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The Association of Stigma with Self-Reported Access to Medical Care and Antiretroviral Therapy Adherence in Persons Living with HIV/AIDS

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BACKGROUND: The stigma of HIV-infection may profoundly affect the lives of persons living with HIV/AIDS (PLHA). However few studies have examined the association of HIV stigma with multiple components of HIV treatment and care.

OBJECTIVES: To estimate the association between HIV stigma and: self-reported access to care, regular source of HIV care, and antiretroviral therapy adherence; and to test whether mental health mediates these associations.

DESIGN: Cross-sectional study.

PARTICIPANTS: 202 PLHA living in Los Angeles County in 2007.

MEASUREMENTS: Participants completed an anonymous survey, assessing internalized HIV stigma (28-items, alpha = 0.93), self-reported access to medical care (six items, alpha = 0.75), regular source of HIV care, and antiretroviral therapy (ART) adherence.

RESULTS: One-third of participants reported high levels of stigma; 77% reported poor access to care; 42.5% reported suboptimal ART adherence; and 10.5% reported no regular source of HIV care. In unadjusted analysis, those reporting a high level of stigma were more likely to report poor access to care (OR=4.97, 95% CI 2.54–9.72), regular source of HIV care (OR=2.48, 95% CI 1.00–6.19), and ART adherence (OR=2.45, 95% CI 1.23–4.91). In adjusted analyses, stigma was significantly associated with poor access to care (OR=4.42, 95% CI 1.88–10.37), but not regular source of HIV care or ART adherence. Mental health mediated the relationship between stigma and ART adherence, but not poor access to care or regular source of HIV care.

CONCLUSIONS: The association of stigma with self-reported access to care and adherence suggests that efforts to improve these components of HIV care will require a better understanding of the possible effects of stigma and it’s mediators.

KEY WORDS: HIV/AIDS; HIV; stigma; care; antiretroviral.

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INTRODUCTION

Advances in HIV treatment over the past decade have transformed HIV-infection from a fatal diagnosis into a manageable chronic illness.1,2 Despite these dramatic advances, the social aspect of the illness-including the stigma of HIV-continues to threaten the emotional, mental, and physical well-being of persons living with HIV/AIDS (PLHA).

The concept of stigma is complex and is rooted in deviance from the values and social norms of a community.3 Theoretical frameworks of stigma grounded in the sociological and anthropologic literature conceptualize stigma as a social process and have been applied to mental illness, epilepsy, and HIV/AIDS among other diseases.4,5 The process of stigma involves the identification and labeling of human differences, linking labeled persons to negative stereotypes, and categorization to facilitate discrimination and unequal outcomes. Finally, the access to power of a dominant group further perpetuates the cycle of discrimination and social inequity.5 In this conceptualization, “internalized stigma” occurs as the individual internalizes cultural norms that label him/her as a member of a deviant group, and assumes a “spoiled identity”.6,7 Additionally, “internalized stigma” parallels the concept of “perceived discrimination” in social psychology,6,7 which has also been associated with important health outcomes, including delays in pharmacy refills and medical care.8

Few studies have examined the association of stigma with multiple components of HIV care simultaneously: including access to care, regular HIV care, and adherence to treatment. Furthermore, the effect of internalized HIV stigma on these outcomes has not been documented. Stigma may influence these outcomes through several possible pathways. One mechanism through which internalized stigma could affect self-reported access to care and having a regular source of care is through perceived discrimination. PLHA who experience greater stigmatization might perceive more difficulty accessing care because fear of rejection and discrimination (consequences of stigma) may lead them to perceive the health care setting as intolerant and inaccessible. The literature docu-
menting an association between perceived stigmatizing attitudes from a health care provider and poor access to medical care\textsuperscript{9,10} lends credence to this assertion. Alternatively, poor mental health may confound or mediate the relationship between stigma and HIV care. Previous studies have described an association between stigma and depressive symptoms,\textsuperscript{11,12} as well as an association between stigma and low levels of antiretroviral therapy (ART) adherence.\textsuperscript{11,13} Additional studies suggest an association of mental health with access and adherence to ART.\textsuperscript{14,15} Therefore, PLHA experiencing high levels of stigma may be more likely to perceive barriers to accessing and adhering to treatment because of depression or other mental illness. Mental illness symptoms may result directly from internalized stigma (suggesting mediation) or from other forces (suggesting confounding) and both relationships have some support from the existing literature.\textsuperscript{16,17} Our study is among the first to formally test whether mental illness mediates the association between internalized stigma and access and adherence to HIV treatment. Another potential confounder of the association between internalized stigma and treatment is social disadvantage. The association between social disadvantage and perceived care, ART adherence).\textsuperscript{21,22}

In the present study, we hypothesized that internalized HIV stigma would be associated with three key components of HIV treatment: 1) self-reported access to medical care, 2) having a regular source of HIV care, and 3) self-reported ART medication adherence. We also tested a secondary hypothesis that mental health may mediate the relationship between stigma and one or more of these outcomes. We adapted the Andersen behavioral model of health services use to guide our study. This model describes the role of predisposing factors (e.g. stigma, mental health, race), enabling factors (e.g. insurance status), and clinical need characteristics (e.g. CD4 cell count), on behavioral health outcomes (access to care, regular source of HIV care, ART adherence).\textsuperscript{21,22}

**METHODS**

**Participants and Data Collection**

We collected data from a diverse convenience sample of 202 HIV-positive adults in Los Angeles County in 2007. Participants were recruited from five community organizations providing outreach and social services to PLHA, as well as two HIV clinical care sites. By recruiting at community organizations and clinical sites, we were able to include both individuals who readily access the health system and those who may not. Eligible participants were 18 years of age or older, HIV-positive, able to answer questions in English, and capable of providing informed consent.

We recruited participants through research assistants stationed at the sites and organization staff also referred interested participants. Eligible participants were invited to complete a 154-item anonymous self-administered questionnaire, with a Flesh-Kincaid reading level of Grade 6.4 (Microsoft Word 2000, Redmond, WA). Participants were paid a $20 honorarium. Informed consent was obtained for all participants, and the UCLA IRB approved the study.

**Measure of Internalized HIV Stigma**

We measured internalized HIV stigma with a 28-item scale developed from previously published work by the authors.\textsuperscript{12,23} Scale scores ranged from 0–100, with higher scores indicative of greater stigma. Internal reliability consistency for the overall measure was 0.93. Mean scores for the stigma subscales were computed, and the overall scale score was calculated as an average of the subscale scores. Because the distribution of stigma scores associated with the outcomes was not linear and suggested a threshold effect, we created a dichotomous variable of high internalized stigma for this analysis, such that participants who on average responded some of the time, most of the time, or all of the time (mean scale score of 50 or greater) were characterized as having high stigma.

**Measure of Access to Care**

We used a six-item access to care measure (alpha=0.75) derived from the HIV Cost and Services Utilization Study (HCSUS);\textsuperscript{24} these items are presented in Table 3. All items had a five-point response scale (strongly agree, somewhat agree, unsure, somewhat disagree, strongly disagree). We created a scale by summing scores from the six items, with a range of possible values from 5–30. “Poor access to care” was defined as responding strongly to somewhat disagree or unsure to the six access items on average (corresponding to a score of 18 or higher). This measure has been associated with utilization of care.\textsuperscript{24}

**Regular Source of HIV Care**

Having a regular source of HIV care was assessed by the question, “Do you currently have a regular place to go for your HIV medical care?” (Yes/No). This item has been associated with time to initiation of ART,\textsuperscript{25} and time to entry into medical care.\textsuperscript{26}

**Measure of ART Adherence**

Self-reported ART adherence was assessed using the item “How often during the past week were you able to take your antiretroviral medications exactly as your doctor or nurse told you?” Response options included none of the time, a little of the time, some of the time, most of the time, all of the time. In our analysis, optimal adherence was defined as “all of the time” and suboptimal adherence was all other response options. This item has been shown to be predict HIV viral load and CD4 cell count at this cut point.\textsuperscript{27}

**Measure of Mental Health**

Mental health composite scores (MCS) were derived from the Medical Outcomes Study Short Form (SF-12), and scores were linearly transformed to T scores (mean = 50, SD=10; higher scores representing better health).\textsuperscript{28,29} The MCS scale ranged from 1–100 and was divided into 10-point increments (i.e. 1–10, 11–20, etc.) for this analysis.

**Other Independent Variables**

Other independent variables in the analysis included predisposing factors: age, gender, race/ethnicity, education, primary language, relationship status, sexual orientation, history of
intravenous drug use (IDU); enabling factors: income, health insurance; and clinical need characteristics: years since HIV diagnosis, CD4 cell count, currently on ART.

Data Analysis

We first examined the distributions of all independent and dependent variables. We then examined the bivariate associations between the predisposing factor of high internalized stigma and the health behavior outcomes. We constructed three separate multiple logistic regression models to estimate the adjusted association between each outcome variable and high internalized stigma, controlling for predisposing, enabling, and clinical need characteristics.

As a secondary goal of the study, we examined whether mental health mediated the relationship between stigma and each outcome. Specifically, first we examined the association between stigma and MCS. Next, we examined the association between MCS and each of the three outcome variables in separate models. If these first two associations are significant, then the possibility of a mediation relationship is heightened. According to standard criteria for assessing mediation, next we examined the association between stigma and the outcomes. In the final step, we examined the extent to which the association between stigma and the outcomes was attenuated by adding MCS to the model. We conducted these mediation analyses in bivariate models, followed by multivariate models.

We used multiple imputation by chained equations (MICE) with five replications to impute missing values for two variables: history of IDU (11 observations missing), and CD4 cell count (38 observations missing). Li-Raghunathan-Rubin estimates were used for calculating standard errors. All analyses were conducted using STATA 10.0 (Stata Corp, College Station, TX).

RESULTS

Sample Characteristics

Two hundred and two participants completed the survey, and refusal rates ranged from 10% to 30% by site. Participant characteristics are presented in Table 1. Fifty percent of the sample was female, and the mean age was 43 years. Fifty-six percent were African American, 28% were White, and 10% were Latino/a. The mean MCS score was 40.1 in the sample, with a standard deviation of 11.2.

Internalized HIV Stigma

Mean scores for each stigma item, subscales, and the overall stigma scale are presented in Table 2. The mean score on the overall stigma scale of 41 reflects that on average participants endorsed items describing experiences or perceptions of stigma slightly less frequently than “some of the time” (mean score of 50).

Access to Care, Regular Source of HIV Care, and ART Adherence

Seventy-seven percent of participants reported poor access to care on one or more of the items (Table 3). Approximately 10% reported having no regular source of HIV care. Of the 142 participants currently taking ART, 42.5% reported suboptimal adherence.

Association of Internalized Stigma with Access, Regular Source of Care, and Adherence

In bivariate analyses, participants experiencing high internalized stigma more frequently reported poor access to care, no regular source of HIV care, and suboptimal ART adherence (Table 4). Respondents diagnosed with HIV in the past five years had significantly increased odds of reporting high levels of stigma compared with those diagnosed more than five years ago (OR=2.49; 95% CI=1.25, 4.98). MCS was significantly related to high levels of stigma (OR=12.95, 95% CI=6.14, 37.10), as well as poor self-reported access, no regular source of HIV care, and suboptimal ART adherence (Table 4). Internalized stigma was not associated with any of the other independent variables.

In multivariable analysis, internalized stigma was strongly associated with poor access to care (OR=4.42; 95% CI=1.88, 10.37) but not the other two outcomes (Table 5). Poor access to care was also significantly associated with younger age (OR=5.43; 95% CI=1.52, 19.43), a history of IDU (OR=3.19; 95% CI=1.24, 8.20), and income below FPL (OR=2.50; 95% CI=1.10, 5.68). Having no regular source of HIV care was significantly associated with younger age (OR=7.39; 95% CI=1.70, 33.03). MCS was related to high levels of stigma (OR=25.5; 95% CI=3.64, 183.9).
Table 2. Internalized Stigma Scale Items and Scores

| Internal Stigma Scale Items | Mean (SD) |
|-----------------------------|-----------|
| **Subscale 1 = Stereotypes of HIV** | |
| 1. HIV is different than other diseases like cancer because people with HIV are judged | 48 (21) |
| 2. People assume I have done something bad to get HIV | 53 (32) |
| 3. Society looks down on people who have HIV | 59 (28) |
| 4. People think that if you have HIV then you got what you deserve | 43 (30) |
| 5. People blame me for having HIV | 43 (35) |
| 6. People assume I slept around because I have HIV | 54 (33) |
| 7. People think that if you have HIV you do not deserve to have children | 50 (34) |
| 8. People are afraid to let someone with HIV adopt a child | 57 (29) |
| 9. People think I am a bad person because I have HIV | 34 (32) |
| 10. Medical providers assume people with HIV sleep around | 38 (31) |
| **Subscale 2 = HIV Disclosure Concerns** | 32 (27) |
| 11. People lose their jobs because they have HIV | 46 (26) |
| 12. People think you can’t be a good parent if you have HIV | 42 (31) |
| **Subscale 3 = Social Relationship Stigma** | 29 (24) |
| 13. I am concerned if I go to the HIV clinic someone I know might see me | 28 (33) |
| 14. I am concerned if I have physical changes from the HIV medicines people will know I have HIV | 33 (33) |
| 15. I am concerned if I go to an AIDS organization someone I know might see me | 30 (34) |
| 16. I am concerned people will find out I have HIV by looking at my medical paperwork | 32 (35) |
| 17. I am concerned that if I am sick people I know will find out about my HIV | 38 (35) |
| **Subscale 4 = Self-Acceptance** | 54 (25) |
| 18. Nurses and doctors treat people who have HIV as if they are contagious | 30 (30) |
| 19. Nurses and doctors dislike caring for patients with HIV | 28 (28) |
| 20. I feel abandoned by family members because I have HIV | 24 (33) |
| 21. People treat me as less than human now that I have HIV | 29 (31) |
| 22. People avoid me because I have HIV | 24 (30) |
| 23. People I am close to are afraid they will catch HIV from me | 26 (32) |
| 24. I feel like I am an outsider because I have HIV | 41 (35) |
| **Subscale 4 = Self-Acceptance** | 54 (25) |
| 25. I feel ashamed to tell other people that I have HIV | 45 (36) |
| 26. I am comfortable telling everyone I know that I have HIV | 61 (35) |
| 27. My family is comfortable talking about my HIV | 55 (33) |
| 28. It is important for a person to keep HIV a secret from co-workers | 56 (33) |
| **Overall Stigma Scale** | 41 (19) |

* Responses to each item are on a 5-point categorical response scale (none of the time, a little of the time, some of the time, most of the time, or all of the time)
† Possible range 0-100 with higher scores indicate greater levels of internalized stigma
‡ Response scale values reversed for scoring

CI=1.26, 43.42). Finally, increased odds of suboptimal ART adherence were found among respondents with lower MCS (OR=1.50; 95% CI=1.01, 2.23) and those who identified as heterosexual (OR=2.92; 95% CI=1.07, 7.98). All four stigma subscales were significantly associated with poor self-reported access to care. None of the subscales were significantly associated with regular source of care (latter data not shown).

Mental Health as Mediator of Relationships of Stigma with Access to Care and Adherence

To examine mental health as a potential mediator of the relationship between stigma and our outcomes of interest, we tested the mediation model as presented in Fig. 1. As described earlier, stigma was significantly associated with MCS, as well as with the outcomes of self-reported access to care and suboptimal ART adherence. MCS was also significantly associated with these two outcomes, controlling for the covariates. Therefore, the conditions for the mediation hypothesis were met. When the MCS was added to the model predicting poor self-reported access to care, high stigma remained significantly associated with poor access (OR=5.14, 95% CI=2.39, 11.90 without MCS and OR=4.42, 95% CI=1.88, 10.37 with MCS). When the MCS was added to the model predicting suboptimal ART adherence, we found that association between high stigma and adherence was no longer statistically significant (OR=3.15, 95% CI=1.35, 7.36 without MCS and OR=2.09; 95% CI=0.81, 5.39 with MCS). The results in both models were similar when observations with missing data were excluded from the analysis.

**DISCUSSION**

In this diverse sample of PLHA in Los Angeles County, approximately one-third of participants reported experiencing high levels of internalized HIV stigma. We found that respondents experiencing high levels of stigma had over four times the odds of reporting poor access to care. Mental health

Table 3. Frequency of HIV-Positive Persons Reporting Health Behavior Outcomes of Poor Access to Care, No Regular Source of HIV Care, and Suboptimal ART Adherence

| Poor access to care items (n=202) | Disagree responses (%) |
|-----------------------------------|------------------------|
| 1. I am able to get medical care whenever I need it | 24.0 |
| 2. Places where I can get medical care are very conveniently located | 26.4 |
| 3. I have never gone without the medical care I need because it is too expensive | 42.3 |
| 4. I have easy access to the medical specialists that I need | 22.4 |
| 5. It is easy for me to get medical care in an emergency | 40.3 |
| 6. If I need hospital care, I can get admitted without any trouble | 27.9 |
| Overall: Reported poor access to 1 or more of the above items | 77.0 |

| No regular source of HIV Care (n=202) | No |
|---------------------------------------|---|
| Do you currently have a regular place to go for your HIV medical care? | 10.5 |

| Suboptimal ART adherence (n=142) | Less than all the time |
|----------------------------------|------------------------|
| How often during the past week were you able to take your antiretroviral medications exactly as your doctor or nurse told you to? | 42.5 |

* Poor access defined as strongly/somewhat disagree or unsure to the items above
† Suboptimal ART adherence defined as taking antiretroviral therapy none, a little, some, or most of the time (vs. all the time)
The association between stigma and suboptimal ART adherence is mediated by mental health. Additional prospective longitudinal studies in larger samples are needed to better understand possible mediators of the associations between HIV stigma and access to care and ART adherence. This may in turn help to guide interventions to improve HIV care and health outcomes for PLHA.

Our findings demonstrate that in a diverse and underserved sample of PLHA, poor self-reported access to medical care is strongly associated with experiencing HIV stigma. It did not appear that mental health or other predisposing, enabling, or clinical need factors explained this association. Poor self-reported access to care could also itself be a result of the perceived discrimination and social inequities that are central to the process of stigma. In this scenario, it is possible that an omitted variable that reflects perceived discrimination and social disadvantage may influence both experiences of stigma and self-reported access to care.

Interestingly, we found that stigma was not strongly associated with having a regular source of HIV care in our sample after controlling for predisposing, enabling, and clinical need characteristics. One explanation for this may be that stigma has less of a role in an established patient-provider relationship compared with other factors such as patient-provider concordance by race or gender, satisfaction, communication, and trust. Alternatively, we may have failed to identify an association because the percentage of the sample reporting no regular source of HIV care was small (10%).

Our data suggest that HIV stigma may be associated with suboptimal ART adherence, and this relationship may be partially mediated by lower mental health status. Specifically, lower MCS was associated with suboptimal adherence, and this relationship may be partially mediated by lower mental health status. Specifically, lower MCS was associated with suboptimal adherence, and this relationship may be partially mediated by lower mental health status. Specifically, lower MCS was associated with suboptimal adherence, and this relationship may be partially mediated by lower mental health status. Specifically, lower MCS was associated with suboptimal adherence, and this relationship may be partially mediated by lower mental health status. Specifically, lower MCS was associated with suboptimal adherence, and this relationship may be partially mediated by lower mental health status.

The Table 4 below shows the bivariate associations of predisposing, enabling, and clinical need characteristics with health behavior outcomes of poor self-reported access to care, no regular source of HIV care, and suboptimal ART adherence.

Table 4. Bivariate Associations of Predisposing, Enabling, and Clinical Need Characteristics with Health Behavior Outcomes of Poor Self-Reported Access to Care, No Regular Source of HIV Care, and Suboptimal ART Adherence

| Dependent variable (Reference group) | Poor self-reported access to care odds ratio (95% CI) (n=202) | No regular source of HIV care odds ratio (95% CI) (n=202) | Suboptimal ART adherence odds ratio (95% CI) (n=142) |
|--------------------------------------|-------------------------------------------------------------|----------------------------------------------------------|-----------------------------------------------------|
| **Predisposing factors**             |                                                             |                                                          |                                                     |
| High internalized stigma (no)        | –                                                          | 2.48 (1.00-6.19)                                          | 2.45 (1.23-4.91)                                    |
| Yes                                  | 4.97 (2.54-9.72)                                            |                                                         |                                                     |
| Mental health status                 | –                                                          | 1.54 (1.03-2.31)                                          | 1.53 (1.12-2.09)                                    |
| Mental health composite score (10-point increase) | 1.73 (1.31-2.29)                                            |                                                         |                                                     |
| Age                                  | –                                                          | –                                                        |                                                     |
| 18–35                                | 4.87 (2.11-11.23)                                           | 4.82 (1.87-12.41)                                         | 2.72 (1.03-7.18)                                    |
| 36–49                                | 0.46 (0.26-0.81)                                            | 0.59 (0.23-1.46)                                         | 0.63 (0.32-1.25)                                    |
| 50 and over                          | 0.65 (0.46-1.60)                                            | 0.26 (0.06-1.17)                                         | 0.80 (0.39-1.64)                                    |
| Gender (male)                        | –                                                          | –                                                        |                                                     |
| Female                               | 0.76 (0.44-1.32)                                            | 1.11 (0.45-2.76)                                         | 1.66 (0.87-3.19)                                    |
| Race / Ethnicity (white)             | –                                                          | –                                                        |                                                     |
| African American                     | 1.06 (0.61-1.86)                                            | 1.12 (0.45-2.80)                                         | 1.32 (0.69-2.53)                                    |
| Latino/a                             | 1.44 (0.56-3.68)                                            | 0.93 (0.20-4.36)                                         | 1.91 (0.66-5.58)                                    |
| Other Race                           | 0.92 (0.29-2.95)                                            | 0.76 (0.92-6.23)                                         | 0.92 (0.24-3.50)                                    |
| Education (more than high school diploma) | –                                                           | –                                                        |                                                     |
| High school diploma                  | 0.86 (0.50-1.50)                                            | 1.51 (0.65-4.00)                                         | 1.11 (0.60-2.06)                                    |
| Less than high school                | 1.25 (0.65-2.40)                                            | 0.72 (0.23-2.24)                                         | 1.68 (0.77-3.65)                                    |
| Sexual orientation (homosexual / bisexual) | –                                                       | –                                                        |                                                     |
| Heterosexual                         | 0.74 (0.43-1.30)                                            | 1.63 (0.63-4.23)                                         | 2.35 (1.23-4.50)                                    |
| History of IDU (no)                  | –                                                          | –                                                        |                                                     |
| Yes                                  | 2.94 (1.41-6.11)                                            | 2.40 (0.92-6.27)                                         | 1.72 (0.79-3.73)                                    |
| **Enabling Factors**                 |                                                             |                                                          |                                                     |
| Income (above FPL*)                  | –                                                          | –                                                        |                                                     |
| Below FPL                            | 1.96 (1.12-3.43)                                            | 1.20 (0.48-2.99)                                         | 1.01 (0.49-2.08)                                    |
| Insurance (yes)                      | –                                                          | –                                                        |                                                     |
| No                                   | 0.53 (0.30-0.92)                                            | 0.59 (0.24-1.46)                                         | 1.05 (0.55-1.98)                                    |
| **Clinical need characteristics**    |                                                             |                                                          |                                                     |
| Yes since HIV diagnosis (>5)         | –                                                          | –                                                        |                                                     |
| Less than 5 yrs                      | 2.58 (1.26-5.32)                                            | 2.49 (0.95-6.47)                                         | 0.87 (0.36-2.06)                                    |
| CD4 count (above 200)                | –                                                          | –                                                        |                                                     |
| Below 200                            | 0.91 (0.43-1.94)                                            | 0.52 (0.11-2.36)                                         | 0.65 (0.26-1.61)                                    |

*FPL = federal poverty level for family of two, less than $1140/month income
potential impact on HIV treatment may be particularly important to incorporate into programs targeting recently diagnosed PLHA.

There were several limitations to this study. First, as our data were cross-sectional, causality between internalized HIV stigma and our outcomes cannot be established. Also, potentially important covariates such as social inequality, social support, and self-efficacy were not observed in our models. However, our study does provide valuable information about the strong association between stigma and self-reported access

### Table 5. Multivariable Associations of Internalized Stigma with Poor Access to Care, No Regular Source of HIV Care, and Suboptimal ART Adherence

| Dependent Variable (Reference group) | Poor Self-Reported Access to Care Odds ratio (95% CI) (n=202) | No Regular Source of HIV Care Odds ratio (95% CI) (n=202) | Suboptimal ART Adherence Odds ratio (95% CI) (n=142) |
|--------------------------------------|-------------------------------------------------------------|-----------------------------------------------------------|---------------------------------------------------|
| **Predisposing Factors**             |                                                              |                                                            |                                                   |
| High internalized stigma (no)        | –                                                           | –                                                         | –                                                 |
| Yes                                  | 4.42 (1.88–10.37)                                           | 2.25 (0.69–7.32)                                           | 2.09 (0.81–5.39)                                  |
| Mental health status                 | –                                                           | –                                                         | –                                                 |
| Mental Health Composite Score (10-point increase) | 1.22 (0.87–1.71)                                      | 1.16 (0.68–1.99)                                           | 1.50 (1.01–2.25)                                  |
| Age (50+)                            | –                                                           | –                                                         | –                                                 |
| 18–35                                | 5.43 (1.52–19.43)                                           | 7.39 (1.26–43.42)                                          | 3.35 (0.90–12.45)                                 |
| 36–49                                | 0.71 (0.30–1.68)                                           | 1.93 (0.36–10.41)                                          | 0.64 (0.23–1.75)                                  |
| Gender (male)                        | –                                                           | –                                                         | –                                                 |
| Female                               | 0.87 (0.38–1.99)                                           | 0.97 (0.29–3.21)                                           | 1.52 (0.61–3.81)                                  |
| Race / Ethnicity (white)             | –                                                           | –                                                         | –                                                 |
| African American                     | 1.34 (0.54–3.30)                                           | 0.93 (0.25–3.48)                                           | 1.42 (0.51–3.98)                                  |
| Latino/a                             | 1.65 (0.45–6.08)                                           | 1.54 (0.22–10.79)                                          | 3.34 (0.72–15.58)                                 |
| Other race                           | 1.30 (0.23–7.21)                                           | 0.78 (0.06–9.73)                                           | 0.88 (0.3–6.11)                                   |
| Education (more than high school)    | –                                                           | –                                                         | –                                                 |
| High school diploma                  | 1.01 (0.41–2.50)                                           | 1.28 (0.34–4.82)                                           | 1.21 (0.42–3.49)                                  |
| Less than high school                | 1.47 (0.44–4.93)                                           | 0.51 (0.08–3.41)                                           | 1.35 (0.35–5.20)                                  |
| Sexual orientation (homosexual / bisexual) | –                   | –                                                         | –                                                 |
| Heterosexual                         | 0.56 (0.23–1.36)                                           | 2.42 (0.67–8.78)                                           | 2.92 (1.07–7.98)                                  |
| History of IDU (no)                  | –                                                           | –                                                         | –                                                 |
| Yes                                  | 3.19 (1.24–8.20)                                           | 1.89 (0.56–6.36)                                           | 1.78 (0.66–4.84)                                  |
| **Enabling factors**                 |                                                              |                                                            |                                                   |
| Income (above FPL*)                  | –                                                           | –                                                         | –                                                 |
| Below FPL                            | 2.50 (1.10–5.68)                                           | 1.27 (0.40–4.07)                                           | 0.96 (0.38–2.40)                                  |
| Insurance (yes)                      | –                                                           | –                                                         | –                                                 |
| No                                   | 0.61 (0.29–1.30)                                           | 0.89 (0.29–2.72)                                           | 1.50 (0.61–3.66)                                  |
| **Clinical need characteristics**    |                                                              |                                                            |                                                   |
| Yrs since HIV diagnosis (>5)         | –                                                           | –                                                         | –                                                 |
| Less than 5 yrs                      | 1.15 (0.44–3.00)                                           | 1.98 (0.62–6.32)                                           | 0.56 (0.12–1.09)                                  |
| CD4 count (above 200)                | –                                                           | –                                                         | –                                                 |
| Below 200                            | 0.64 (0.25–1.64)                                           | 0.42 (0.08–2.19)                                           | 0.78 (0.25–2.37)                                  |

*FPL = federal poverty level for family of two, less than $1140/month*

**Figure 1. Mediation model to explore the role of mental health in mediating the associations between internalized HIV stigma and poor access to care and suboptimal ART adherence.**

-Mediators:
- (Predisposing Factor)
- Mental health status

-Independent variable:
- (Predisposing Factor)
- Internalized HIV stigma

-Without mediator
- Poor access: 5.14 (2.39–11.09)
- Suboptimal adherence: 3.15 (1.35–7.36)

-Dependent variable:
- (Behavioral Health Outcomes)
- Self-reported access to care
- ART adherence

- With mediator
- Poor access: 4.42 (1.88–10.37)
- Suboptimal adherence: 2.09 (0.81–5.39)

*Mediation models control for age, gender, race/ethnicity, education, sexual orientation, history of intravenous drug use, income, insurance status, years since diagnosis, and CD4 count.  
*Relationship expressed as OR (95% CI).
to care and adherence, and directs future work to further delineate these relationships. Second, our study sample may be biased (ascertainment bias) toward people who have already partially engaged in medical care or social services, and it may underestimate the association between poor access and internalized stigma for the most vulnerable group of PLHA who do not access care or HIV services at all. Finally, although we successfully recruited a sample of diverse PLHA, non-English speakers such as Latino/as and Asian Americans were underrepresented in our sample.

Despite these limitations, our study provides important information about the association between internalized HIV stigma and self-reported access to medical care and ART adherence. Prospective studies that include more objective measures of access to care, such as utilization of subspecialty care, HIV care, preventive care, and emergency/hospital care, would help us to better understand the access needs of underserved PLHA over the course of their disease. Prospective studies could also help us to examine the directionality of the association between stigma and access to care, as well as to identify additional factors that may mediate or moderate this relationship. Finally, such studies could enable us to examine changes in stigma and its contribution to health care and health outcomes throughout the disease trajectory.

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