Social Support, Internalized HIV Stigma, Resilience and Depression Among People Living with HIV: A Moderated Mediation Analysis

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Abstract

Internalized HIV stigma has been associated with depression among people living with HIV (PLWH). However, it is still unclear whether resilience would mediate the association between internalized HIV stigma and depression and how this indirect effect would be moderated by social support. Data were collected from 402 PLWH in South Carolina using a cross-sectional survey.

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Data were fitted using a path model that specified the extent to which internalized HIV stigma and depression were related through resilience and how this effect was moderated by social support. Sociodemographic characteristics were included in the model as covariates. The indirect effect of internalized HIV stigma on depression through resilience was statistically significant for high social support but not for low social support. To mitigate negative impacts of internalized HIV stigma on mental health of PLWH, intervention efforts should integrate multilevel components for promoting both resilience and social support.

Keywords

resilience; internalized HIV stigma; depression; social support; HIV; mediation analysis

Introduction

In 2020, there were 37.7 million people living with HIV (PLWH) in the world [1]. Due to the advanced medicine technology and wide utilization of antiretroviral therapy (ART), HIV is transforming to a chronic and manageable disease [2]. In consideration of attaining the Joint United Nations Programme on HIV/AIDS "90–90-90" goal, the quality of life and psychosocial well-being of PLWH become crucial and emerging topics for HIV treatment and care [3]. In the U.S. and globally, mood disorders such as depression are challenges for PLWH's wellbeing. One meta-analysis suggests that the prevalence of depression was at least double than that of the general population [4]. Depression is prevalent in a significant proportion of PLWH and is one of the most common comorbidities among PLWH [5, 6]. A recent literature review suggests that 24.4%−50.8% of PLWH in low- and middle-income countries have depression [7–9]. Depression not only affects the quality of life of PLWH but may also impede medicine adherence and disease management [10, 11]. Biological (genetic, neuroendocrine, immune, microbiome, antiretroviral therapy), psychosocial (stress, trauma, coping), and structural (violence, stigma, poverty) factors interact to influence the pathogenesis of depression among PLWH [12–15].

Of all factors at various socioecological levels, stigma and discrimination against PLWH are prominent sources of stress for PLWH. In a social context where HIV-related stigma is still persistent and prevalent, PLWH may internalize HIV-related stigma. Internalized HIV-related stigma refers to accepting and adopting negative evaluations held in society about PLWH and applying these evaluations to oneself [16]. Internalized HIV stigma is related with depression, hopelessness, low medication adherence self-efficacy, maladaptive coping styles (e.g., self-blame, avoidance, denial), and low quality of life [17–19]. Internalized HIV stigma shows much stronger associations with adverse cognitive and mental health outcomes compared with other types of stigma (e.g., community stigma, perceived stigma). In addition, associations between other types of stigma and outcomes may work through the pathway of increased internalized HIV stigma [20].

Given the significant role of internalized HIV stigma, there is a growing consensus on calling for a paradigm-shift from focusing on non-affected populations (potential populations who "stigmatize" PLWH) to patient-centered and resilience-based interventions

geared towards PLWH. Social stigma has been difficult to eradicate or diminish significantly [21]. It is possible that an intervention itself does not change the social environment (e.g., public or social stigma), but it might improve health behavior outcomes and biomedical outcomes through promoting psychological facilitators among those that experience stigma. Enhancing resilience of the individual could be a critical strategy to mitigate negative impacts of stigma [21]. Resilience is a dynamic, multidimensional construct that incorporates bidirectional interaction between individuals and their environment (family, peer, school, community, society) [22]. Extant literature suggests resilience could buffer the impact of stigma on mental health problems among PLWH [23–25], and sexual and gender minorities. Resilience in the face of adversity or stress is a necessary capacity of human development [26, 27]. Recent studies suggest that resilience is not only linked with personality, but can also be cultivated or enhanced in an individual's life by the presence of one or more protective factors, such as a range of problem-solving skills, self-esteem, self-confidence, and positive future orientation [28, 29].

In addition to the intrapersonal characteristics, social relationships could be a critical resource for PLWH with respect to developing resilience and coping with depression. According to the three theoretical perspectives on the relationship between social support and health posited by Lakey and Cohen [30], social support can buffer the negative impact of stressors (stress and coping perspective), promote self-esteem and self-regulation (social constructionist perspective), and predict psychological and physical wellbeing as an indicator of social relationship quality (relationship perspective). Social support may reduce feelings of shame and guilt caused by internalized HIV stigma through enhancing resilience [31, 32]. Social support may also mitigate the stress and anxiety of PLWH regarding their social relations with others since their HIV diagnosis [33]. Stigma is a social process embedded in social interaction and relationships [34]. HIV-related stigma could destroy PLWH's existing relationship ties with others and isolate them from social networks; whereas, receiving social support, to some extent, can help PLWH connect with and maintain supportive relationships with others [35]. This positive social context could contribute to PLWH's "bouncing back" and thus protect them from depression or reduce depressive symptoms.

Although extant literature suggests that resilience and social support could be protective factors for PLWH with internalized HIV stigma from depression, their specific roles in the mechanism from internalized HIV stigma to depression have yet to be explored. At present and based on our knowledge, there is no study addressing the research question of whether social support moderates the mediating relationship between internalized HIV stigma (exposure), resilience (mediator), and depression (outcome). We believe that this question is important as we can determine the importance of social support in multilevel interventions in promoting resilience through mediating relationships such as the association between internalized HIV stigma, resilience, and depression. The current study aims to test 1) if resilience could buffer the negative impact of internalized HIV stigma on psychological outcomes (depression) among PLWH; and 2) if social support moderates the mediating relationship between internalized HIV stigma, resilience, and depression. We hypothesized that individuals who were exposed to internalized HIV stigma would have lower resilience

and higher depression. We also hypothesized that social support would moderate the mediating relationship between internalized HIV stigma, resilience, and depression.

Methods

Data Source and Participants

Cross-sectional data were collected from 402 PLWH receiving care from a large immunology center in South Carolina from May to September 2018. Eligible participants were 18 years old or older, living with HIV, and willing to participate in the 30–40 minute survey [36]. Participants provided data on psychosocial and behavioral factors and self-reported clinical outcomes.

Over 80% of patients who were initially approached agreed to participate. Participants provided informed consent and received a $20 gift card for their participation. Rather than excluding any data, missing values were handled by multivariate imputation method with missing at random assumption and predictive mean matching method, which has the advantage that imputed values are restricted to observed values so that no impossible values were generated [37]. The University of South Carolina Institutional Review Board approved the study protocol.

Measures

Internalized HIV-related stigma was measured using 12 items taken from the 40 item Negative Self-Image Scale [38, 39]. A sample item from this scale was: "People's attitudes about HIV makes me feel worse about myself." Answers were obtained on a 4-point scale ranging from Strongly disagree (1) to Strongly agree (4). Higher scores represented greater internalized HIV-related stigma. The Cronbach's alpha value for the Internalized HIV-related stigma scale was 0.88.

Resilience was measured using the 10-item Connor-Davidson Resilience Scale (CD-RISC-10) [40]. The CD-RISC-10 comprised ten of the original 25 items from the Connor-Davidson Resilience Scale (CD-RISC). An example of an item was: "I am able to adapt when changes occur." Response options were based on a 5-point scale, where 4 = extremely, 3 = quite a bit, 2 = moderately, 1 = a little bit, 0 = not at all. Higher scores indicated greater resilience. The Cronbach's alpha value for the CD-RISC-10 was 0.92.

Depressive symptoms were measured using the Patient Health Questionnaire-9 (PHQ-9) [41], which contains 9 items taken from the full Patient Health Questionnaire (PHQ). An example of an item was "Little interest or pleasure in doing things." Response options ranged from Not at all (0) to Nearly every day (3) and higher scores indicated greater depressive symptoms. The Cronbach's alpha value for the PHQ-9 was 0.92.

Social support was measured using items from the 19-item Medical Outcomes Study (MOS) Social Support Survey [42]. An example of an item was "Someone you can count on to listen to you when you need to talk." Answers ranged from None of the time (0) to All of the time (4). Higher scores represented greater social support. The Cronbach's alpha value for the MOS-social support survey was 0.98.

Confounders included gender, race, ethnicity, education, income, age and time since diagnosis. Variables considered to be potential confounders were determined by literature search *a priori* and were found to be associated with depression and/or internalized HIV stigma. Prior research has shown gender differences in depressive symptoms where women tend to have higher Center for Epidemiologic Studies Depression Scale (CES-D) scores compared to men among PLWH [43]. Racial/ethnic differences have also been found in depression [44, 45]. Educational and income differences also exist where populations of lower socioeconomic status tend to have higher levels of depressive symptoms [46]. Among PLWH, depression prevalence also varies by age and time since diagnosis where older populations and those who have had a longer diagnosis tend to have depressive symptoms [46]. Women tend to report higher HIV-related stigma compared to men [47, 48]. The experiences of HIV-related stigma can also differ based on race/ethnicity due to differences in culture and interpretation of HIV-related stigma items [49]. Populations with higher educational attainment tend to have less HIV-related stigma [50, 51]. Income levels also varied with HIV-related stigma [51]. Perceived and internalized HIV stigma have been shown to differ by age with adults aged 50 and older scoring the lowest on the Berger HIV Stigma Scale [52] and adults aged 45 and younger reporting greater stigma [50]. A longer time since diagnosis has also been shown to be related to lower internalized HIV stigma [53].

Analytic Approach

Descriptive statistics were used to describe the overall distribution of sociodemographic characteristics of the study population. The effects of confounders on study variables were also examined. Crude and adjusted path models were used to determine the mediating relationship between internalized HIV stigma, resilience and depression, and the effect measure modification of social support. Age, gender, race, ethnicity, education, income, and time since diagnosis were included in the model as covariates. The confounders were added to models of M and Y following Hayes (2017) such that the confounding threat of covariates to the association between X and M, X and Y as well as M and Y were removed [54]. Specifically, the adjusted path model was fitted with the following two equations:

$$M = i_M + a1X + a2W + a3XW + \sum_{i=1}^{q}(f_i C_i) + e_M \qquad \text{[Equation 1],}$$

wherein M refers to the mediator: resilience; X refers to internalized HIV stigma; W refers to the moderator: social support;

i_M

refers to the regression constant,

e_M

is the error/residual. C refers to the confounders that are a set of *q* variables.

$$Y = i_Y + c'X + bM + \sum_{i=1}^{q}(g_i C_i) + e_Y \qquad \text{[Equation 2],}$$

wherein Y refers to depression; M refers to the mediator: resilience; X refers to internalized HIV stigma,

i_Y

refers to the regression constant,

e_Y

is the error/residual. C refers to the confounders that are a set of q variables. c' refers to the direct effect.

We evaluated the goodness of fit of the pathway using multiple indices including: χ^2, CFI, SRMR, and RMSEA. A non-significant χ^2, a value of 0.95 for CFI, <0.08 for SRMR, and 0.05 for RMSEA of the model are considered to be good fit [55]. All analyses were conducted in R.

Results

Table 1 shows the overall distribution of sociodemographic characteristics of the study sample. The majority of the study sample was male (64%), African American (79%), and non-Hispanic or Latino (61%). The majority had an education higher than grade 12. Close to four in ten earned less than $10,000 per year (37%), were 50 and older (39.8%), and one in five had a time since diagnosis greater than 5 years to less than or equal to 10 years (22%).

The final adjusted path model indices were: χ^2=0.248, p=.883; CFI=1.00; SRMR=.001; RMSEA<.001, which showed good fit (Figure 1). The crude path model indices showed similar results: χ^2=1.192, p=.551; CFI=1.00; SRMR=.011; RMSEA<.001. With regards to the fit indices, the path model was not just-identified (or saturated) as the degrees of freedom was equal to 2 rather than 0. Models with small degrees of freedom are in fact quite common in path models [56], and previous literature suggests relying more on SRMR and CFI than RMSEA for models with small degrees of freedom (e.g., df = 2) [57]. The specific issue of RMSEA for models of small degrees of freedom is that the RMSEA often indicates a poor fitting model falsely because the sampling variability of RMSEA increased. However, this issue is alleviated for larger N (> 400) based on simulation results [56]. The model is not overparameterized, in which the difference between the number of unique variances and covariances and number of free parameters (i.e., degrees of freedom) was actually the same with or without confounders being included. The comparable results for adjusted and crude path models also confirmed that the main findings did not change depending on the inclusion of covariates.

Table 2 shows the direct and indirect standardized estimates between stigma, resilience and depressive symptoms and moderation by social support. The effects of confounders were also provided as supplemental information. After adjusting for gender, race, ethnicity, education, income, age, and time since diagnosis, internalized HIV stigma was positively associated with depressive symptoms (β=0.266, p=<0.001) while resilience was negatively associated with depressive symptoms (β=−0.159, p=<0.001). Internalized HIV stigma was positively associated with resilience (β=0.308, p=0.010) and social support was positively associated with resilience (β=0.360, p=<0.001). The effect of internalized HIV stigma on resilience was also moderated by social support (β=−0.008, p=<0.001). The mediation role of resilience in the relationship between internalized HIV stigma and depression was significant (β=−0.049, p=0.026). The mediation model between internalized HIV stigma, resilience, and depression was also moderated by social support (β=0.001, p=0.004). The

conditional indirect effect analyses showed that the indirect effect of internalized HIV stigma on depression through resilience was statistically significant for high social support (β=0.043, p=0.002) but not for low social support (β=−0.01, p=0.375). The simple slope analysis demonstrated the moderating role of social support in the association between internalized HIV stigma and resilience (Figure 2). The association between internalized HIV stigma and resilience was significantly negative for high social support group (β=−0.23, p<0.001); whereas the association was not statistically significant for low social support group (β=0.03, p=0.727).

Discussion

The main findings suggest that internalized HIV stigma was positively, and resilience was negatively associated with depression. Moreover, internalized HIV stigma and social support were positively associated with resilience. However, social support moderated the effect of internalized HIV stigma on depression through resilience. The indirect effect was statistically significant for high social support but not for low social support.

In line with previous studies, the present study shows that internalized HIV stigma is positively correlated with depression [58]. For example, a qualitative study among adolescents and women caregivers found perceived community stigma and internalized HIV stigma were linked with greater depression [59]. The findings of the study also shows that family or other support system is a protective factor in the association of stigma and depression [59]. Another study by Charles et. al. found that 12% of the participants with external or internal stigma were severely depressed and had a poor quality of life [60]. Turan et al., 2019 in a longitudinal study found that internalized HIV stigma was associated with depressive symptoms among women living with HIV [61]. Thus, people who experience any kind of HIV related stigma are more likely to be depressed or do worse on psychological health. People with self-stigmatized opinions may isolate themselves or live in fear of HIV disclosure [58], which in turn may result in stress and/or depressive symptoms [62].

In addition, consistent with extant literature, our study also shows that resilience was negatively associated with depression [58, 62]. For instance, a study by Wen et. al. found those with greater resilience were less depressed compared to individuals with lower resilience [63]. Therefore, people with a capacity to overcome difficult situations related to HIV-related stigma may be less likely to experience depression. The underlying reasons for high resilience can include self-efficacy and self-esteem [63]. Hence, these factors along with the resilience may help PLWH to have lower depressive symptoms and improved psychological well-being [63]. In addition, people with a capacity to overcome difficult situations related to HIV-related stigma may be less likely to experience depression.

The present study also found that internalized HIV stigma was positively associated with resilience and these results were inconsistent with a study by Yang et al., 2020, which found a negative relationship between HIV-related stigma and resilience [64]. Another study found that internalized HIV stigma was negatively correlated with resilience among people living with HIV, but this correlation was not statistically significant [65]. It is possible that a harsh social environment (perceived stigma and/or enacted stigma) may influence internalized

HIV stigma and may prompt internal power (e.g., resilience) of bouncing back among this study population. It is possible that among this study population, individuals who experience internalized HIV stigma may show greater resilience, especially among those with high social support. Given the potentially different associations between various types of stigma (internalized HIV stigma, perceived stigma, enacted stigma) and resilience, further studies are also needed to explore if different types of stigma have similar impacts on resilience and if social support may moderate these associations in different ways.

We found that social support moderated the association between internalized HIV stigma, resilience and depression, where the association was statistically significant among those with high social support but not among those with low social support. In other words, among PLWH who had high social support, resilience buffers the negative impacts of stigma on mental health (e.g., depression). These findings suggest that social support plays a key role in the link between internalized HIV stigma, resilience and depression and that interventions geared towards improving social support may help in strengthening the buffering effect of resilience between internalized HIV stigma and depression. Social support can facilitate positive coping with stigma and discrimination in daily life by offering a solid foundation of resources for overwhelming challenges. Existing studies suggest that self-efficacy and self-esteem could be a potential path from resilience to reduced depression [63]. Our findings highlight social support as a critical component at the interpersonal level in the link between internalized HIV stigma, resilience, and depression.

Our findings have important implications in developing and delivering resilience-based interventions for mitigating negative impacts of internalized HIV stigma and improving the psychological wellbeing among PLWH. First, these interventions need to include multiple level components such as social support that goes beyond intrapersonal factors (e.g., self-esteem and resilience) [66]. Our findings show that the buffering effect of resilience on depression is not homogeneous but varies by the social support that PLWH receive. To some extent, the intervention approach with an emphasis solely on inner resilience may not be an integrated or sustainable one because it may risk removing or reducing societal responsibility to protect disadvantaged populations and the attempts to change the social environment [67]. Receiving social support from family, friends, health care institutions and welfare systems may help to foster long-term resilience in a more ecological context, which is especially important for key populations such as PLWH.

Second, we still need to be fully aware of the mental health needs of the PLWH with a high level of resilience at the baseline and should not exclude them from health promotion interventions. As our study suggests, internalized HIV stigma may invoke internal resilience among some PLWH, yet we cannot ignore or normalize their disadvantages and challenges in their daily lives. The resilience and mental health trajectories are rarely linear or smooth for PLWH. For example, many African American women living with HIV demonstrate high level resilience and inner strengths in taking on family responsibilities (e.g., income generation and caregiving), yet without social support and institutional assistance, the resilience itself does not lift their burdens or even impact their health seeking and self-management of HIV [68]. Social support from multilevel systems tailored for all

disadvantaged PLWH is necessary for enhancing the psychosocial wellbeing of this population and to ensure that no one is left behind.

Limitations

Several limitations need to be considered. First, the study used a cross-sectional design, therefore, it is difficult to establish temporality and causal relationships. Given the complication of interaction between internalized HIV stigma, resilience, social support and depression, and potential bi-directional impacts, studies based on longitudinal data and with cross-lagged modeling analysis are warranted to advance our understanding on the dynamics from stigma to depression through resilience and social support. Second, data were collected in South Carolina and may not be applicable to other regions with different sociocultural contexts. We need to be cautious in interpretation of the findings and improve the external validity of the findings based on data from diverse settings. Third, majority of participants in our study had been living with HIV for at least five years and may not be reflective of participants with a shorter time of diagnosis. Literature has elaborated the trajectories of mental health outcomes among PLWH along with their course of living with HIV since diagnosis. Fourth, this study has limitations in measurement instruments. For example, the social support measurement we used in this study focused on the functional support received, rather than the size of the social support network. In addition, depression was measured with a psychosocial assessment tool questionnaire rather than a clinical diagnosis and may be subject to social desirability bias.

Conclusions

Internalized HIV stigma continues to be a challenge for PLWH. Based on our study's findings that internalized HIV stigma was associated with higher depression, and resilience was linked to lower depression, programs should endeavor to decrease internalized HIV stigma and develop resilience-based interventions, which would lower depression. In addition, by addressing internalized HIV stigma this approach may enhance PLWH's capacity of positive coping. Our study also found that internalized HIV stigma was associated with greater resilience. This finding was unexpected and future studies should explore if there are populations with internalized HIV stigma who may show greater resilience in the presence of high social support. In addition, our study suggests that internalized HIV stigma and social support may invoke bouncing back and inner resilience among PLWH. We also found that the buffering effect of resilience between internalized HIV stigma and depression is further moderated by social support level. Our findings highlight the critical role of social support in resilience-based interventions for this vulnerable population because the buffering effect of resilience may not be statistically significant without a high level of social support. Emphasizing social support from multiple levels beyond intrapersonal factors may allow interventions based on a socioecological context to foster long-term resilience among PLWH. Simultaneously, interventions should not exclude PLWH with high levels of resilience as they may face high levels of internalized HIV stigma and obtain limited social support. A supportive social context is critical to enhance the psychosocial wellbeing of PLWH. Multilevel interventions are warranted and

should engage PLWH and populations who provide social support such as family, friends, and other key individuals.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments:

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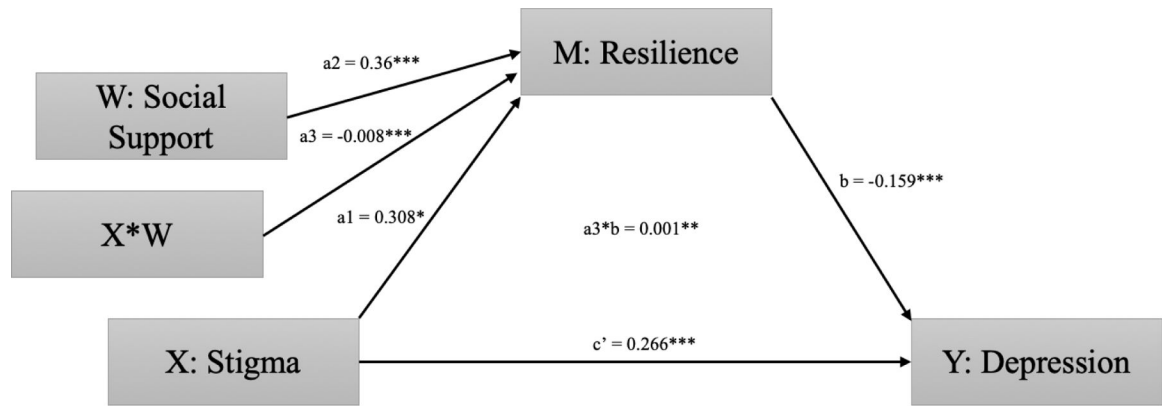
Figure 1.
Path diagram of winning model showing relationship between stigma, resilience, and depressive Symptoms moderated by social support among People Living with HIV.
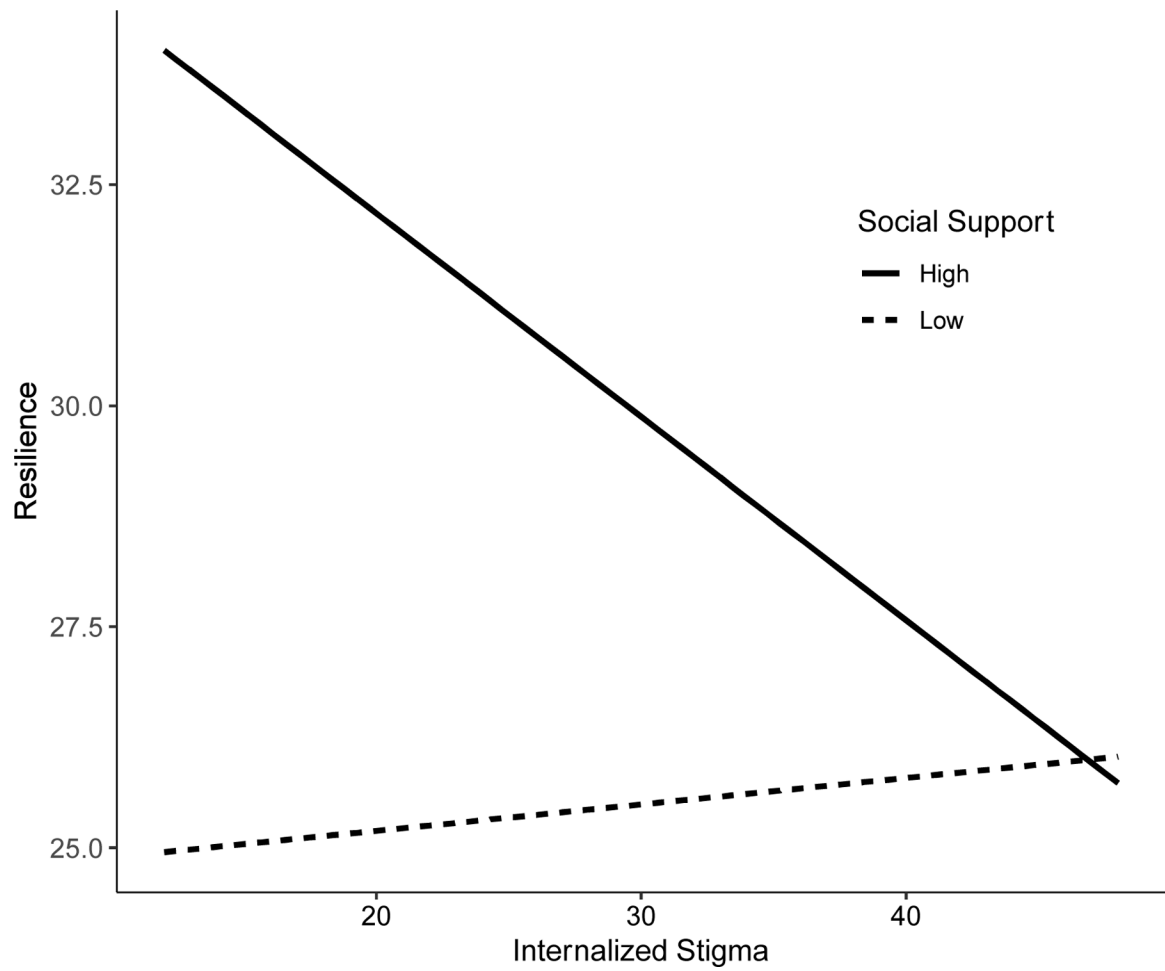Note: ***p<0.001; **p<0.01; *p<0.05

Figure 2.
The moderation effect of social support on the relationship between internalized HIV stigma and resilience. The association between internalized HIV stigma and resilience was significantly negative for high social support group, β=−0.23, p<0.001; whereas, the association was not significant for low social support group, β=0.03, p=0.727.

Table 1.

Distribution of Sociodemographic Characteristics

Characteristic	Variable type [a]	Overall N (%)
Gender	Categorical	
Female		136 (33.8)
Male		259 (64.4)
Other		7 (1.7)
Race	Categorical	
Black or African American		316 (78.6)
White		67 (16.7)
American Indian or Alaskan Native, Asian, Native Hawaiian or Other Pacific Islander		7 (1.7)
Other		12 (3.0)
Ethnicity	Categorical	
Hispanic or Latino		19 (4.7)
Not Hispanic or Latino		244 (60.7)
Other		139 (34.6)
Education	Categorical	
Grades 1 through 8		5 (1.2)
Grades 9 through 11		58 (14.4)
Grade 12 or GED		128 (31.8)
Some college, Associate's Degree, or Technical Degree		129 (32.1)
Bachelor's Degree		48 (11.9)
Any postgraduate studies		34 (8.5)
Income	Continuous	
$10,000		148 (36.8)
> $10,000 to $24,999		112 (27.9)
> $25,000 to $49,999		95 (23.6)
> $50,000 to $99,000		35 (8.7)
> $100,000		12 (3.0)
Age	Continuous	
18–34		95 (23.6)
35–49		111 (27.6)
50+		160 (39.8)
Time since diagnosis	Continuous	
5 years		69 (17.2)
> 5 years to 10 years		87 (21.6)
>10 years to 20 years		130 (32.3)
>20 years		116 (28.9)

[a] The type that the variable was included into the model.

Table 2.

Direct and Indirect Standardized Estimates between Stigma, Resilience, and Depressive Symptoms moderated by Social Support among People Living with HIV

Effects of Stigma on Depressive Symptoms (c')		Effects of Resilience on Depression Symptoms (b)		Effects of Stigma on Resilience (a1)		Effects of Social Support on Resilience (a2)		Effects of Stigma on Resilience Moderated by Social Support (a3)		Moderated Mediation (a3*b)	
Crude β	p-value	Crude β	p-value	Crude β	p-value	Crude β	p-value	Crude β	p-value	Crude β	p-value
0.272	<0.001	−0.171	<0.001	0.292	0.02	0.363	<0.001	−0.007	0.001	0.001	0.004
Adjusted β^a	p-value	Adjusted β^a	p-value	Adjusted β^a	p-value	Adjusted β^a	p-value	Adjusted β^a	p-value	Adjusted β^a	p-value
0.266	<0.001	−0.159	<0.001	0.308	0.01	0.360	<0.001	−0.008	<0.001	0.001	0.004

[a] Adjusted estimates controlled for gender, race, ethnicity, education, income, age and time since diagnosis.