2013; Y. J. Zhang et al., 2015).

Our study revealed three types of stigma associated with increased likelihood of being psychosocially distressed (e.g., depression and anxiety) and decreased likelihood of being protectively buffered (e.g., resilience, self-esteem) across all age groups. Of particular note, the enacted stigma proves to have the strongest negative impact on the anxiety and depression with the highest magnitudes among PLWHA across all age groups. In China, PLWHA are usually considered as “social evil” (Wu et al., 2008; C. Zhang et al., 2016). The discriminatory experience encountered by PLWHA in their daily life may further weaken their protective buffers but worsen their psychosocial distress (H. Liu et al., 2006; Sullivan et al., 2010). Future interventions should target different PLWHA and accommodate their personal, social, and cultural needs to enhance their stigma coping skills for the improvement of their psychological well-beings.

Previous studies have indicated a possible correlation between increased stigma-imposed stressful experience and the decreased likelihood of substance use abstinence among younger PLWHA (Cosci et al., 2011). In the current study, we found both perceived and internalized stigma was associated with lower odds of alcohol use among young PLWHA. Alcohol use commonly happens during social occasions in China (Y. Liu et al., 2014; C. Zhang et al., 2012, 2014). It is likely that in the context of conservative and sensitive cultural value in Chinese settings, younger PLWHA might isolate themselves from social interactions due to their HIV positivity to avoid stigmatized experience, which partially contributed to their lower odds of alcohol use. For older PLWHA, they were the group with the least protective buffers including social support, resilience, and self-esteem. Older PLWHA may face layered stigma that come from both aging and HIV (AIDS.GOV, 2015; Vance, 2013). Although taking care of elderly parents is the norm of filial duty in China, many elderly PLWHA are abandoned as being HIV-positive is labelled as a shame for the whole family (Zhou, 2007). Evidence suggests that enhanced resilience and decreased depression are both positively associated with healthy aging (Jeste et al., 2013). Thus there is an urgent need to intervene among the older PLWHA in China for the improvement of their psychological well-being and the healthy aging, especially when this group is ever-growing with the advent and scale-up of ART regime for prolonged life expectancy among PLWHA.

To the best of our knowledge, the current study is the first study to examine the impacts of various types of stigma on PLWHA's psychosocial well-being and behaviors of substance use by different age groups in China. Our study is also merited by a large sample size, various venues of recruitments and the rigorous statistical models. There are also limitations to this study. First, we cannot conclude any causality when interpreting our findings as a result of the cross-sectional study design. Second, as the current study was conducted in Guangxi, a southwest region with many minorities, our findings might not be generalizable to other settings. Third, as a secondary data analyses, we were limited in assessing the detailed quantity or frequency regarding substance use behaviors. Fourth, data collection was based on self-report and was subjected to potential recall and misclassification biases for key variables.

HIV/AIDS has become a manageable chronic condition in the era of ART and expanding coverage of HIV care. Nonetheless PLWHA may sustain accumulating stigma-induced psychosocial distress and harm from concomitant substance use in a variety of social and cultural contexts across different stages of their lifespans (Sherbourne et al., 2000). Thus, health promotion programs should incorporate the lifespan of PLWHA as a dynamic continuum (Ma, Xu, Lin, Ju, & Lv, 2015). Our findings suggest age-sensitive strategies targeting different types of HIV stigma for PLWHA's comorbid mental health conditions should be incorporated into the existing health care system for PLWHA in China: for younger people, periodical drug-quitting counselling services should be implemented; for middle-aged people, psychological counselling for mental distress and adaptive coping strategy should be included; for older people, family and community-level social support as well as establishments of government-sponsored nursing homes might be helpful (Y. Zhang et al., 2013).

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TABLE 1

Demographic Information Among PLWHA by Their Age Groups ($N = 2,987$)

Demographics	Overall	Age groups		
		Younger: 18–34	Middle-aged: 35–49	Older: >50
Ethnicity (%)				
Han	70.76	68.04	70.54	74.34*
Zhuang	25.88	27.39	26.42	23.16
Others	3.36	4.57	3.04	2.5
Religious (%)				
No	92.24	93.61	93.17	89.01**
Yes	7.76	6.39	6.83	10.99
Hukou (residence registration; %)				
Urban	15.56	14.60	16.54	14.98
Rural	84.44	85.40	83.46	85.02
Residence of living (%)				
Urban	19.80	22.77	20.35	15.37**
Rural	80.20	77.23	79.65	84.63
Job category (%)				
Peasant workers	58.51	49.22	57.73	70.83****
Services	4.63	8.24	4.39	0.79
Self-employed	11.48	16.37	12.65	3.68
Unemployed	13.56	15.92	15.00	8.28
Others	11.82	10.24	10.23	16.43
Marital status (%)				
Married	66.45	63.190	67.860	67.88*
Not married	33.55	36.810	32.140	32.12
Monthly income (yuan; %)				
< 999	53.22	50.73	54.40	54.12
1000–1999	29.32	29.63	29.92	27.93
2000–2999	11.32	13.13	10.25	11.04
>= 3000	6.14	6.51	5.43	6.91
Years of school (mean [<i>SD</i>])	6.97 (3.00) [0–18]	7.80 (2.64)	6.98 (2.84)	5.97 (3.31)****

Note.

* $p < .05$.** $p < .01$.**** $p < .0001$.

TABLE 2

Psychosocial Well-Being and Substance Use Among PLWHA by Age Groups ($N=2,987$)

	Younger: 18–34	Middle-aged: 35–49	Older: > 50	Overall
Psychosocial Well-Being^a				
Depression (mean [<i>SD</i>])	7.78 (4.75)	8.13 (5.07)	7.15 (4.71)	7.78 (4.90) ***
Anxiety	31.14 (8.60)	31.54 (9.06)	30.16 (8.73)	31.07 (8.85) **
Resilience	3.22 (0.84)	3.23 (0.85)	3.10 (0.83)	3.19 (0.84) **
Coping	2.55 (0.65)	2.56 (0.66)	2.46 (0.62)	2.53 (0.65) **
Self-esteem	3.38 (0.73)	3.32 (0.72)	3.24 (0.70)	3.32 (0.72) ***
Social Support	2.48 (0.89)	2.40 (0.86)	2.36 (0.76)	2.42 (0.85) *
Substance Use				
Smoking (%)	47.09	56.89	47.63	51.57 ****
Drug use (%)	21.90	27.59	2.11	19.35 ****
Alcohol drinking (%)	45.42	42.55	39.97	42.76
Stigma^b				
Perceived	15.48 (3.60)	15.76 (3.43)	15.22 (3.61)	15.54 (3.53) **
Internalized	18.48 (4.41)	18.82 (4.32)	17.97 (4.29)	18.50 (4.35) ***
Enacted	2.11 (0.48)	2.01 (0.49)	2.06 (0.37)	2.09 (0.46)

Note.

^aDepression: short version of the Center for Epidemiological Studies Depression Scale; Anxiety: Zung Self-Rating Anxiety Scale; Resilience: Connor-Davidson Resilience Scale; Self-esteem: tailored HIV self-efficacy scale; Coping: Family Coping Project Coping Scale; and Social support: Multidimensional Scale of Perceived Social Support and Medical Outcomes Study Social Support Survey.

^bBerger HIV Stigma Scale.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

**** $p < .0001$.

TABLE 3
 Psychosocial Well-Being and Substance Use by Stigma Quantile Among PLWHA at Different Age-Groups

	HIV Stigma ^a					<i>p</i> for trend
	Overall	Quartile 1	Quartile 2	Quartile 3	Quartile 4	
Overall (N = 2,987)						
Psychosocial Well-Being ^b (mean [SD])						
Depression	7.78 (4.89)	6.56 (4.38)	7.09 (3.80)	7.41 (4.34)	9.54 (5.88)	.000
Anxiety	31.08 (8.87)	29.50 (7.92)	28.70 (7.22)	29.90 (7.48)	35.11 (10.35)	.000
Resilience	3.19 (0.84)	3.44 (0.92)	3.38 (0.81)	3.12 (0.72)	2.93 (0.82)	.000
Coping	2.53 (0.65)	2.48 (0.69)	2.46 (0.59)	2.49 (0.59)	2.66 (0.69)	.000
Self-esteem	3.31 (0.72)	3.50 (0.83)	3.38 (0.67)	3.27 (0.62)	3.16 (0.72)	.000
Social support	2.42 (0.85)	2.58 (0.93)	2.45 (0.79)	2.37 (0.77)	2.32 (0.87)	.000
Substance Use (N = 2,987; %)						
Smoking	51.53	51.6	44.1	54.53	54.51	.014
Drug use	19.31	14.22	14.86	21.99	24.12	.000
Alcohol drinking	42.84	47.25	40.45	44.5	39.93	.027
Younger (n = 898)						
Psychosocial Well-Being ^b (mean [SD])						
Depression	7.78 (4.75)	6.72 (4.40)	6.96 (3.79)	7.33 (4.14)	9.45 (5.53)	.0000
Anxiety	31.14 (8.60)	29.64 (8.21)	28.64 (6.73)	29.56 (6.68)	35.16 (9.90)	.0000
Resilience	3.22 (0.84)	3.52 (0.90)	3.44 (0.78)	3.11 (0.71)	2.94 (0.80)	.0000
Coping	2.55 (0.65)	2.48 (0.64)	2.48 (0.59)	2.47 (0.59)	2.70 (0.71)	.002
Self-esteem	3.38 (0.73)	3.59 (0.81)	3.50 (0.62)	3.29 (0.68)	3.21 (0.72)	.0000
Social support	2.48 (0.89)	2.67 (0.97)	2.58 (0.86)	2.41 (0.82)	2.35 (0.87)	.0002
Substance Use (%)						
Smoking	47.09	44.71	37.22	49.78	53.05	.010
Drug use	21.90	14.90	16.11	24.12	29.03	.000
Alcohol drinking	45.42	56.25	43.33	43.67	40.14	.001
Middle-aged (n = 1,319)						
Psychosocial Well-Being ^b (mean [SD])						
Depression	8.13 (5.07)	6.94 (4.39)	7.41 (4.01)	7.57 (4.47)	9.83 (6.03)	.0000

HIV Stigma ^a							
	Overall	Quartile 1	Quartile 2	Quartile 3	Quartile 4	<i>p</i> for comparison	<i>p</i> for trend
Anxiety	31.54 (9.06)	29.77 (7.88)	29.18 (7.48)	30.35 (7.96)	35.18 (10.37)	.0000	.0000
Resilience	3.23 (0.85)	3.48 (0.91)	3.46 (0.81)	3.14 (0.76)	2.98 (0.83)	.0000	.0000
Coping	2.56 (0.66)	2.47 (0.72)	2.50 (0.59)	2.52 (0.61)	2.70 (0.68)	.0000	.0000
Self-esteem	3.32 (0.72)	3.52 (0.83)	3.38 (0.70)	3.30 (0.61)	3.16 (0.71)	.0000	.0000
Social support	2.40 (0.86)	2.54 (0.95)	2.41 (0.79)	2.37 (0.79)	2.34 (0.91)	.0314	.005
Substance Use (%)							
Smoking	56.86	55.68	50.36	60.67	58.61	.058	.118
Drug use	27.54	21.29	25.09	30.90	30.17	.024	.005
Alcohol drinking	42.51	41.67	43.07	45.51	40.14	.497	.725
Older (n = 760)							
Psychosocial Well-Being ^b (mean [SD])							
Depression	7.15 (4.71)	5.81 (4.30)	6.72 (3.48)	7.20 (4.37)	8.97 (6.00)	.0000	.0000
Anxiety	30.16 (8.73)	28.78 (7.48)	27.99 (6.99)	29.46 (7.48)	34.88 (11.01)	.0000	.0000
Resilience	3.10 (0.83)	3.28 (0.96)	3.24 (0.80)	3.07 (0.64)	2.79 (0.80)	.0000	.0000
Coping	2.46 (0.62)	2.49 (0.70)	2.40 (0.58)	2.47 (0.52)	2.47 (0.67)	.4187	.475
Self-esteem	3.24 (0.70)	3.38 (0.83)	3.29 (0.66)	3.20 (0.54)	3.07 (0.73)	.0002	.000
Social support	2.36 (0.76)	2.52 (0.85)	2.40 (0.73)	2.31 (0.69)	2.21 (0.74)	.0009	.0000
Substance Use (%)							
Smoking	47.56	53.07	41.98	48.94	47.19	.173	.568
Drug use	2.11	2.79	0.94	2.66	2.23	.554	.953
Alcohol drinking	39.89	43.82	34.27	43.32	39.11	.178	.817

Note.

^aBerger HIV Stigma Scale.

^bDepression: short version of the Center for Epidemiological Studies Depression Scale; Anxiety: Zung Self-Rating Anxiety Scale; Resilience: Connor-Davidson Resilience Scale; Self-esteem: tailored HIV self-efficacy scale; Coping: Family Coping Project Coping Scale; and Social support: Multidimensional Scale of Perceived Social Support and Medical Outcomes Study Social Support Survey.

TABLE 4

Associations Between Different Types of Stigma and Psychosocial Well-Being as Well as Substance Use ($N = 2,987$)

Stigma	Psychosocial Well-being				
	Overall	Younger: 18–34	Middle-aged: 35–49	Older: > 50	
	Adjusted β (95% CI)	Adjusted β (95% CI)	Adjusted β (95% CI)	Adjusted β (95% CI)	Adjusted β (95% CI)
Anxiety ^a	Enacted	3.68 (3.07, 4.28) ****	2.72 (1.71, 3.73) ****	3.60 (2.72, 4.48) ****	5.57 (4.08, 7.05) ****
	Perceived	0.19 (0.11, 0.27) ****	0.18 (0.04, 0.32) *	0.15 (0.02, 0.28) *	0.24 (0.08, 0.41) **
	Internalized	0.56 (0.49, 0.62) ****	0.52 (0.41, 0.63) ****	0.53 (0.43, 0.64) ****	0.62 (0.49, 0.76) ****
Depression ^b	Enacted	1.59 (1.24, 1.95) ****	1.23 (0.62, 1.85) ****	1.74 (1.23, 2.26) ****	2.01 (1.17, 2.85) ****
	Perceived	0.17 (0.12, 0.21) ****	0.11 (0.03, 0.20) **	0.15 (0.07, 0.22) ****	0.26 (0.17, 0.35) ****
	Internalized	0.27 (0.24, 0.31) ****	0.23 (0.17, 0.30) ****	0.29 (0.23, 0.35) ****	0.31 (0.24, 0.39) ****
Resilience ^c	Enacted	-0.16 (-0.22, -0.09) ****	-0.13 (-0.24, -0.01) *	-0.14 (-0.23, -0.05) **	-0.25 (-0.39, -0.10) **
	Perceived	-0.02 (-0.03, -0.02) ****	-0.03 (-0.05, -0.02) ****	-0.02 (-0.03, -0.004) *	-0.03 (-0.04, -0.01) **
	Internalized	-0.04 (-0.05, -0.04) ****	-0.05 (-0.06, -0.03) ****	-0.04 (-0.05, -0.03) ****	-0.04 (-0.06, -0.03) ****
Self-Esteem ^d	Enacted	-0.18 (-0.24, -0.13) ****	-0.20 (-0.29, -0.10) ****	-0.13 (-0.20, -0.05) **	-0.34 (-0.46, -0.22) ****
	Perceived	-0.03 (-0.03, -0.02) ****	-0.02 (-0.04, -0.01) ****	-0.03 (-0.04, -0.02) ****	-0.03 (-0.04, -0.01) ****
	Internalized	-0.03 (-0.03, -0.02) ****	-0.03 (-0.04, -0.02) ****	-0.03 (-0.04, -0.02) ****	-0.03 (-0.04, -0.01) ****
Coping ^e	Enacted	0.01 (-0.04, 0.06)	0.04 (-0.05, 0.12)	0.001 (-0.07, 0.07)	-0.01 (-0.12, 0.11)
	Perceived	0.01 (0.01, 0.02) ****	0.01 (0.00, 0.02)	0.02 (0.01, 0.03) ****	0.001 (-0.01, 0.01)
	Internalized	0.01 (0.01, 0.02) ****	0.02 (0.01, 0.03) ****	0.02 (0.01, 0.03) ****	0.005 (-0.02, 0.01)
Social Support ^f	Enacted	-0.11 (-0.18, -0.05) **	-0.15 (-0.27, -0.03) *	-0.09 (-0.18, 0.01)	-0.10 (-0.25, 0.04)
	Perceived	-0.02 (-0.03, -0.01) ****	-0.02 (-0.04, 0.00) *	-0.01 (-0.03, 0.00)	-0.02 (-0.04, -0.01) **
	Internalized	-0.02 (-0.03, -0.02) ****	-0.03 (-0.04, -0.02) ****	-0.02 (-0.03, -0.01) **	-0.03 (-0.04, -0.01) ****
Substance Use					
Stigma	Overall	Younger: 18–34	Middle-aged: 35–49	Older: >50	
	^a OR (95% CI)	^a OR (95% CI)	^a OR (95% CI)	^a OR (95% CI)	
Smoking ^g	Enacted	1.37 (1.05, 1.78) *	1.84 (1.21, 2.81) **	1.08 (0.76, 1.53)	1.28 (0.71, 2.30)
	Perceived	0.99 (0.96, 1.02)	0.97 (0.91, 1.04)	0.99 (0.94, 1.04)	0.99 (0.94, 1.05)

		Psychosocial Well-being			
Drug ^h	Internalized	1.00 (0.97, 1.02)	1.00 (0.95, 1.05)	0.97 (0.94, 1.01)	1.01 (0.96, 1.06)
	Enacted	1.25 (1.00, 1.56)	1.53 (1.00, 2.34)	1.11 (0.83, 1.49)	0.05 (0.00, 31187.78)
	Perceived	1.05 (1.01, 1.09)**	1.02 (0.96, 1.09)	1.07 (1.01, 1.13)**	0.96 (0.82, 1.12)
Alcohol ⁱ	Internalized	1.01 (0.98, 1.04)	1.01 (0.96, 1.06)	1.00 (0.96, 1.04)	0.92 (0.80, 1.05)
	Enacted	0.94 (0.78, 1.12)	1.04 (0.73, 1.46)	1.02 (0.79, 1.30)	0.70 (0.43, 1.14)
	Perceived	0.97 (0.94, 0.99)*	0.94 (0.90, 0.98)**	0.98 (0.94, 1.02)	1.00 (0.95, 1.05)
	Internalized	0.97 (0.95, 0.99)**	0.93 (0.90, 0.97)***	0.98 (0.95, 1.01)	0.99 (0.95, 1.03)

Note.

Models ^{a-f}: adjusted for demographics, substance use and physical fitness;

Models ^{g-i}: adjusted for demographics and physical fitness. All models

* **p** < .05.

** **p** < .01.

*** **p** < .001.

**** **p** < .0001.