

Differences in internalized HIV stigma across subpopulations of people living with HIV in care across the US

Running Head: Subgroup differences in internalized HIV stigma

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Abstract

Background. Few studies have examined which subgroups of people with HIV (PWH) carry the greatest burden of internalized HIV stigma (IHS), which may be important to care provision and interventions.

Methods. PWH in the CFAR Network of Integrated Clinical Systems (CNICS) longitudinal, US-based, multisite, clinical care cohort completed tablet-based assessments during clinic visits including a 4-item, Likert scale (low 1-5 high), IHS instrument. Associations between sociodemographic characteristics and IHS scores were assessed in adjusted linear regression models.

Results. 12,656 PWH completed the IHS assessment at least once from February 2016 to November 2022, providing 28,559 IHS assessments. At baseline IHS assessment, the mean age was 49 years, 41% reported White, 38% Black/African American, and 16% Latine race/ethnicity, and 80% were cisgender men. The mean IHS score was 2.04, with all subgroups represented among those endorsing IHS. In regression analyses, younger PWH and those in care fewer years had higher IHS scores. In addition, cisgender women vs. cisgender men, PWH residing in the West vs. the Southeast, and those with sexual identities other than gay/lesbian had higher IHS scores. Compared with White-identifying PWH, those who identified with Black/African American or Latine race/ethnicity had lower IHS scores. Age stratification revealed patterns related to age category, including specific age-related differences by gender, geographic region and race/ethnicity.

Discussion. IHS is prevalent among PWH, with differential burden by subgroups of PWH. These findings highlight the benefits of routine screening for IHS and suggest the need for targeting/tailoring interventions to reduce IHS among PWH.

Keywords: Internalized HIV stigma, burden, people living with HIV, subpopulations, age stratification

Background

The modern concept of stigma was defined by Erving Goffman as the reduction “in our minds from a whole and usual person to a tainted, discounted one”; wherein he describes both concepts of others’ beliefs vs. self-belief and hidden vs. overt attributes with respect to stigma [1]. These concepts gave rise to common classifications of stigma today including; enacted, i.e., unfair or stigmatizing treatment from others [2]; perceived, i.e., what one believes are others’ attitudes about a stigma [3], which can further translate into the fear of being stigmatized [4]; anticipated, i.e., the belief that one will be stigmatized by others [5]; and internalized, sometimes referred to as “felt stigma” [2] or “self-stigma” [3], which is the belief one has about oneself with respect to a stigma [6].

A growing body of literature demonstrates that all types of stigma can negatively impact health outcomes across a range of health measures [7, 8], including HIV-related stigma and health outcomes, such as depression, unsuppressed HIV viral load, continuity of care, and others [9, 10]. The processes by which stigmas can impact health outcomes have been theorized to be diverse and multifactorial, including potential mediating pathways [11], and are further compounded by intersectional stigma, or belonging to more than one stigmatized group [12, 13]. Intersectional stigma is important among people with HIV (PWH) [14], and while enacted HIV and other stigmas are frequently observable, the impact on internalized HIV stigma (IHS), in particular, among subpopulations of PWH has been understudied.

Determining the burden of IHS across subpopulations of PWH can highlight differential impact of intersectional stigma, yet subpopulation differences in IHS burden have been examined in few studies. The Medical Monitoring Project (MMP), which conducts cross-sectional surveys of adults with HIV in care across the US, is one of the largest studies to assess this to date. Responses indicated that non-White men reported higher IHS scores than White men, however this was not observed in transgender individuals or women, and analyses did not control for possible confounders [15]. Additionally, participants with higher IHS scores were >50 years-old, had received HIV care for a shorter time, and were more likely to report being heterosexual or bisexual than gay/lesbian/homosexual. While the MMP sample size was large (N=13,841), participant response rates were modest (49-55%). In a sub-study (n=603) of MMP data from 2015-2016 among respondents from Florida, identifying as homosexual/gay/lesbian was associated with lower IHS as compared to heterosexual [16]. Among a sample of women with HIV (N=1256) participating in the Women's Interagency HIV Study (WIHS), IHS was lower in more racially/ethnically diverse neighborhoods, and among White women and older participants [17]. Similarly, smaller studies have found high IHS among PWH with more recent HIV diagnosis [18], those who were younger or had less education [19], those who identified as heterosexual [18], women [19, 20], and PWH who identified as Black/African American [19, 20]. While these studies provide some insight into IHS burden by subpopulation, they are limited by small sample sizes and low response rates. To fill the knowledge gap, we examined subpopulation differences in IHS in a large, diverse cohort of PWH in clinical care across the US from 2016-2022.

Methods

Population, Data, and Measures

This study was conducted in the Centers for AIDS Research (CFAR) Network of Integrated Clinical Systems (CNICS), a dynamic cohort of PWH in care across ten US sites (<https://sites.uab.edu/cnics/>). PWH are enrolled as they enter care at a participating HIV primary care clinic, with care data and biological samples collected longitudinally under an IRB approved protocol. PWH from 8 of the 10 CNICS sites that had patient reported outcomes and measures (PRO) data available at the time of analysis were included in the study.

Demographic (age, self-reported race/ethnicity) and clinical data (years in care, geographic locations) are extracted from the electronic health records at the participating sites. PRO data are collected every ~4-6 months via touchscreen tablets at the beginning of HIV care visits, and contain a number of

domains including IHS, self-reported gender (updated every two years), self-reported sexual orientation (updated annually), and other domains.

Implemented February 2016, IHS is collected annually on PROs using a validated four-item instrument [21, 22]. The instrument includes strongly-worded items focused on self-perception with respect to HIV including: “Having HIV makes me feel like a bad person”, “Having HIV is disgusting to me”, “I think less of myself because I have HIV”, and “I feel ashamed of having HIV”. Response options are based on a Likert scale with categories of 1-strongly disagree, 2-disagree, 3-neither agree nor disagree, 4-agree, and 5-strongly agree. Lower scores indicate lower IHS with higher scores indicating higher IHS. For our analyses, each time participants completed IHS, scores from all four items for that assessment were averaged, resulting in a single summary score.

Statistical Analyses

To assess differences in average IHS score by subpopulations of interest, including age groups, gender identity, racial/ethnic identity, years in HIV care, geographical location, and sexual identity, we fitted linear regression models including all subpopulations of interest in the same model, using a Huber/White sandwich estimator for single measures on participants and a cluster sandwich estimator of variance for analyses with repeated measures on participants. We repeated analyses, excluding age in order to stratify by age category to examine differences in each subpopulation by age group. All analyses were completed in STATA v. 17.0 (College Station, Texas).

Results

From February 2016–November 2022, 12,565 PWH responded to the IHS assessment at least once, with 7,800 responding twice, and 4,785 responding three or more times for a total of 28,559 responses. At first or baseline IHS assessment, the median age was 49 years (mean 47.2 years); 17.4% self-identified as cisgender and 1.7% as transgender women; 59.1% identified with a race/ethnicity other than White (38.4% Black/African American, 15.4% Latine, and 5.4% other races/ethnicities, including mixed race/ethnicity); and 50.1% indicated gay/lesbian identity (Table 1). Almost half (48.7%) had been in care >6 years. PWH came from four of the five US geographic census regions. Approximately 1/3 (30.9%) of PWH neither agreed nor disagreed with at least one of the four IHS questions at their baseline assessment and 16% agreed. PWH who agreed or neither agreed nor disagreed (47%) to any IHS question, were more similar to one another, and differed from those who disagreed/strongly disagreed by subpopulation characteristics (Table 1).

In adjusted regression models, compared to PWH who were >59 years-old, those in all younger age categories reported greater IHS with those 18–29 years experiencing the highest scores (Figure 1, tabulated in Supplemental Table 1, <http://links.lww.com/QAD/D124>). PWH who had been in care for less time reported higher IHS than those in care for >6 years. Additionally, cisgender women and PWH identifying with other genders reported higher IHS compared with cisgender men, as did those residing in the West as compared to the Southeast, and PWH identifying with heterosexual, bisexual and other sexual identities compared to gay/lesbian identifying PWH. Conversely, compared to PWH who identified with White race/ethnicity, those who identified with Black/African American or Latine

race/ethnicity reported lower IHS. Similar associations, with reduced power, were observed when analyses were restricted to participants' baseline IHS assessment only (Supplemental Figure 1, <http://links.lww.com/QAD/D124>, Supplemental Table 2, <http://links.lww.com/QAD/D124>).

Stratification by age groups revealed age-specific patterns in IHS burden. Higher mean IHS scores among cisgender women compared to cisgender men were only observed in PWH 30-59 years-old, but not in the youngest and oldest age groups (Table 2). Additionally, among PWH in the two youngest age groups, 18-29 and 30-39 years, higher IHS was reported among those residing in the Northeast compared to Southeast, whereas for those in the 40-49, 50-59 and >59 year groups, residing in the West was associated with reporting higher IHS compared to the Southeast. In addition, for those in the youngest age group (18-29 years), those who identified with Black/African American or Latine race/ethnicity reported higher IHS than those who identified with White race/ethnicity, whereas in the 50-59 and >59-year-old age groups, the reverse association was observed.

While some subpopulations clearly had a higher burden of IHS than others, it is important to note that every subpopulation included PWH who did not reject or disagree with at least one IHS statement. Table 3 shows the proportion of PWH who did not disagree with a given question by subpopulation characteristics at baseline. PWH most frequently failed to disagree (41.3%) with the statement, "I feel ashamed of having HIV", with >36% of PWH from every subpopulation failing to reject this statement. Close to one-third of PWH (31.2%) did not reject the statement, "I think less of myself because I have HIV", with the lowest proportion among PWH >59 years old (22.0%). The statement, "Having HIV is disgusting to me" was not rejected by 28.2% of PWH and was also least rejected by PWH who were >59 years old (22.8%). Even with the least frequently supported statement, "Having HIV makes me feel like I am a bad person", most subpopulations had at least 20% of people who did not reject this statement. In addition, across all groups at baseline, the highest score on any given question was a 5 or "Strongly Agree" for 1,143 (9.1%) PWH, a 4 or "Agree" for 2,701 (21.5%) PWH, 3 or "Neither agree nor disagree" for 2,054 (16.4%) PWH, 2 or "Disagree" for 2,098 (16.7%) PWH, and 1 or "Strongly Disagree" for the remaining 4,569 PWH (36.4%) (supplemental figure 2, <http://links.lww.com/QAD/D124>), demonstrating that a high proportion of PWH in care endorsed at least one question.

Discussion

Among 12,565 PWH in care across the US who responded 28,559 times to a validated IHS assessment, we observed higher IHS scores among younger PWH, cisgender women and minoritized genders other than transgender women compared to cisgender men, those in care for shorter durations, and those whose sexual identity was heterosexual, bisexual and other identities as compared to gay/lesbian. This builds upon previous work focusing on viremia in a subset of CNICS participants from data collected 2016-2017, which identified higher mean stigma scores among PWH 18-49 years compare with those ≥ 50 years, cisgender females, and those who identified as heterosexual [22]. In this study, with almost double the same size, PWH who identified with Black/African American or Latine race/ethnicity had lower IHS scores than those who identified with White race/ethnicity. Furthermore, differences in IHS score were modified by age. When we stratified by age group, among PWH who were 18-29-years-old, those who identified with Black/African American or Latine race/ethnicity had higher IHS scores

than those who identified with White race/ethnicity; conversely, among PWH who were ≥ 50 -years-old, those identifying with Black/African American and Latine race/ethnicity had lower IHS than those identifying with White race/ethnicity. Similarly, higher IHS scores among cisgender women, compared to cisgender men, were reported by PWH in age groups that covered 30-59 years, but not the youngest and oldest age groups. Additionally, among the two youngest age groups those living in the Northeast had higher IHS scores compared with the Southeast, but among the three oldest age groups, those living in the West had higher IHS scores than those living in the Southeast, suggesting potential social changes with respect to IHS. Regardless of these differences, it is important to note that a substantial portion of PWH in every subpopulation did not reject IHS statements, highlighting that while some groups carry a greater burden of IHS, in our population just under half of PWH are experiencing some level of IHS and people could experience very high IHS in any group.

Our findings of higher IHS scores among PWH in younger age groups is consistent with previous studies including those with modest participation rates [16-20], unadjusted associations [15], and smaller sample sizes [16, 18, 19]. For our cohort, continuous decreasing age had a linear association with higher IHS score (data not shown). Years in care demonstrated a similar linear association up to 10 years, at which point the curve flattened (data not shown), suggesting that there may be a saturation effect after ≥ 10 years in care. There may be a number of reasons why these associations are observed. Lower internalized stigma, in general, may be influenced by psycho-social changes that occur during the aging process. Indeed a small number of studies examining internalized mental health stigma also demonstrate lower internalized stigma in older age groups [23, 24]. Retention in HIV care may also influence observations of reduced IHS among both those in care for longer and those who are older; although consistency with studies of PWH recruited from the community, rather than clinical settings [17, 25], render this mechanism less likely. Additionally, the dynamics of reduction in IHS with increased time in care are likely more complex and include quality of care engagement; indeed, patients with more engaged HIV care providers have been shown to have a decrease in IHS as well as better retention in care [26]. Similarly, time in care could be a proxy for time living with diagnosed HIV, which may result in greater opportunity to identify social support with respect to living with HIV, as social support has been observed as a potential modifying factor on IHS [27].

Our findings, with respect to self-identified race/ethnicity, specifically lower IHS among PWH ≥ 50 years who identified as Latine or Black/African American as compared to PWH who identified as White, contradict a number of the previous studies examining differences in subpopulations with Black/African American PWH and Latine PWH, who reported higher IHS scores than White PWH [15, 19, 20]. There are a number of reasons why these differences may be observed. The previous studies differed from ours in that they: may have had lower power due to much smaller sample sizes [19, 20]; included analyses that did not account for confounding by other variables [15]; and did not stratify by age. These studies also used IHS instruments that were similar, but not identical, in self-reflective statements as ours; PWH who identified with different race/ethnicity may respond differently to these, although we did not identify any studies demonstrating this. However, social environment and changes over time in IHS within subgroups of PWH are more likely to explain these differences. As described in a study of IHS within the Women's Interagency HIV Study (WIHS) cohort, participants living in neighborhoods with greater racial/ethnic diversity exhibited lower IHS, which will be a focus of inquiry as these data become available in CNICS. Additionally, in our age-

stratified analysis among PWH aged 18-29 years those who identified as Black/African American or Latine had higher IHS scores than those who identified with White race/ethnicity; which is consistent with previous studies, but was only revealed through age-stratified analyses, which suggests a greater reduction in stigma among Black/African American PWH and Latine PWH with aging than White PWH. Regardless of mechanism, both changes in IHS as PWH age and differences in associations by race/ethnicity by age are likely to contribute to the differences observed. Qualitative investigations into these dynamics could elucidate why we see differential associations in burden of IHS by race/ethnicity in different age groups.

Our study provides greater granularity on differences in IHS by gender and self-identified sexual orientation to that of previous studies. While previous studies identified greater IHS in female/women participants [15, 19, 20], only one examined groups other than men/women or male/female and included transgender persons [15]. Consistent with previous studies, we found that cisgender women, as compared to cisgender men, had higher IHS scores. However, we also found that PWH who identified with a gender other than cisgender men, cisgender women, or transgender women, had higher IHS scores than cisgender men after controlling for all other subgroup characteristics. In age-stratified analyses, this association was only observed in the oldest (>59 years) age group. This is an important finding as this other gender group is often overlooked in studies of IHS, but potentially carries a disproportionate burden of IHS. Additionally, previous studies examined sexual identities of men only [19] or did not control for potential confounders [15]. Our findings demonstrate that PWH with sexual identities other than gay/lesbian, including heterosexual, bisexual and other sexual identity groups, have higher IHS burden than gay/lesbian identified PWH, after controlling for gender, age, time in care, race/ethnicity and their geographic location. It is interesting to note that a similar finding was observed in a study with unadjusted analyses [15], demonstrating the persistence of this association. There is some evidence, albeit limited, that internalized sexual identity stigma may be predictive of IHS after HIV diagnosis [28] and that less social support and/or connection with the lesbian, gay, bisexual, transgender, queer, questioning, intersex, asexual and others (LGBTQIA+) community is also associated with higher IHS [29], which may explain our observations.

Examination of IHS burden by geographic location in the US is also unique to this study, revealing differences by geographic census region. While few studies have compared any type of HIV-related stigma by region in the US, synthesis of limited information on HIV incidence, early diagnosis, treatment and attitudes about HIV suggest that greater HIV-related stigma may influence the disproportionately high HIV incidence and fatality observed in the Southern US [30]. Thus, we would have anticipated greater IHS among PWH in care in the Southeast region, however we observed a lower burden of IHS among PWH in the Southeast compared to the Northeast in our two younger age groups, <40 years old, and in the West in our three upper age groups, >40 years-old. While regional differences observed in this study should be considered lightly, due to potential differences in populations that may utilize different participating CNICS facilities, they raise some interesting hypotheses that may be worth further exploration. It may be possible that enacted, perceived, and anticipated HIV stigma have less of an impact on IHS than hypothesized and that this impact could differ by region. Additionally, PWH in care in the Southeast may experience IHS differently than those who have not sought care or have not been diagnosed. It is also possible that characteristics of the populations served by the different clinics may explain the regional differences, and not broader

regional trends. The lack of evidence for both differences in all types of HIV-related stigma by geographic region and reasons for why differences are observed, suggests a need for further research in this area.

Our analyses of IHS burden in subgroups of PWH stratified by age groups provides new insights that suggest differences by age cohort, demonstrating differential IHS burden among Latine and Black/African American PWH by age cohort, different burden by geographic location by age cohort, and burden differences by gender. These differences between age groups highlight the value of using large longitudinal cohorts to examine important psycho-social issues, the importance of multivariable and stratified modelling, and the need to regularly monitor IHS over time to ensure that we understand the burden and impact among PWH. As higher IHS burden in subpopulations might be, in part, due to intersectional stigma, it may be important to assess IHS as well as other stigmas in subpopulations with high burden, such as race/ethnicity-related stigma, sexual identity-related stigma, other health condition-related stigma, and substance use-related stigma [31, 32].

While this study revealed distinct differences in burden of IHS among subgroups of PWH, it also highlighted that nearly 50% of PWH do not reject IHS (i.e., answered >2 on any IHS question) and they can be found in every subpopulation. While the subpopulations with lower IHS burden across all participants were represented at lower proportions among those who did not reject any given IHS questions, every subgroup had ~20% or more PWH who did not reject an IHS question. This highlights the need for IHS assessment across all PWH in order to support those who are experiencing IHS, as it has been associated with adverse HIV-related health outcomes, such as higher HIV viral load and inconsistent engagement in care [10, 22, 33].

While this study is one of the largest studies examining the burden of IHS among PWH in care in the US, demonstrating differences in burden by subgroup and the overall need for IHS screening among PWH, it has some limitations. Although results are based on a large sample size (N=12,565) of PWH across numerous observations (N=28,559), from different sites across the US, generalizability may be limited to PWH in care in the US. Indeed, studies from other parts of the world have demonstrated higher IHS among men than women in South Africa [34], higher IHS among men and older PWH in Bangladesh [35], and no differences by sex or age in Morocco [36]. However, these differences and our findings highlight the importance of regular monitoring of IHS and for supporting IHS reduction interventions among all PWH worldwide. Additionally, PWH in care in general may have lower IHS than those who do not seek care or drop out of care, which we were unable to evaluate in this study and warrants further investigation. We did not have additional stigma measures to enable us to fully examine intersectional stigma as a contributing factor to higher IHS burden in some subpopulations, due to time constraints on PROs as part of clinical care. Studies such as the present one may provide opportunities to expand or change measures for future support of PWH in care and more extensive studies into healthcare and intervention needs.

Our findings provide insight into overall and differential burden of IHS among PWH, which is critical for supporting policies on measuring IHS among PWH, establishing the need for future studies on IHS among PWH, and informing IHS interventions. Through better understanding IHS burden, subpopulation needs, and the impact of IHS among PWH, we can work toward personalizing care and

developing interventions that have greater impact due to tailoring to specific subpopulations concerns and needs.

Author Roles

All authors contributed to this manuscript as follows: LND- designed study, secured funding, analyzed data, drafted manuscript. MOJ- supported IHS scale assessment and collection, secured funding, ensured local implementation, data collection and management, provided critical commentary on analyses, reviewed and revised manuscript drafts. KHM- provided critical input on interpretation of findings, secured funding, ensured local implementation, data collection and management, reviewed and revised manuscript drafts. KC- supported IHS scale assessment and collection, secured funding, ensured local implementation, data collection and management, discussed findings and interpretation, reviewed and revised manuscript drafts. EC- provided feedback findings and interpretation, secured funding, ensured local implementation, data collection and management, reviewed and revised manuscript drafts. TNC- discussed findings and approved manuscript drafts. BMW- provided centralized data cleaning, quality control and distribution, provided feedback findings and interpretation and reviewed and revised manuscript drafts. MD- early-stage investigator (ESI) who reviewed and revised manuscript drafts. SAR- ESI who reviewed and revised manuscript drafts. LSM- ESI who reviewed and revised manuscript drafts. JCK- ensured local implementation, data collection and management, provided feedback findings and interpretation and reviewed and revised manuscript drafts. GC- ensured local implementation, data collection and management, provided insight on findings and interpretation and reviewed and revised manuscript drafts. MSS- secured funding, ensured local implementation, data collection and management, provided feedback findings and interpretation and reviewed and revised manuscript drafts. MMK- secured funding, ensured local implementation, data collection and management, provided centralized data cleaning and distribution, provided feedback findings and interpretation and reviewed and revised manuscript drafts. RDM- secured funding, ensured local implementation, data collection and management, provided insight into findings and interpretation and reviewed and revised manuscript drafts. ALW- ensured local implementation, data collection and management, provided centralized data cleaning and distribution, provided feedback findings and interpretation and reviewed and revised manuscript drafts. JJE- provided feedback findings and interpretation, secured funding, ensured local implementation, data collection and management, reviewed and revised manuscript drafts. SN- provided feedback findings and interpretation, secured funding, ensured local implementation, data collection and management, reviewed and revised manuscript drafts. RMN – ESI who reviewed and approved manuscript drafts. AH – ESI who reviewed and approved manuscript drafts. JM – ESI who provided feedback findings and interpretation and reviewed and revised manuscript drafts. LB - secured funding, ensured local implementation, data collection and management, provided insight into findings and interpretation and reviewed and revised manuscript drafts. RJF - secured funding, oversaw local implementation and data collection, provided feedback findings and interpretation, and reviewed and revised manuscript drafts. JACD- designed study and statical analyses, ensured quality control of centralized data, provided feedback findings and interpretation, and reviewed and revised manuscript drafts. HMC- designed study, secured funding, ensured local implementation, data collection and management, provided

centralized data cleaning and distribution, provided feedback findings and interpretation, and reviewed and revised manuscript drafts.

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Figure 1: Regression coefficients and 95% confidence intervals (CI) for associations between averaged internalized HIV stigma score and participant characteristics in fully adjusted linear regression models (N=12,565; obs=28,559)

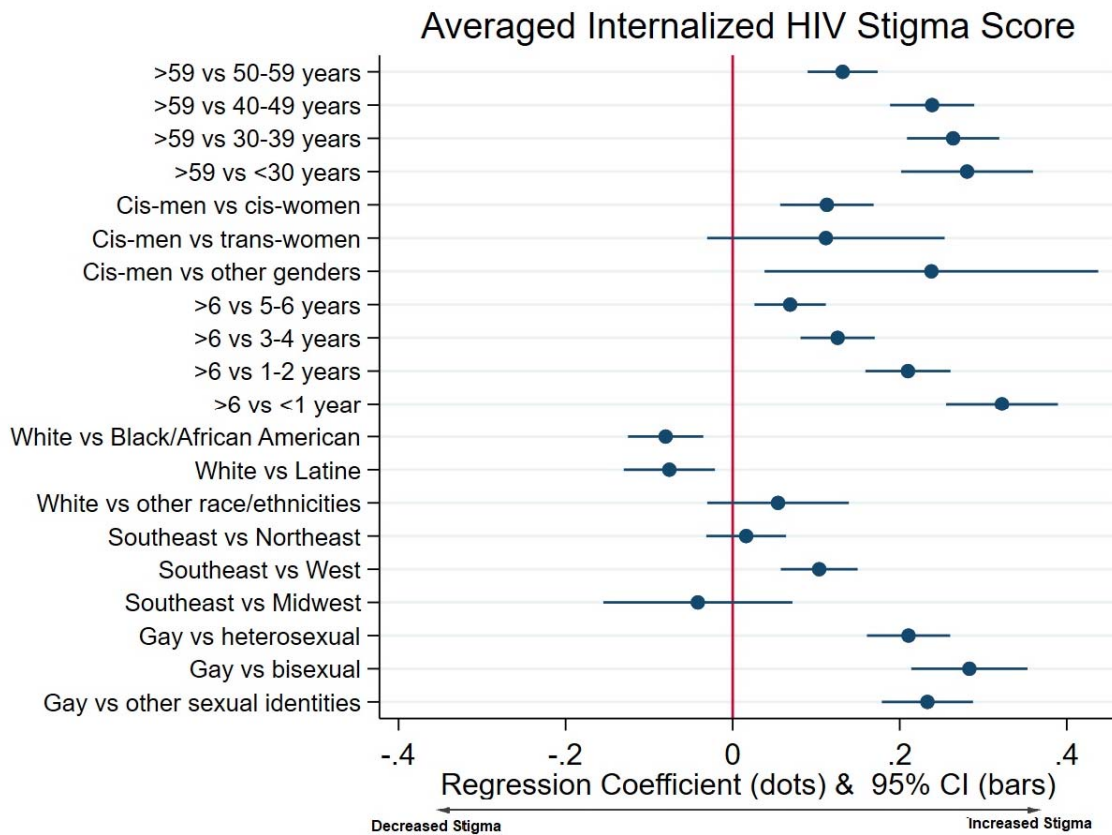


Table 1: Characteristics of PWH by internalized HIV stigma (IHS) response* on any question at baseline IHS assessment (N=12,565)

	TOTAL (N=12,565)	IHS DISAGREE (N=6,667)	IHS NEITHER (N=3,886)	IHS AGREE (N=2,012)
	N (%)	N (%)	N (%)	N (%)
Age				
> 59 years	1,928 (15.3)	1,192 (17.9)	503 (12.9)	233 (11.6)
50-59 years	3,999 (31.8)	2,283 (34.2)	1,098 (28.3)	618 (30.7)
40-49 years	2,995 (23.8)	1,534 (23.0)	971 (25.0)	490 (24.4)
30 -39 years	2,496 (19.9)	1,184 (17.8)	847 (21.8)	465 (23.1)
18-29 years	1,147 (9.1)	474 (7.1)	467 (12.0)	465 (23.1)
Gender				
Cisgender men	10,043 (79.8)	5,509 (82.6)	3,106 (79.9)	1,428 (71.0)
Cisgender women	2,181 (17.4)	997 (15.0)	667 (17.2)	517 (25.7)

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Transgender women	218 (1.7)	106 (1.6)	68 (1.8)	44 (2.2)
All other genders	123 (1.0)	55 (0.8)	45 (1.2)	23 (1.1)
Race/ Ethnicity				
White	5,133 (40.9)	2,865 (43.0)	1,618 (41.6)	650 (32.3)
Black/African American	4,821 (38.4)	2,431 (36.5)	1,398 (36.0)	992 (49.3)
Latine	1,929 (15.4)	1,049 (15.7)	612 (15.8)	268 (13.3)
Other race/ethnicity	682 (5.4)	322 (4.8)	258 (6.6)	102 (5.1)
Years in Care				
>6 years	6,113 (48.7)	3,543 (53.1)	1,690 (43.5)	880 (43.7)
5-6 years	1,289 (10.3)	693 (10.4)	376 (9.7)	220 (10.9)
3-4 years	1,683 (13.4)	885 (13.3)	511 (13.2)	287 (14.3)
1-2 years	2,084 (16.6)	952 (14.3)	755 (19.4)	377 (18.7)
<1 year	1,396 (11.1)	594 (8.9)	554 (14.3)	248 (12.3)
Geographic Location				
Southeast	4,248 (33.8)	2,155 (32.3)	1,330 (34.2)	763 (37.9)
Northeast	2,609 (20.8)	1,488 (22.3)	677 (17.4)	444 (22.1)
West	5,415 (43.1)	2,858 (42.9)	1,781 (45.8)	776 (38.6)
Midwest	293 (2.3)	166 (2.5)	98 (2.5)	29 (1.4)
Sexual Identity				
Gay/Lesbian	6,299 (50.1)	3,642 (54.6)	1,914 (49.3)	743 (36.9)
Heterosexual	3,578 (28.5)	1,704 (25.6)	1,121 (28.9)	753 (37.4)
Bisexual	906 (7.2)	425 (6.4)	319 (8.2)	162 (8.1)
Other Identities	1,782 (14.2)	896 (13.4)	532 (13.7)	354 (17.6)

* IHS response per question is “strongly disagree” or “disagree” = IHS disagree; “neither agree nor disagree” = IHS neither; and “agree” or “strongly agree” = IHS agree; $p < 0.001$ for all subgroup comparisons between endorsing and not endorsing IHS questions by χ^2 .

Table 2: Adjusted linear regression models stratified by age category for associations between averaged internalized HIV stigma score and participant characteristics, fully adjusted for all characteristics modelled (N=12,565)

	<30 years (N=1,147 obs=1,757) Coefficient (95% CI)	30-39 years (N=2,496 obs=4,905) Coefficient (95% CI)	40-49 years (N=2,995 obs=6,209) Coefficient (95% CI)	50-59 years (N=3,999 obs=9,634) Coefficient (95% CI)	>59 years (N=1,928 obs=6,054) Coefficient (95% CI)
Gender					
Cisgender men	REF	REF	REF	REF	REF

Cisgender women	0.12 (-0.17, 0.41)	0.26 (0.11, 0.41)	0.13 (0.01, 0.25)	0.10 (0.01, 0.20)	0.02 (-0.07, 0.11)
Transgender women	0.01 (-0.34, 0.36)	0.29 (-0.01, 0.58)	0.01 (-0.26, 0.28)	0.06 (-0.18, 0.29)	0.01 (-0.33, 0.34)
All other genders	-0.02 (-0.37, 0.33)	0.36 (-0.03, 0.75)	0.15 (-0.29, 0.58)	0.36 (-0.11, 0.83)	0.41 (0.03, 0.79)
Race/ Ethnicity					
White	REF	REF	REF	REF	REF
Black/African American	0.17 (0.02, 0.32)	-0.02 (-0.12, 0.08)	-0.04 (-0.13, 0.06)	-0.15 (-0.23, -0.08)	-0.08 (-0.17, 0.01) [†]
Latine	0.19 (0.001, 0.38)	0.03 (-0.09, 0.15)	-0.05 (-0.15, 0.06)	-0.15 (-0.24, -0.06)	-0.17 (-0.28, -0.05)
Other race/ethnicity	0.07 (-0.19, 0.33)	0.07 (-0.08, 0.22)	0.17 (-0.05, 0.34)	0.06 (-0.11, 0.22)	0.06 (-0.11, 0.22)
Years in Care					
≥ 7 years	REF	REF	REF	REF	REF
5-6 years	-0.15 (-0.39, 0.08)	0.08 (-0.01, 0.18)	0.09 (0.00, 0.17)*	0.09 (0.02, 0.16)	0.05 (-0.04, 0.15)
3-4 years	0.13 (-0.11, 0.36)	0.10 (0.01, 0.19)	0.23 (0.14, 0.32)	0.09 (0.01, 0.17)	0.047 (-0.04, 0.17)
1-2 years	0.21 (-0.02, 0.44)	0.14 (0.04, 0.24)	0.25 (0.14, 0.32)	0.24 (0.14, 0.34)	0.22 (0.10, 0.34)
<1 year	0.39 (0.15, 0.63)	0.39 (0.25, 0.52)	0.32 (0.17, 0.47)	0.17 (0.05, 0.30)	0.35 (0.12, 0.60)
Geographic Location					
Southeast	REF	REF	REF	REF	REF
Northeast	0.23 (0.05, 0.41)	0.13 (0.01, 0.25)	0.04 (-0.06, 0.15)	0.02 (-0.06, 0.10)	-0.09 (-0.17, -0.01)
West	0.10 (-0.08, 0.28)	0.07 (-0.03, 0.18)	0.10 (0.01, 0.19)	0.13 (0.06, 0.20)	0.11 (0.02, 0.21)
Midwest	0.07 (-0.35, 0.50)	0.01 (-0.36, 0.38)	0.14 (-0.14, 0.43)	-0.12 (-0.31, 0.08)	-0.17 (-0.35, 0.01) [‡]
Sexual Identity					
Gay/Lesbian	REF	REF	REF	REF	REF

Heterosexual	0.31 (0.09, 0.53)	0.24 (0.11, 0.37)	0.21 (0.10, 0.32)	0.21 (0.13, 0.29)	0.23 (0.14, 0.32)
Bisexual	0.15 (-0.04, 0.34)	0.33 (0.20, 0.47)	0.28 (0.12, 0.44)	0.21 (0.09, 0.33)	0.40 (0.24, 0.56)
Other Identities	0.15 (-0.05, 0.34)	0.20 (0.08, 0.32)	0.19 (0.08, 0.31)	0.27 (0.19, 0.36)	0.31 (0.19, 0.43)
CONSTANT	1.71 (1.47, 1.95)	1.79 (1.68, 1.8824)	1.79 (1.70, 1.87)	1.76 (1.70, 1.83)	1.64 (1.56, 1.72)

bold indicates significant associations for increased internalized HIV stigma; **bold italicized** indicates significant associations for decreased internalized HIV stigma * p=0.053; † p=0.080; ‡ p=0.062

Table 3: Proportion of PWH who do not disagree with* each IHS statement at baseline by demographic characteristics (N=12,565)

	I feel ashamed of having HIV N (%)	I think less of myself because I have HIV N (%)	Having HIV is disgusting to me N (%)	Having HIV makes me feel like I am a bad person N (%)
Total	5,192 (41.3)	3921 (31.2)	3540 (28.2)	2937 (23.4)
Age				
> 59 years	611 (31.7)	425 (22.0)	440 (22.8)	352 (18.3)
50 – 59 years	1484 (37.1)	1145 (28.6)	1046 (26.2)	858 (21.5)
40-49 years	1291 (43.1)	996 (33.3)	872 (29.1)	739 (24.7)
30 -39 years	1,204 (48.2)	903 (36.2)	761 (30.5)	641 (25.7)
18-29 years	602 (52.5)	425 (39.4)	421 (36.7)	347 (30.3)
Gender				
Cisgender men	3975 (39.6)	3073 (30.6)	2683 (26.7)	2279 (22.7)
Cisgender women	1066 (48.9)	724 (33.2)	745 (34.2)	554 (25.4)
Transgender women	92 (42.2)	73 (33.5)	66 (30.3)	61 (28.0)
All other genders	59 (48.0)	51 (41.5)	46 (37.4)	43 (35.0)
Race/ Ethnicity				
White	1994 (38.9)	1703 (33.2)	1311 (25.5)	1167 (22.7)
Black/African American	2102(43.6)	1348 (28.0)	1475 (30.6)	1083 (22.5)
Latine	768 (39.8)	614 (31.8)	536 (27.8)	491 (25.5)
Other race/ethnicity	328 (48.1)	256 (37.5)	218 (32.0)	196 (28.7)

Years in Care				
>6 years	2237 (36.6)	1666 (27.3)	1518 (24.8)	1233 (20.2)
5-6 years	514 (39.9)	397 (30.8)	347 (26.9)	300 (23.3)
3-4 years	708 (42.1)	518 (30.8)	461 (27.4)	393 (23.4)
1-2 years	1009 (48.4)	787 (37.8)	690 (33.1)	597 (28.7)
<1 year	724 (51.9)	553 (39.6)	524 (37.5)	414 (29.7)
Geographic Location				
Southeast	1877 (44.2)	1250 (29.4)	1235 (29.1)	973 (22.9)
Northeast	998 (38.3)	736 (28.2)	663 (25.4)	524 (20.1)
West	2200 (40.6)	1861 (34.4)	1568 (29.0)	1378 (25.5)
Midwest	117 (39.9)	74 (25.3)	74 (25.3)	62 (21.2)
Sexual Identity				
Gay/Lesbian	2350 (37.3)	1929 (30.6)	1496 (23.8)	1377 (21.9)
Heterosexual	1659 (46.4)	1093 (30.6)	1177 (32.9)	859 (24.0)
Bisexual	430 (47.5)	322 (35.5)	313 (34.6)	248 (27.4)
Other Identities	753 (42.3)	577 (32.4)	554 (31.1)	453 (25.4)

* responses to IHS statements of “strongly agree”, “agree”, and “neither agree nor disagree” were consider not disagreeing with IHS whereas “strongly disagree” and “disagree” were considered disagreeing with IHS statements

ACCEPTED