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Internalized HIV-related stigma and breast health beliefs among African American women receiving care for HIV in the United States

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Abstract

Objectives.—African American women suffer disproportionately from HIV, breast cancer, and other illnesses. Little is known about the relationship between internalized HIV-related stigma and health beliefs related to other illnesses, including breast cancer. Our study examined: 1) the relationship between internalized HIV-related stigma and breast health beliefs over time; and, 2) the moderating effects of participating in a stigma reduction intervention and/or social support.

Methods.—Data from 239 African American women receiving care for HIV in Chicago, Illinois or Birmingham, Alabama, enrolled in the Unity randomized controlled trial, were used in this secondary analysis. Threat of breast cancer was measured in terms of perceived susceptibility, fear, and adverse consequences as well as an overall perceived threat of breast cancer. We used multivariate models with Generalized Estimating Equations to examine the relationship between internalized HIV-related stigma and breast health beliefs across three time points (baseline, immediately post-workshop, and at 12-month follow-up) and to examine if study arm (HIV stigma reduction vs. breast cancer education) or social support moderated the relationship.

Results.—Internalized HIV-related stigma was associated with greater overall perceived threat ($p < 0.001$), susceptibility ($p = 0.03$), fear ($p < 0.001$), and perceived adverse consequences ($p < 0.001$) of breast cancer. These associations remained consistent across study arms and across all levels of social support.

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Conclusions.—Future studies that examine co-morbid health conditions among African American women living with HIV should consider the impact of HIV-related stigma on attitudes and beliefs related to co-morbid conditions.

Keywords

HIV; stigma; African American women; breast cancer

Introduction

African American women experience a disproportionate burden of multiple health conditions. For example, African American women account for 61% of all new HIV cases among women in the US [1]. Simultaneously, African Americans living with HIV have death rates that are 13% higher than their non-Latino White counterparts [3]. As well, African American women diagnosed with breast cancer at a later stage [4], experience worse treatment outcomes [5], and have a 42% higher mortality rate [6]. Systematic marginalization within healthcare (e.g., unequal access, suboptimal provider-patient relationships) has contributed to these disparities, *in part* through negative psychosocial consequences (e.g., internalized stigma, fear, fatalism) [7-10]. Yet, relatively little work has examined if these negative psychosocial consequences have spill-over effects for other conditions. The current study has two objectives. First, we examine if HIV-related stigma is associated with breast health among African American women living with HIV, using a longitudinal design. Such work is crucial, given breast cancer is the most common type of cancer and leading cause of cancer-related death among women living with HIV [11,12]. Second, we examine potential health-protective factors that may ameliorate this relationship, including a stigma reduction intervention and social support.

African American women living with HIV are particularly vulnerable to intersectional stigma [13]. Stigma refers to when “elements of labeling, stereotyping, separation, status loss, and discrimination co-occur in a power situation that allows the components of stigma to unfold” [15]. HIV-related stigma has been implicated as a determinant of HIV care utilization, morbidity, and mortality [14,16-19]. Simultaneously, HIV-related stigma can impact other health behaviors and outcomes [12,21,22][23][24,25][26]. HIV-stigma may affect other aspects of women’s health, *because* the trauma of living with HIV may result in heightened fear about living with multiple conditions [12,23]. Earnshaw’s stigma framework highlights internalized stigma as the most relevant stigma construct related to this hypothesis, as it is in particular associated with the greatest feelings of helplessness [22]. In support of this “spill-over” hypothesis, a recent cross-sectional study found that internalized HIV-related stigma was strongly associated with greater perceived threat of breast cancer, especially in terms of breast cancer fear/fatalism among African American women living with HIV [21].

While cross-sectional studies have found associations between HIV-related stigma and beliefs/fears about other conditions [21,27], little is known these relationships over time. Another gap in the literature regards whether there are protective factors which may disrupt these associations. For example, stigma reduction programs and general social support may

not only reduce the levels of HIV-related stigma women experience, but also attenuate how the trauma of HIV affects beliefs/fears about other conditions. To test these hypotheses, our study aims to examine: 1) the relationship between internalized HIV-related stigma and perceived threat of breast cancer, over time, among African American women receiving care for HIV, and 2) if present, to determine whether this relationship is moderated by intervention arm (stigma reduction or breast cancer education) or social support.

Methods

All procedures performed were in accordance with the ethical standards of the institutional and/or national research committee (University of Washington IRB, HSD #43970). The parent study was a multisite randomized controlled trial that examined two intervention approaches. Unity is an anti-stigma intervention that has been adapted for use specifically among African American women living with HIV in the US. It uses a workshop-style approach in which a peer facilitator presents digital media and leads group discussions. Content focuses on participants' personal experiences with HIV-related stigma, with exercises designed to foster coping skills and increase self-efficacy. In the parent study, a separate arm focused on breast cancer education and used the same workshop-style format to present and discuss information related to breast cancer and breast health beliefs. Informed consent was obtained from all individual participants included in the study. A full description of the study and procedures is available elsewhere [33]. Sociodemographic and psychosocial data were collected during study visits via tablet-based audio computer assisted self-interview (ACASI) at baseline, post-intervention, and 4, 6, 8, and 12 months post-intervention. Measures related to breast cancer beliefs were only assessed at baseline, post-intervention, and at a 12-month follow-up assessment, so these time points were chosen for inclusion in the analysis.

Measures

Sociodemographic and clinical variables—Questionnaires were administered to all participants at baseline to gather self-reported data on age, year of HIV diagnosis, educational attainment, employment status, number of children, and marital status. Self-reported clinical variables were collected at baseline, immediately post-workshop, and at 12-month follow-up visit. These included questions assessing the frequency of completing clinical breast examinations and mammograms. The question related to mammography was asked to all participants. We only considered the answers of women over 40, in line with the American Cancer Society's guidelines at the time when the study was conducted. Completion of a yearly clinical breast examination was used as a proxy measure for regular breast health engagement, as it provides the opportunity for patient-to-provider interactions centered specifically on breast health across all ages and risk levels.

HIV-related stigma—Participants were asked to answer the 14-item Stigma Scale for Chronic Illness (SSCI) at all time points to assess stigma. The SSCI assesses experienced and internalized stigma and has been validated for use with African Americans living with HIV (Cronbach's $\alpha = 0.93$) [34]. Six of the 14 items in the scale measured internalized stigma, while the remaining 8 measured enacted stigma. Responses ranged from 1 = *Never*

to 5 = *Always*. Total internalized stigma scores were calculated by summing each question in the subscale.

Social Support—The emotional/information support and positive social interaction subscales of the Medical Outcomes Study-Social Support Survey (MOS-SSS) were used to measure participants' perceived social support [35] at all time points. The scale determines levels of social support in the context of chronic disease through a series of questions pertaining to the frequency of available social support, with answers ranging from 1 = *None of the time* to 5 = *All of the time*. The emotional/informational support and positive social interaction subscales include eight and three questions, respectively.

Perceived threat of breast cancer—Our outcome of interest was perceived threat of breast cancer. We utilized three subscales from Champion's Health Belief Model and Breast Cancer scales [36,37] as well as an overall score, each of which were assessed at baseline, immediately post-workshop, and at a 12-month follow-up assessment. Subscales included Perceived Susceptibility to Breast Cancer (Cronbach's $\alpha = 0.74$ to 0.87 across time points), Fear of Breast Cancer (Cronbach's $\alpha = 0.74$ to 0.83 across time points), and Perceived Adverse Consequences of Breast Cancer (Cronbach's $\alpha = 0.69$ to 0.72 across time points). Overall perceived threat of breast cancer score was calculated as an average of each subscale. Responses ranged from 1 = *Strongly Disagree* to 4 = *Strongly Agree*.

Analyses

As <3% of data were missing, we conducted complete case analysis. T-tests and chi-squared tests were used for continuous and categorical variables, respectively, comparing treatment and comparison arms of the study. Perceived threat of breast cancer was assessed by creating mean-imputed summary scores for overall perceived threat and for each subscale (fear, susceptibility, adverse consequences). For both objectives, we ran Generalized Estimating Equations (GEE) models for overall perceived threat and for each of the three subscales. To make final model decisions about variable distribution and correlation structure, we examined relative quasi-likelihood information criteria model fit [38]. Our findings suggested the best fit assumed outcomes had a linear/normal distribution and an independent correlation structure. Covariates were determined using univariate analyses and retained in the final models if associated with internalized HIV-related stigma or breast health beliefs at significance levels at or below 0.05. For the first objective, given our focus on the relationship of internalized HIV-related stigma and breast health beliefs, we included the following predictors: internalized HIV-related stigma, education, occurrence of yearly clinical breast exams, marital status, study site, and number of years living with HIV. Age and number of years with HIV were analyzed as continuous variables, and categorical variables were dichotomized as follows: educational attainment (completed high school vs. less than completed high school), employment status (employed vs. unemployed), number of children (any children vs. none), and marital status (married or cohabitating vs other). Clinical variables were dichotomized as follows: clinical breast examination (once in a year vs. other) and mammogram (once in a year or once every two years vs. other). For the second objective, we repeated the models with an interaction term for study arm (study arm

x internalized HIV-related stigma), and again with an interaction term for social support (social support x internalized HIV-related stigma).

Results

Table 1 describes the characteristics of our study sample stratified by Unity study arm ($N=239$). The average age was 47.0 (SD = 11.1) years among the HIV stigma reduction group and 46.5 (SD = 9.9) years among the breast cancer education comparison group. Over half of all women had completed at least a high school level education, were married, and received a clinical breast exam yearly. The average number of years living with HIV was 14.6 (SD = 7.8) and 13.7 (SD = 6.6) for the HIV stigma and the breast cancer education groups, respectively. Internalized stigma scores ranged from 6 to 30 with a mean score of 13.7 (SD = 6.4) in the stigma reduction arm and of 13.1 (SD = 6.4) in the breast cancer education arm. There were no significant differences in demographic characteristics between groups.

Breast cancer belief subscale scores at each time point are found in Table 2. All summary scores for perceived threat of breast cancer ranged from 1 to 4. The overall perceived threat of breast cancer had an overall mean of 2.3 (SD = 0.44). Breast cancer belief subscales of perceived susceptibility, fear, and adverse consequences had overall means of 1.8 (SD = 0.70), 2.5 (SD = 0.9), and 2.1 (SD = 0.7), respectively.

Regression estimates can be found in Table 3. After adjusting for education, occurrence of yearly clinical breast exams, marital status, study site, and number of years living with HIV, internalized HIV-related stigma was associated with overall perceived threat of breast cancer across time ($B = 0.015$, 95% CI [0.009, 0.021], $p = <0.001$). Further, it was associated with all three subscales (susceptibility: $B = 0.012$, 95% CI [0.001, 0.023], $p = 0.03$; fear: $B = 0.024$, 95% CI [0.012, 0.037], $p = <0.001$; adverse consequences: $B = 0.028$, 95% CI [0.019, 0.036], $p = <0.001$).

Next, we examined if study arm moderated the relationship between HIV-related stigma and breast health beliefs. Results suggested that interactions were not significant for overall perceived threat of breast cancer ($p = 0.72$), or for subscales (p -values = 0.40–0.93). Finally, we looked at social support as a potential moderator. Results showed non-significant interactions for overall perceived threat of breast cancer ($p = 0.25$) as well as for perceived susceptibility ($p = 0.79$) and fear ($p = 0.12$). For perceived adverse consequences, we found the interaction with social support to be significant ($B = 0.001$, 95% CI [0.00, 0.001], $p = 0.03$).

Discussion

We examined the relationship between internalized HIV-related stigma and breast health attitudes and beliefs among African American women receiving care for HIV over time and examined if study arm and social support moderated this association. We found that HIV-related stigma was associated with overall perceived threat of breast cancer, as well as with perceived susceptibility, fear, and adverse consequences of breast cancer. These relationships were consistent across study arm and largely consistent across levels of social support.

Our results confirm the longitudinal nature of the association, building upon the cross-sectional findings that identified a relationship between internalized HIV-related stigma and breast health beliefs [21]. Previous research has suggested that African Americans may be more attuned to concepts related to discrimination due to their experiences with social inequities and therefore experience HIV-related stigma differently than Whites [39]. Multiple co-occurring stigmas, including those related to disease presence (i.e., HIV serostatus, cancer diagnosis) as well as to race, gender, and any other socially marginalized identity or position enhance the experience of stigma [40]. It may be that these consistent relationships across time reflect the unique experiences of African American women. Notably, HIV-related stigma appeared to be more strongly related to fear and adverse consequences than susceptibility. These patterns were similar to what was found in previous cross-sectional studies. Our findings align with conceptual frameworks regarding “spill-over” effects, in that traumatic experiences of living with HIV may impact the fear of additional diagnoses and related social sequelae. Susceptibility may however be more strongly associated with participants’ perspectives about if and how HIV may make them biologically vulnerable to breast cancer.

We largely did not find that participation in a stigma reduction program or social support moderated the relationship between internalized HIV-related stigma and breast health beliefs. With regard to the moderating role of study arm, both interventions may have been helpful in reducing stigma through providing an avenue for social support [33]. Given this, the relationship between internalized HIV-related stigma and breast health beliefs may not have varied between the study arms. Social support, however, also did not largely moderate the relationship between internalized HIV-related stigma and breast health beliefs. There was only a significant moderating effect regarding perceived adverse consequences. On the one hand, the types of perceived adverse consequences in the instrument used were largely social in nature. Thus, it may be that social support could attenuate anticipations of negative social responses to a breast cancer diagnosis. Group-based supportive services may thus be important for reducing the impact of HIV-related stigma on overall social functioning and other social perception outcomes (e.g., cultural norms, social cohesion). On the other hand, these results may be due to Type I error. In this scenario, while increased social support is related to reduced internalized HIV-related stigma [33], it may not modify the relationships between stigma and other health beliefs. Social support may reduce stigma and health-aversive breast health beliefs simultaneously, rather than affecting their relationships. Accordingly, group-based supportive services, regardless of their content, may be particularly helpful for addressing multiple psychosocial factors simultaneously among African American women living with HIV.

Limitations

Our study had several limitations. Our sample population was limited to cisgender African American women receiving care for HIV in two cities within the United States. Findings may not apply to the experiences of other women and marginalized communities. Furthermore, by limiting the study to only cisgender women who were actively engaged in HIV care, we excluded those who are not receiving care and those with other gender identities. Additionally, we limited our approach to an examination of internalized HIV-

related stigma. While internalized stigma has the strongest association with some indicators of health and well-being, we recognize the relevance of enacted and anticipated stigma. These dimensions of stigma need to be incorporated into future analyses. Because breast cancer outcomes were self-reported, we cannot determine to what degree these measures align with actual rates of service delivery. We did not assess mechanisms of internalized stigma and perceived threat of breast cancer. Further, while related, breast cancer fatalism and perceived threat of breast cancer may represent distinct constructs and differ in their relationships to internalized stigma.

Future studies

The link our study emphasizes the importance of research that goes beyond prevalence and incidence estimates. We deconstruct aspects of stigma, discrimination, and identity that influence health disparities and health seeking behaviors. In the context of future observational work, perceived powerlessness and helplessness have been identified as underlying mechanisms of both breast cancer fatalism [28] and internalized HIV-related stigma [22]. Our associations support a conceptual relationship between internalized HIV-related stigma and breast cancer beliefs, suggesting that these mechanisms may be shared and underlie spill-over effects. Future research could explore how the Earnshaw's HIV stigma framework is associated with conceptual frameworks of other diseases and subpopulations to further elucidate spill-over effects of HIV-related stigma on non-AIDS defining illnesses. In addition to theory, studies that examine more granular associations between constructs of breast cancer beliefs (i.e. susceptibility, fear, adverse consequences) and stigma (internalized, experienced, anticipated) can isolate more specific pathways for intervention and merit further research. More research is also needed that examines spill-over effects from HIV stigma to other non-AIDS defining illnesses within communities that face multiple intersecting barriers to healthcare. Indeed, research has uncovered patients' reluctance to disclose HIV status to primary care providers, often out of fear of discrimination or harassment (Hutchinson, Sutcliffe, Williams, & Estcourt, 2016; Stockton et al., 2018). These limited disclosure patterns may lead to isolating patients to specialty care. Given this, spill-over effects on healthcare use may not be illness-specific among cisgender women living with HIV.

The conjunction of the relationship between HIV-related and breast cancer-related stigmas over time and the experience of discrimination by African American women create multifaceted yet understudied avenues for intervention. Such work is timely, given that as people living with HIV continue to live longer, more challenges will arise in relation to the identification and management of other, non-AIDS-defining conditions. Thus, reducing internalized HIV-related stigma may improve the ability to care for other health concerns. For example, interventions that seek to lower HIV-related stigma and consequently reduce the perceived threat of breast cancer may in turn begin to reduce this barrier to breast cancer care uptake. For women living with HIV and receiving treatment, anti-stigma initiatives may therefore reinforce pathways to breast cancer prevention and screening and empower women to engage in breast health-seeking behaviors.

Conclusion

Deconstructing the complex interactions of structural marginalization, institutionalized racism, stigma, and psychosocial correlates on healthcare access and effectiveness is critical. There is a paucity of research devoted to the unique challenges faced by African American women and other minority groups living with HIV. The current study reinforces the importance of stigma research, especially within communities experiences multiple forms of marginalization. Understanding the role of internalized HIV-related stigma in the perceptions and beliefs about other illnesses illuminates avenues for intervention. Prioritizing interventions tailored to marginalized communities and the unique barriers imposed upon them can disrupt these patterns and lead to equitable healthcare.

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References

- Centers for Disease Control and Prevention. Women | Gender | HIV by Group | HIV/AIDS | CDC [Internet]. 2016 [cited 2018 Jul 12]. Available from: <https://www.cdc.gov/hiv/group/gender/women/index.html>
- US Census Bureau. Annual Estimates of the Resident Population by Sex , Race Alone or in Combination , and Hispanic Origin for the United States , States , and Counties: April 1 , 2010 to July 1 , 2017. 2018.
- Siddiqi A, Hu X, Hall H. Mortality Among Blacks or African Americans with HIV Infection - United States. *MMWR Morb Mortal Wkly Rep*. 2012;64:81–6.
- Silber J, Rosenbaum P, Clark A, Giantonio B, Ross R, Teng Y, et al. Characteristics associated with differences in survival among Black and White women with breast cancer. *JAMA*. 2013;310:389–97. [PubMed: 23917289]
- Coughlin SS, Yoo W, Whitehead MS, Smith SA. Advancing breast cancer survivorship among African-American women. *Breast Cancer Res Treat* [Internet]. NIH Public Access; 2015 [cited 2018 Jul 2];153:253–61. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/26303657> [PubMed: 26303657]
- DeSantis C, Fedewa S, Sauer A, Kramer J, Smith R, Jemal A. Breast cancer statistics, 2015: convergence of incidence rates between Black and White women. *CA Cancer J Clin*. 2016;66:31–42. [PubMed: 26513636]
- Jones C El, Maben J, Jack RH, Davies EA, Forbes LJ, Lucas G, et al. A systematic review of barriers to early presentation and diagnosis with breast cancer among black women *BMJ Open* [Internet]. BMJ Publishing Group; 2014 [cited 2018 Jul 2];4:e004076 Available from: <http://www.ncbi.nlm.nih.gov/pubmed/24523424>
- Peek M, Sayad J, Markwardt R. Fear, fatalism, and breast cancer screening in low-income African American women: the role of clinicians and the health care system. *J Gen Intern Med*. 2008;23:1847–53. [PubMed: 18751758]
- Rao D, Andrasik MP, Lipira L. HIV Stigma Among Black Women in the United States: Intersectionality, Support, Resilience *Am J Public Health* [Internet]. American Public Health Association; 2018 [cited 2018 May 6];108:446–8. Available from: <http://ajph.aphapublications.org/doi/10.2105/AJPH.2018.304310> [PubMed: 29513587]
- McDoom MM, Bokhour B, Sullivan M, Drainoni M-L. How Older Black Women Perceive the Effects of Stigma and Social Support on Engagement in HIV Care AIDS Patient Care STDS

[Internet]. Mary Ann Liebert, Inc 140 Huguenot Street, 3rd Floor New Rochelle, NY 10801 USA ; 2015 [cited 2018 May 13];29:95–101. Available from: <http://online.liebertpub.com/doi/abs/10.1089/apc.2014.0184> [PubMed: 25494607]

11. Deeks SG, Lewin SR, Havlir DV. The end of AIDS: HIV infection as a chronic disease. *Lancet* (London, England) [Internet]. NIH Public Access; 2013 [cited 2018 Jul 24];382:1525–33. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/24152939>
12. Stockton MA, Giger K, Nyblade L. A scoping review of the role of HIV-related stigma and discrimination in noncommunicable disease care *PLoS One* [Internet]. Public Library of Science; 2018 [cited 2018 Jul 24];13:e0199602 Available from: <http://www.ncbi.nlm.nih.gov/pubmed/29928044> [PubMed: 29928044]
13. Crenshaw K Mapping the Margins: Intersectionality, Identity Politics, and Violence against Women of Color. *Stanford Law Rev.* 1991;43:1241–99.
14. Chambers LA, Rueda S, Baker DN, Wilson MG, Deutsch R, Raeifar E, et al. Stigma, HIV and health: a qualitative synthesis *BMC Public Health* [Internet]. BioMed Central; 2015 [cited 2018 Jul 12];15:848 Available from: <http://www.ncbi.nlm.nih.gov/pubmed/26334626> [PubMed: 26334626]
15. Link B, Phelan J. Conceptualizing stigma. *Annu Rev Sociol.* 2001;27:363–85.
16. Katz IT, Ryu AE, Onuegbu AG, Psaros C, Weiser SD, Bangsberg DR, et al. Impact of HIV-related stigma on treatment adherence: systematic review and meta-synthesis. *J Int AIDS Soc* [Internet]. 2013 [cited 2018 Jul 12];16:18640 Available from: <http://www.ncbi.nlm.nih.gov/pubmed/24242258> [PubMed: 24242258]
17. Rao D, Feldman BJ, Frederickson RJ, Crane PK, Simoni JM, Kitahata MM, et al. A Structural Equation Model of HIV-Related Stigma, Depressive Symptoms, and Medication Adherence. *AIDS Behav* [Internet]. 2012 [cited 2018 Jul 12];16:711–6. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/21380495> [PubMed: 21380495]
18. Lambert CC, Mugavero MJ, Najjar YS, Enah C, Guthrie BJ. The State of Adherence to HIV Care in Black Women. *J Assoc Nurses AIDS Care* [Internet]. 2018 [cited 2018 Jul 12];29:487–503. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/29764715> [PubMed: 29764715]
19. McCoy K, Higgins M, Zuñiga JA, Holstad MM. Age, Stigma, Adherence and Clinical Indicators in HIV-Infected Women. *HIV/AIDS Res Treat open J* [Internet]. 2015 [cited 2018 Jul 12];2015:S1–8. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/27200416>
20. Lopez CR, Antoni MH, Fekete EM, Penedo FJ. Ethnic Identity and Perceived Stress in HIV+ Minority Women: The Role of Coping Self-Efficacy and Social Support *Int J Behav Med* [Internet]. Springer US; 2012 [cited 2018 Jul 24];19:23–8. Available from: <http://link.springer.com/10.1007/s12529-010-9121-x> [PubMed: 20890774]
21. Molina Y, Scheel JR, Endeshaw M, Turan JM, Lambert N, Cohn SE, et al. Enacted HIV-related stigma and breast-health beliefs and practices among African American women living with HIV: the mediating roles of internalized HIV-related stigma and depressive symptoms. *Stigma Heal.* 2017;
22. Earnshaw V, Smith L, Chaudoir S, Amico K, Copenhaver M. HIV stigma mechanisms and well-being among PLWH: a test of the HIV Stigma Framework. *AIDS Behav.* 2013;17:1785–95. [PubMed: 23456594]
23. Andrasik MP, Rose R, Pereira D, Antoni M. Barriers to Cervical Cancer Screening among Low-Income HIV-Positive African American Women *J Health Care Poor Underserved* [Internet]. Johns Hopkins University Press; 2008 [cited 2018 Jul 10];19:912–25. Available from: http://muse.jhu.edu/content/crossref/journals/journal_of_health_care_for_the_poor_and_underserved/v019/19.3.andrasik.html [PubMed: 18677078]
24. Chang S-H, Cataldo J. A systematic review of global cultural variations in knowledge, attitudes and health responses to tuberculosis stigma. *Int j Tuberc Lung Dis.* 2014;18:168–73. [PubMed: 24429308]
25. Turan J, Miller S, Bukusi E, Sande J, Cohen C. HIV/AIDS and maternity care in Kenya: how fears of stigma and discrimination affect uptake and provision of labor and delivery services. *AIDS Care.* 2008;20:938–45. [PubMed: 18777222]

26. Kamitani E, Fukuoka Y, Dawson-Rose C. Knowledge, Self-efficacy, and Self-perceived Risk for Cardiovascular Disease among Asians Living With HIV: The Influence of HIV Stigma and Acculturation. *J Assoc Nurses AIDS Care* [Internet]. 2015 [cited 2018 Jul 25];26:443–53. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/25769758> [PubMed: 25769758]
27. Turan B, Hatcher AM, Weiser SD, Johnson MO, Rice WS, Turan JM. Framing Mechanisms Linking HIV-Related Stigma, Adherence to Treatment, and Health Outcomes *Am J Public Health* [Internet]. American Public Health Association; 2017 [cited 2018 Jul 25];107:863–9. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/28426316> [PubMed: 28426316]
28. Spurlock W, Cullins L. Cancer fatalism and breast cancer screening in African American women. *ABNF J*. 2006;17:38–43. [PubMed: 16596899]
29. Miles A, Voorwinden S, Chapman S, Wardle J. Psychologic predictors of cancer information avoidance among older adults: the role of cancer fear and fatalism. *Cancer Epidemiol Biomarkers Prev*. 2008;17:1872–9.
30. Hotz KG. “Big momma had sugar, Imma have it too” Medical fatalism and the language of faith among African-American women in Memphis. *J Relig Health*. 2015;54:2212–4. [PubMed: 25338304]
31. Somayaji D, Cloyes KG. Cancer fear and fatalism: how African American participants construct the role of research subject in relation to clinical cancer trials. *Cancer Nurs*. 2015;38:133–44. [PubMed: 24945262]
32. Phillips J, Cohen M, Moses G. Breast cancer screening and African American women: fear, fatalism, and silence. *Oncol Nurs Forum*. 1999;26:561–71. [PubMed: 10214597]
33. Rao D, Kemp CG, Huh D, Nevin PE, Turan J, Cohn SE, et al. Stigma Reduction Among African American Women with HIV: UNITY Health Study. *JAIDS*. 2018;
34. Rao D, Desmond M, Andrasik M, Rasberry T, Lambert N, Cohn SE, et al. Feasibility, acceptability, and preliminary efficacy of the unity workshop: an internalized stigma reduction intervention for African American women living with HIV AIDS Patient Care STDS [Internet]. Mary Ann Liebert, Inc.; 2012 [cited 2018 Jul 11];26:614–20. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/22984780> [PubMed: 22984780]
35. Sherbourne C, Stewart A. The MOS social support survey. *Social Sci Med*. 1991;32:705–14.
36. Champion V Instrument refinement for breast cancer screening behaviors. *Nurs Res*. 1993;42:139–43. [PubMed: 8506161]
37. Champion V, Skinner C, Menon U, Rawl S, Giesler R, Monahan P, et al. A breast cancer fear scale: psychometric development. *J Heal Psychol*. 2004;9:753–62.
38. Pan W Akaike’s Information Criterion in Generalized Estimating Equations *Biometrics* [Internet]. Wiley/Blackwell (10.1111); 2001 [cited 2018 Jul 17];57:120–5. Available from: <http://doi.wiley.com/10.1111/j.0006-341X.2001.00120.x> [PubMed: 11252586]
39. Rao D, Pryor JB, Gaddist BW, Mayer R. Stigma, secrecy, and discrimination: ethnic/racial differences in the concerns of people living with HIV/AIDS. *AIDS Behav*. 2008;12:265–71. [PubMed: 17588146]
40. Reidpath D, Chan K. A method for quantitative analysis of the layering of HIV-related stigma. *AIDS Care*. 2005;17:425–32. [PubMed: 16036227]

Demographic characteristics of study sample (N = 239) by study arm as well as breast cancer subscale scores. P-values were considered significant below 0.05.

Table 1:

Demographics	HIV Stigma Reduction Arm (n = 124)		Breast Cancer Education Arm (n = 115)		p-value
	N	%	N	%	
Educational attainment					1.0
<High School	46	37.1	43	37.4	
High School	75	60.5	69	60.0	
Number of children					0.37
None	67	54.0	70	60.9	
1 or more	54	43.5	43	37.4	
Occupation					0.90
Employed	51	41.1	48	41.7	
Unemployed	65	52.4	57	49.6	
Marital status					1.0
Married/cohabitating	73	58.9	68	59.1	
Not married	50	40.3	47	40.9	
Breast exam frequency					0.38
Once in a year	78	62.9	65	56.5	
Other	45	36.3	49	42.6	
Mammogram frequency (women aged 40+ years old)					0.56
Every 1-2 years	65	69.1	57	64.8	
Other	27	28.7	30	34.1	
Age (mean, SD)	M 47.0	SD 11.1	M 46.5	SD 9.9	0.69
Years living with HIV (mean, SD)	14.6	7.8	13.7	6.6	0.32
Internalized stigma (mean, SD)	13.7	6.4	13.1	6.4	0.21

Perceived threat of breast cancer subscale scores across three observed time points: baseline, immediately post-intervention, and at 12-month follow-up assessment.

Table 2:

Breast Health Beliefs (mean, SD)	HIV Stigma Reduction Arm (n = 124)			Breast Cancer Education Arm (n = 115)		
	Baseline	Post-Int	Follow-up	Baseline	Post-Int	Follow-up
Overall Perceived Threat of Breast Cancer Subscales						
Perceived Susceptibility	1.75 (0.63)	1.81 (0.79)	1.58 (0.66)	1.65 (0.60)	1.99 (0.78)	1.79 (0.72)
Fear	2.58 (0.83)	2.49 (0.92)	2.30 (0.87)	2.54 (0.81)	2.60 (0.85)	2.58 (0.82)
Perceived Adverse Consequences	2.20 (0.72)	2.20 (0.75)	2.03 (0.65)	2.07 (0.62)	2.16 (0.64)	2.09 (0.64)

Regression estimates for internalized HIV-related stigma, adjusted for education, occurrence of yearly clinical breast exam, marital status, study site, and number of years living with HIV. **Bold** indicates statistical significance.

Table 3:

	Overall Perceived Threat		Susceptibility		Fear		Adverse consequences	
	Coefficient [95%CI]	p-value	Coefficient [95%CI]	p-value	Coefficient [95%CI]	p-value	Coefficient [95%CI]	p-value
Internalized stigma	0.015 (0.009, 0.021)	<0.001	0.012 (0.001, 0.023)	0.03	0.024 (0.012, 0.037)	<0.001	0.028 (0.019, 0.036)	<0.001
Internalized stigma* Study arm	0.002 (−0.010, 0.014)	0.72	−0.001 (−0.023, 0.021)	0.93	−0.002 (−0.026, 0.023)	0.89	0.007 (−0.10, 0.024)	0.40
Internalized stigma* Social support	0.000 (0.000, 0.001)	0.25	0.000 (−0.001, 0.001)	0.79	0.001 (0.000, 0.002)	0.12	0.001 (0.000, 0.001)	0.03