



# Sources of Resilience as Mediators of the Effect of Minority Stress on Stimulant Use and Sexual Risk Behavior Among Young Black Men who have Sex with Men

Erik D. Storholm<sup>1</sup> · Wenjing Huang<sup>1</sup> · Daniel E. Siconolfi<sup>1</sup> · Lance M. Pollack<sup>2</sup> · Adam W. Carrico<sup>3</sup> · Wilson Vincent<sup>2</sup> · Gregory M. Rebchook<sup>2</sup> · David M. Huebner<sup>4</sup> · Glenn J. Wagner<sup>1</sup> · Susan M. Kegeles<sup>2</sup>

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## Abstract

The greatest proportion of new HIV infections among men who have sex with men (MSM) is occurring among young Black MSM (YBMSM) ages 13–24. Consequently, research is needed to understand the psychosocial pathways that influence HIV risk and resilience in YBMSM. Minority Stress Theory proposes that the stigma, prejudice, and discrimination facing sexual and racial minorities are chronic stressors that lead to increased engagement in risk behaviors. The present study examined whether minority stress is associated with stimulant use and sexual risk behaviors by depleting psychosocial resilience. We recruited 1817 YBMSM, ages 18–29, from multiple venues in two major cities in Texas for participation in a brief survey. Results from structural equation modeling indicated that decreased resilience partially mediated the association of minority stress with sexual risk behavior. Resilience was also negatively associated with stimulant use. Interventions focused on cultivating psychosocial resilience could mitigate the deleterious consequences of minority stress and reduce stimulant use in YBMSM.

**Keywords** Stimulant use · Resilience · Minority stress · Sexual risk · YBMSM

## Introduction

The greatest proportion of all new HIV diagnoses among men who have sex with men (MSM) is occurring among young Black MSM (YBMSM) ages 13–24 [1, 2]. Numerous studies have demonstrated a strong association between stimulant drug use (e.g., powder cocaine, crack cocaine, ecstasy, and methamphetamine) and sexual risk behaviors that can lead to the acquisition of HIV among MSM [3–8]. Stimulants impair judgment, increase impulsivity, lower risk-aversion, and increase one's arousal and desire

to engage in sexual behavior. Use of these substances can increase the likelihood of engaging in condomless sex, increase the frequency and duration of sex, and potentially increase the number of one's sex partners [9–11]. The contribution of stimulants to HIV risk has also been documented among Black MSM who engage in high-risk sexual behavior [12, 13]. However, less is known about the risk and protective factors for stimulant use and high-risk sexual behavior among YBMSM.

There is a robust body of literature showing that experiences of discrimination and victimization, as well as the negative psychosocial states that are associated with experiences of racism and homophobia, are associated with stimulant and other illicit drug use among MSM [11, 14–17]. Substance use disparities and HIV disparities may be viewed as socially-produced ills, in part explained by discrimination and victimization these men have experienced [18–25]. These ills experienced by YBMSM both predispose them to, and may exacerbate the formation of, maladaptive behaviors including stimulant use and risky sexual behavior. For YBMSM, the intersectionality of multiple stigmatized identities (i.e., minority race, and minority sexual orientation)

✉ Erik D. Storholm  
storholm@rand.org

<sup>1</sup> RAND Corporation, 1776 Main Street, Office 5227, Santa Monica, CA 90407, USA

<sup>2</sup> Center for AIDS Prevention Studies, Department of Medicine, University of California, San Francisco, USA

<sup>3</sup> School of Medicine, University of Miami, Miami, FL, USA

<sup>4</sup> School of Public Health, George Washington University, Washington, DC, USA

may have layered or additive effects [25–27]. For example, risk for substance use disorders has been shown to be greatest when individuals report multiple types of discrimination [28], suggesting the need to account for multiple, overlapping identities or experiences of discrimination.

Minority stress theory [20] provides a lens through which one can examine the cumulative effects of discriminatory experiences on the well-being of YBMSM. Minority Stress Theory maintains that individuals who have non-majority identities, such as gay men and racial/ethnic minorities, experience disproportionately burdensome degrees of stigma, prejudice, and discrimination, and as a result, are at risk for increased levels of depression, substance use and sexual behaviors that may put the individual at risk for HIV [19, 20]. Additionally, homophobia, discrimination, and victimization may be internalized, and this internalized homophobia itself is a minority stressor [19, 20, 29]. The combined effects of these discriminatory experiences and their internalization may increase risk for HIV infection or transmission by influencing individual-level risk factors such as stimulant use and risky sexual behavior among YBMSM [15, 16, 30].

While the associations between mental health problems, substance abuse, and sexual risk behavior have been documented among young MSM [5, 29, 31, 32], these seminal approaches to understanding HIV disparities have focused largely on the measurement of risk-factors and have contributed to the risk-reduction literature while providing little attention to the vitality of protective factors in YBMSM health. In the broader literature focused on MSM, resilience has been defined as a process of adaption and readjustment including psychological, social, and behavioral characteristics that occur despite multiple personal and social losses [33–37]. HIV prevention researchers have also suggested that sources of resilience have been largely untapped resources in behavioral interventions and that they may be associated with reductions in substance abuse and HIV-related risk behaviors among MSM [29, 35, 36, 38]. Further, sources of resilience such as higher levels of self-esteem and social support have been specifically linked to reduced HIV-risk behavior and increased HIV-related health behaviors such as HIV testing, specifically among Black MSM [24, 39]. Herrick et al. [36] suggested that HIV prevention work would be more efficacious if it were designed to draw upon these sources of resilience.

In order for behavioral interventions to be maximally effective among YBMSM, they must focus directly on the potential mediating and moderating factors for problematic substance use and sexual risk behavior that result from minority stress. More specifically, combating stimulant use will likely be ineffective unless the discrimination experienced as the result of multiple stigmatized identities is addressed. It is paramount that HIV-prevention interventions

focus not only on preventing and addressing the deleterious effects of minority stress, but also on fully understanding and capitalizing on the potentially mediating and or moderating factors that influence substance use among YBMSM. The influence of resilience assets and resources (i.e., individual factors such as gay and bisexual pride and self-esteem, and social factors such as support from peers) on YBMSM need to be examined as potential protective factors against minority stress and its associated risks [37–41].

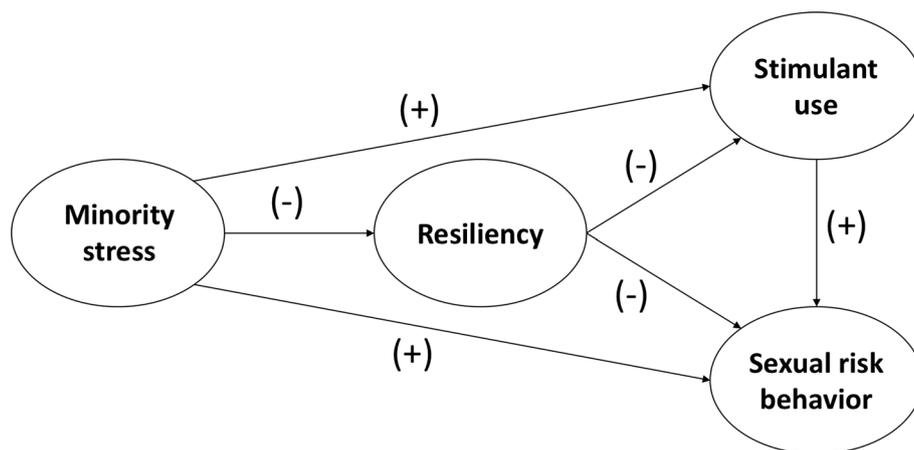
In the resilience literature there has been some debate as to whether resilience serves a mediator or a moderator. This study sought to examine sources of resilience as a potential mediator of the relationship between stressful discriminatory experiences, stimulant use, and sexual risk taking among an understudied population of YBMSM from the U.S. South (two cities in Texas) who are at high-risk for HIV infection. Based on the existing literature, we examined three specific sources of resilience among YBMSM: sexual identity pride (e.g., pride in being gay or bisexual), (2) availability and receipt of social support, and (3) traits and attitudes conceptualized as resilience, such as the belief that one's life has meaning, or the belief that one can get through difficult times [42]. This study is the first to elucidate the potentially mediating effects of gay pride/self-esteem, resilience, and social support on the relationship between stressful experiences of racism and homophobia, stimulant use, and sexual risk behavior among YBMSM. Specifically, we hypothesized that the effect of minority stress on sexual risk behavior would have a direct pathway, as well as indirect pathways, where the relationship between minority stress and sexual risk behavior would be *mediated* by sources of resilience and stimulant use. We also hypothesized that sources of resilience would have an effect on stimulant use, which in turn we hypothesized would affect sexual risk behavior. A simplified path diagram of our hypotheses, without the measurement component, is depicted in Fig. 1. Understanding the important role of these potential protective factors is vital to the development of innovative resilience-based substance abuse and HIV-prevention interventions for YBMSM.

## Methods

### Participants

Participants were Black and/or African American men between ages of 18–29. Participants were recruited as part of a large community-based HIV prevention study of YBMSM in the Dallas and Houston metropolitan areas. Data for these analyses were obtained from three waves of independent, cross-sectional samples (N = 1817) surveyed 1 year apart in each community after implementation of Mpowerment, a multi-level intervention designed to promote sense of

**Fig. 1** Path model of hypothesized structural relationships



community, increase HIV testing, and reduce sexual risk behavior among YBMSM [43]. Data from the three waves collected in the summer and fall of 2013, 2014, and 2015 were combined for this study. Eligibility requirements were that participants were Black or African American, were 18–29 years old, lived in the Dallas or Houston metropolitan areas, reported having had receptive and/or insertive anal sex with another man in the past 12 months, and spoke English.

## Recruitment and Procedures

The methods have been previously described in more detail in Vincent et al. [44]. Briefly, participants were recruited using modified venue-based time-location sampling, adapted from the National HIV Behavioral Surveillance Survey [45]. Venues and sampling periods were identified in 4-h blocks. In order to proceed with data collection, at least eight YBMSM needed to be present at each sampling event. A maximum of 20 surveys were collected in a given sampling event. The majority of recruitment took place at bars and clubs (93%), with an additional 7% taking place at the project offices at a major university and 0.4% at a community-based youth organization.

Nearly all participants who were approached agreed to undertake the study eligibility screening (92%); nearly all eligible participants opted to participate (94%). The site recruiters from the University of Texas, Southwestern Medical Center in Dallas and the University of Texas Health Sciences Center in Houston introduced the study and obtained verbal informed consent from each participant. Self-administered surveys were completed privately on personal digital assistants (PDAs). Autonomous PDAs were used to encourage honest responses and reduce social desirability bias for sensitive behaviors such as sexual behavior and drug use [46]. Participants were asked to provide partial information on unique characteristics (e.g., first letter of their mother's first name) in order to construct post hoc a unique alphanumeric identifier which was used to identify respondents

who participated in multiple waves so we could exclude them from these analyses. Surveys took less than 30 min on average to complete (Mean = 24 min; IQR = 17–29 min). Participants were compensated \$30. The study procedures were reviewed and approved by several institutional review boards (IRBs), including the IRB at the home institution of the principal investigator as well as the IRBs of the data collection subcontractors in Dallas and Houston.

## Measures

### Sociodemographic

Age, self-reported HIV status, city of residence, education attained, sexual identity, and income were assessed to describe the sample, and those variables found to be significantly associated with the outcome variables at the bivariate level were used as control variables for analyses.

### Minority Stress

Three separate measures of minority stress were administered including experienced homophobia, experienced racism, and internalized homophobia. Correlations among these measures were moderate ( $r$ 's = 0.46–0.51), suggesting that they assess relatively distinct facets of minority stress.

### Experienced Homophobia

We used seven items adapted from Díaz et al.'s longer scale to assess men's experiences of homophobia in the past year [47]. Participants rated how often in the past year they: (1) were made fun of or called names; (2) were hit or beaten up; (3) heard that gay people are sinners, (4) heard that gay people will be alone when they grow old; (5) felt that their attraction to other men (or being gay or bisexual) hurt and embarrassed their family; (6) had to pretend that they were

totally straight or heterosexual in order to be accepted; and (7) were treated unfairly at their job for being effeminate (girly) or for being attracted to other men (or gay or bisexual). Items were rated on five-point Likert-type scales from never [1] to very often [5]. The items displayed adequate internal consistency (Cronbach's  $\alpha = 0.86$ ;  $M = 15.64$ ,  $SD = 6.68$ ) and were used as a composite score.

### Experienced Racism

We used eleven items adapted from Díaz et al.'s longer scale to assess men's experiences of racism in the past year [47]. Sample items assessed how often "your civil rights been violated (i.e., job or housing discrimination due to racism, racial discrimination, or racial prejudice)," how often "you witnessed prejudice or discrimination directed at someone else because of their race/ethnic group," and how often "you were treated as if you were 'stupid' or 'talked down to' because of your race/ethnic group?" Items were rated on a Likert-type scale from never [1] to very often [5]. The items displayed excellent internal consistency (Cronbach's  $\alpha = 0.95$ ;  $M = 23.25$ ,  $SD = 10.36$ ) and were used as a composite score.

### Internalized Homophobia

We used three items from our previous research [48], originally adapted from Nungesser's [49] work to reflect the current vernacular when speaking about homosexuality, to assess this construct: "Do your religious beliefs make you feel any guilt about having sex with other men?" "Does having sex with other men make you dislike yourself?" and "Do you ever wish that you were attracted only to women?" Items were rated on a Likert-type scale from not at all [1] to a great deal [5]. The items displayed adequate internal consistency (Cronbach's  $\alpha = 0.79$ ;  $M = 5.99$ ,  $SD = 3.23$ ) and were used as a composite score.

### Sources of Resilience

Three separate measures of sources of resilience were administered including a measure of pride/self-esteem, social support and perceived resilience. Correlations among these measures were moderate ( $r$ 's = 0.34–0.47), suggesting that they assess relatively distinct facets of minority resilience.

### Pride and Self-Esteem

We used three items developed from our previous research [48] to assess this construct. We asked how happy and how much pride men felt in being gay or bisexual. We also asked how comfortable they were with their sexual attraction

to other men. Items were reworded to fit an interval scale response set (i.e., the degree to which they endorsed the item). These items were rated on a five-point Likert-type scale from not at all to a great deal. The items displayed adequate internal consistency (Cronbach's  $\alpha = 0.84$ ;  $M = 11.41$ ,  $SD = 3.43$ ) and were used as a composite score.

### Social Support

We assessed how much social support respondents received from their African American gay and bisexual male friends using four items adapted from our previous research [48] that were originally adapted from Procidano and Heller [50]. The decision to assess support from other gay and bisexual friends was based on previous research suggesting that support from these peers is uniquely important for MSM and YBMSM when they are facing HIV-related concerns or challenges [51–53]. The four items include (1) being with these friends helps them feel good about themselves; (2) these friends provide them with helpful information or advice; (3) these friends help solve problems; and (4) they have a deep sharing relationship with these friends. Items were rated on a six-point Likert-type scale from disagree strongly to agree strongly. The items had good internal consistency (Cronbach's  $\alpha = 0.89$ ;  $M = 18.37$ ,  $SD = 5.36$ ) and were used in a composite score.

### Resilience

We used the 14-item Wagnild & Young Resilience Scale [42] to measure respondents' overall resilience that is not specific to their identity. Example items are "I feel that I can handle many things at a time," and "I can get through difficult times because I've experienced difficulty before." Items were rated on a six-point Likert-type scale from disagree strongly to agree strongly. The items had excellent internal consistency (Cronbach's  $\alpha = 0.97$ ;  $M = 73.53$ ,  $SD = 15.29$ ) and were used as a composite score.

### Stimulant Use

Participants reported the number of days in the past 2 months where they used ecstasy, powder cocaine, crack-cocaine or methamphetamine. Each of these substances was collapsed into a binary variable (e.g., use of any ecstasy in the prior 2 months) and then these four variables were used to model the *stimulant use* latent variable.

### Sexual Risk Behavior

Participants were first asked if they had a current boyfriend or lover (i.e., primary partner) and then were asked to report their sexual risk behavior with other sex partners (i.e., not

their boyfriend or lover). Such behaviors were measured by three indicators: (1) a 7-point indicator of levels of sexual risk with other men that ranged from: “1 = no sex in past 2 months, 2 = no anal sex in past 2 months, 3 = anal sex with condom only past 2 months, 4 = had condomless anal sex past 2 months with sero-concordant partners only, 5 = had condomless anal sex past 2 months with risk to the insertive partner, 6 = had condomless anal sex past 2 months with risk to the receptive partner, 7 = had condomless anal sex past 2 months with risk to both partners”; (2) and (3) are the numbers of casual condomless anal sex episodes in the past 60 days, insertive and receptive, respectively. Pre-exposure prophylaxis (PrEP) was not factored into our operationalization of sexual risk as it was not available in either Dallas or Houston at the time of data collection.

## Statistical Analyses

We used structural equation modeling (SEM) to assess the relationship between the four constructs: *minority stress*, *resilience*, *stimulant use* and *sexual risk behavior*. The measurement model estimated the latent variables, which are defined by the indicators. The structural model estimated the relationships between the latent constructs. Again, we hypothesized that the effect of *minority stress* on *sexual risk behavior* would have a direct pathway, as well as indirect pathways where the relationship is mediated by *sources of resilience* and *stimulant use*. We also hypothesized that *sources of resilience* would have an effect on *stimulant use*, which in turn affects *sexual risk behavior*. These mediating effects are tested through three indirect pathways in Fig. 1, which are explained in more detail in the results section.

We conducted SEM using *Mplus 8* with maximum likelihood estimation with robust standard errors (i.e. robust to non-normality) of model parameters. For each estimated regression parameter, we report the standardized solution, including the standardized estimate ( $\beta$ ), its standard error (SE), and the  $p$  value based on the Z-statistic. Age, city, HIV status and income were included as covariates in the models. To evaluate model fit, we report the Root Mean Square Error of Approximation (RMSEA; [54]), Comparative Fit Index (CFI; [55, 56]), and the standardized root mean square residual (SRMR). Satisfactory global model fit is attained when two of the following three conditions are met: CFI  $\geq 0.95$ , RMSEA  $\leq 0.06$ , and SRMR  $\leq 0.08$  [57].

## Results

Participants are described in Table 1. The analytic sample was split evenly across Dallas and Houston and the majority of participants self-identified as gay (78%). Mean age was 24.86 and most had graduated from high school or obtained

a GED (86%) and were currently employed part- or full-time (83%). Almost three-quarters of the participants made less than \$40,000 annually. One in six participants self-reported an HIV-positive serostatus. More than one in five participants (23%) reported stimulant use in the past 2 months. The two most common stimulants used in the prior 60 days were ecstasy (18%) and powder cocaine (17%). The use of crack cocaine (14%) and methamphetamine (13%) were slightly less common.

Overall model fit of the structural equation model was acceptable ( $\chi^2(107) = 450$ ,  $p < 0.001$ ; CFI = 0.91, RMSEA = 0.05 and SRMR = 0.04). Associations between the control variables and *sexual risk behavior* were not statistically significant. Figure 2 depicts the estimated paths in Model 1. Paths with solid lines in Fig. 2 indicate statistically significant effects with  $p < 0.05$  and those with dashed lines represent effects that are not statistically significant ( $p > 0.05$ ). The factor loadings for the measurement model (the latent variables) and the regression coefficients for the structural model are reported in Table 2. For the measurement model, indicator loadings were of moderate to high magnitude (0.52–0.87) and were statistically significant, which together indicate a strong relationship with their respective hypothesized latent constructs. For the structural model, the reported estimates represent the standardized regression coefficients.

### Direct Effects

Sexual risk behavior was associated with each of the three latent predictor variables (*stimulant use*, *minority stress*, and *resilience*). *Stimulant use* had the largest association with *sexual risk behavior* ( $\beta = 0.19$ ,  $p < 0.001$ ), followed by the association between *minority stress* and *sexual risk behavior* ( $\beta = 0.11$ ,  $p = 0.01$ ). *Sources of resilience* was negatively associated with sexual risk behavior ( $\beta = -0.11$ ,  $p = 0.02$ ).

### Total Effects

The total indirect effect of *minority stress* on *sexual risk behavior* included three unique pathways. These included a path where *sources of resilience* mediated the association between *minority stress* on *sexual risk behavior*, a path where stimulant use mediated the association between *minority stress* on *sexual risk behavior*, and a path that included both *sources of resilience* and *stimulant use* as mediators between *minority stress* and *sexual risk behavior*. Table 3 summarizes the total effects of *minority stress* on *sexual risk behavior*. The combined total effect (direct and indirect) is statistically significant (estimated total effect = 0.14,  $p < 0.05$ ). The indirect effects are shown as three unique pathways in Table 3 (through *stimulant use*, through *sources of resilience*, through *stimulant use* and

**Table 1** Participants' characteristics (n = 1817)

	%	n
Age		
M = 24.86, SD = 2.85		
City		
Dallas	50.25	913
Houston	49.75	904
Sexual orientation identity		
Gay, homosexual	77.58	1407
Bisexual	20.29	368
Heterosexual	1.49	27
Other	0.66	12
Educational attainment		
Did not complete high school or GED	14.47	258
High school or GED	23.56	420
Some college/associate's/technical degree	41.05	732
Bachelor's degree	16.10	287
Any graduate studies	4.82	86
Employment status		
Employed full-time	64.58	1154
Employed part-time	18.02	322
Unemployed	14.89	266
Disability	2.52	45
Income		
< \$10,000	23.61	419
\$10,000–\$19,999	18.54	329
\$20,000–\$39,999	31.27	555
\$40,000–\$59,999	14.99	266
\$60,000–\$79,999	5.75	102
\$80,000–\$99,999	2.99	53
≥ \$100,000	2.87	51
HIV serostatus		
HIV-negative	78.30	1407
HIV-positive	13.24	238
Unknown (includes tested, never tested)	8.46	152
Stimulant use in past 60 days		
Ecstasy	18.36	325
Powered cocaine	16.70	294
Crack	14.23	252
Methamphetamine	13.10	232
Sexual risk behavior		
Casual sex risk index in past 60 days		
No sex	53.36	945
No anal sex	8.81	156
Anal with condom only	15.08	267
UAI sero-concordant only	14.29	253
UAI insertive risk	2.99	53
UAI receptive risk	5.42	96
UAI mutual risk	0.06	1
	Mean (SD)	n
Casual UAI # times (past 60 days)	0.64 (3.41)	1817

Table 1 (continued)

	Mean (SD)	n
Among men with any casual UAI insertive	2.03 (6.38)	832
Casual UAR # times (past 60 days)	0.93 (4.43)	1817
Among men with any casual UAI receptive	1.40 (4.94)	829

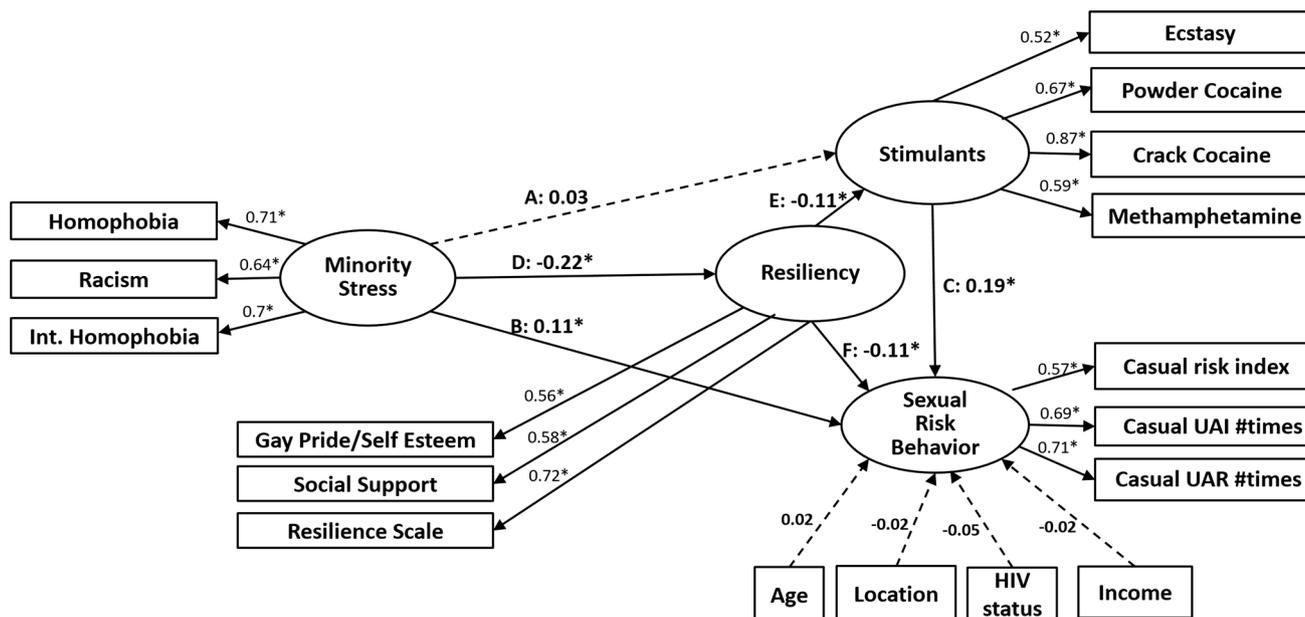


Fig. 2 Measurement and structural model of minority stress, resilience, stimulant use, and sexual risk behavior

sources of resilience). The indirect effects summarize the lags that constitute each pathway; each of these lags were also reported independently as  $\beta$  estimates in Table 2.

The first pathway represents the indirect effect of *minority stress* on *sexual risk behavior* through *stimulant use* (paths A and C with  $\beta_A = 0.03$  and  $\beta_C = 0.19$  from Table 1). Although the second lag  $\beta_C$  is statistically significant ( $p < 0.001$ ) suggesting that *stimulant use* is associated with more *sexual risk behavior*, the first lag is not statistically significant ( $p = 0.37$ ). As a result, our testing of the combined indirect effect of *minority stress* on *sexual risk behavior* mediated by *stimulant use* (specifically pathway A and C) shows that this particular indirect effect is not statistically significant (total estimate = 0.01,  $p = 0.38$  from Table 3), and that *sources of resilience* likely plays a more important role in explaining the significant total indirect effect (estimate = 0.04,  $p < 0.05$ ) given its influence on the second and the third pathways.

The second pathway consists of paths D and F. This represents the mediating effect of *sources of resilience* on the path between *minority stress* and *sexual risk behavior*. These paths were estimated as  $\beta_D = -0.22$  and  $\beta_F = -0.11$  respectively, from Table 2. The combined effect

is statistically significant (total indirect effect estimated as 0.03,  $p < 0.05$  from Table 3). This pathway suggests that greater *minority stress* is associated with lower *sources of resilience*; lower *sources of resilience* is associated with increased *sexual risk behavior*.

The third pathway consists of paths D, E, and C. This combined effect suggests that higher *minority stress* is associated with less *resilience* ( $\beta_D = -0.22$ ,  $p < 0.05$ ). Less *resilience* is associated with more *stimulant use* ( $\beta_E = -0.11$ ,  $p < 0.05$ ), which in turn is associated with more *sexual risk behavior* ( $\beta_C = 0.19$ ,  $p < 0.05$ ). The total indirect effect of this pathway is estimated as 0.01 with  $p < 0.05$  and is shown at the bottom of Table 3. This pathway suggests that greater *minority stress* is associated with less *resilience*, which is associated with more *stimulant use*; higher levels of *stimulant use* are associated with higher levels of *sexual risk behavior*. Pathway (D, E, and C) provides additional sources of influence on *stimulant use* and *sexual risk behavior* beyond the direct effect of *minority stress* on *sexual risk behavior* (path B) and indirect effect (paths D and F representing effect of *minority stress* on *sexual risk behavior* mediated by *resilience*).

**Table 2** Standardized SEM results

	Standardized estimate	SE	<i>p</i>
<b>Measurement model</b>			
Minority stress			
Homophobia	0.71	0.02	<0.001
Racism	0.64	0.02	<0.001
Internalized homophobia	0.70	0.02	<0.001
Sources of resilience			
Gay/bisexual pride and self-esteem	0.56	0.03	<0.001
Social support	0.58	0.03	<0.001
Resilience scale	0.72	0.03	<0.001
Stimulant use			
Ecstasy	0.52	0.02	<0.001
Powder cocaine	0.67	0.02	<0.001
Crack cocaine	0.87	0.02	<0.001
Methamphetamine	0.59	0.02	<0.001
Sexual risk behavior			
Casual sex risk index	0.57	0.04	<0.001
Casual UAI # times	0.69	0.04	<0.001
Casual UAR # times	0.71	0.04	<0.001
<b>Structural model</b>			
Sources of resilience regressed on			
Minority stress (Path D)	-0.22	0.04	<0.001
Stimulant use regressed on			
Minority stress (Path A)	0.03	0.03	0.37
Sources of resilience (Path E)	-0.11	0.04	0.00
Sexual risk behavior regressed on			
Stimulant use (Path C)	0.19	0.04	<0.001
Minority stress (Path B)	0.11	0.04	0.01
Sources of resilience (Path F)	-0.11	0.05	0.02

## Discussion

Using structural equation modeling, we examined the effect of minority stress on sexual risk behavior, while accounting for the role of resilience sources and stimulant

use among YBMSM. Our findings controlled for differences across sociodemographic variables including age, city, income, and HIV status; none of these covariates were significantly associated with sexual risk behavior among these YBMSM. Minority stress was found to be negatively associated with resilience, and resilience was found to be negatively associated with stimulant use and sexual risk behavior. Essentially, these findings suggest that minority stress makes men less resilient, and less resilient men have more sexual risk.

Minority stress was significantly and directly associated with sexual risk behavior among these YBMSM. This finding is consistent with existing research that has demonstrated that minority stress (experiences of homophobia and/or racism, and internalized homophobia) is associated with sexual risk behavior among MSM [30, 58, 59] and that Black MSM may experience multiple layers of stigma [25–27, 60]. We also found that stimulant use was associated with sexual risk behavior. The direct effect of stimulant use on sexual risk behavior was nearly twofold greater than the direct effect of minority stress on sexual risk behavior. This finding may represent the more proximal psychosocial and physiological effects of stimulant use. For example, methamphetamine has well-documented associations with sexual risk behavior among MSM and this relationship is partly attributed to its perceived or actual effects on libido [9, 11, 61]. As a similar but distinct point, we also note the association between stimulant use and sexual risk behavior may also represent the context of use for these substances. That is, YBMSM may be using stimulants in social environments where they meet sexual partners, or using stimulants more proximally in association with sexual behavior itself (i.e., using the drug immediately before or during sex) [13, 15, 62, 63].

We did not find evidence for an association between minority stress and stimulant use among these YBMSM, either before or after accounting for the potential role of sources of resilience in the model. This is in contrast to prior research indicating that minority stress, such as experiences of victimization and discrimination, and internalized homophobia are associated with substance use [11, 14–17]. For example, data from the National epidemiology survey on

**Table 3** Total standardized effect of minority stress on sexual risk behavior

	Standardized estimate	SE	<i>p</i>
Total effect of minority stress on sexual risk behavior	0.14	0.04	<0.001
Direct effect (path B)	0.11	0.04	0.01
Total indirect effects	0.04	0.01	0.01
Through stimulants (paths A and C)	0.01	0.01	0.38
Through sources of resilience (paths D and F)	0.03	0.01	0.02
Through sources of resilience and stimulant use (paths D, E, and C)	0.01	0.00	0.01

alcohol and related conditions (NESARC) suggest that sexual minorities who experience multiple forms of discrimination (e.g., homophobia, racism) are at increased risk for substance use disorders [28]. We also did not find evidence for an indirect association, where minority stress would lead to greater stimulant use, which in turn would increase sexual risk behavior. The lack of a direct or indirect effect suggests that in the context of sources of resilience and sexual risk behavior among YBMSM, stimulant use may be a phenomenon distinct from minority stress. While our findings represent one model and are preliminary, they may indicate that overly simplistic models for antecedents of sexual risk taking (e.g., stimulants are used to cope with minority stress, and thus have the secondary effect of increasing sexual risk behavior) are not always sufficient explanations for sexual risk behavior among YBMSM.

Finally, our model suggests several interesting findings related to sources of resilience as a compensatory function [37]. The indicators we incorporated into this latent construct are theoretically informed, with existing evidence for their inclusion as markers of resilience [37, 38, 64]. Indicators included both resilience assets (e.g., individual traits) and resources (e.g., social support) [37]. Importantly, we found that these sources of resilience potentially reduced stimulant use and sexual risk behavior. Sources of resilience was negatively associated with stimulant use, and also negatively associated with sexual risk behavior. The magnitude of its effect on these two risk behaviors was virtually equivalent. This finding aligns with prior research that has shown that sources of resilience such as sexual identity pride, individuals' resilient traits, and social support are associated with positive outcomes such as better psychosocial health indicators, reduced sexual risk behavior, or increased HIV testing [37–39, 65].

Minority stress was found to be negatively associated with sources of resilience among the YBMSM in this sample. This finding is important because it suggests that minority stress may deplete sources of resilience, and that this depletion is partially responsible for stimulant use and sexual risk behavior among these men. In fact, of all the significant effects in the model, this association had the largest magnitude. In other words, YBMSM who experience more minority stress will have lower levels of protective resilience (in this case, sexual identity pride, social support, and resilient traits). Interventions to increase resilience (again, operationalized as both individual-level assets as well as resources) may have the dual-purpose function of increasing resilience and reducing minority stress, in order to address these interrelated risk factors of stimulant use and sexual risk among YBMSM.

Our findings have caveats related to the directionality and temporality of the associations we tested and identified. With cross-sectional data, it is not possible to assess temporality of

the associations. Relatedly, it is also not possible to determine the direction of the effects we identified. The model that we tested was empirically informed by the existing body of cross-sectional research in this area; however, other explanations are plausible. It is possible that rather than (or in addition to, in the case of heterogeneous effects) minority stress contributing to stimulant use and/or sexual risk behavior, stimulant use and/or sexual risk behavior might actually exacerbate the risk for experiencing or perceiving minority stress (e.g., homophobia, racism). For example, research has found that methamphetamine use is stigmatized among HIV-positive men [66]. If behaviors such as methamphetamine use or sexual risk behavior violate predominant social norms, men may be socially marginalized, resulting in fewer social supports (in our model, a facet of resilience). Stimulant use may also increase men's exposure to environments or circumstances where they are at increased risk of homophobia or racism (e.g., incarceration, homelessness). Finally, we also note that the sources of resilience that we incorporated as indicators (sexual identity pride, social support, and resilience) may be factors that either *promote* resilience, or they may be *markers of* resilience. For example, peer social support may engender resilience (e.g., peer support is protective against risk); however, peer social support may also be an outcome of resilience (e.g., other resilient traits engender strong social relationships, and thus social support). Future research, especially longitudinal research, should seek to delineate the temporality and direction of associations between minority stress, resilience, substance use, and sexual risk behavior.

## Limitations

Our findings should be considered in light of several more general limitations. Our latent variables inherently cannot be observed, and instead consist of proxy indicators of the underlying latent construct. Other observed or unobserved indicators may be more robust indicators of the underlying constructs. Our selection of indicators was empirically and theoretically informed, and the indicators loaded sufficiently (in terms of magnitude and statistical significance) on their respective latent variables. With regard to minority stress, we did not assess internalized racism in the study and therefore we were unable to include it as a variable in our model. Future studies assessing minority stress among YBMSM should include measures of internalized racism. There are also potential limitations in terms of sampling and the data obtained. Data were collected after Mpowerment, a multi-level intervention designed to promote sense of community, empower identity, and reduce sexual risk behavior among YBMSM, had been fully implemented in both cities, potentially limiting the generalizability of these findings to all YBMSM. However, Mpowerment was

intended to influence the levels of these variables rather than change the associations between variables. Participants were recruited from two cities in Texas, and from a variety of pre-specified venues. However, venue-based time-location sampling was used to increase the representativeness of the sample with regard to the venues for recruitment. Finally, data were self-reported and subject to social desirability bias. However, participants completed the surveys autonomously on electronic devices to encourage honest responses [46].

## Conclusions

Minority stress has been shown to be higher among YBMSM because of the intersectionality of multiple oppressions due to their race and sexual orientation. We found that minority stress and stimulant use are independently and directly associated with sexual risk behavior among YBMSM. However, sources of resilience also have protective effects against stimulant use and sexual risk behavior. Our findings show that minority stressors may deplete resilience. Our findings suggest several areas for future research and intervention development. Minority stress has well-documented and multifaceted effects on the health of YBMSM. Therefore, interventions should focus on addressing discrimination and homophobia at the community-level in order to reduce the structural inequalities that contribute to these socially-produced ills and reductions in resilience among YBMSM. Second, the resilience factors linked to reduced substance use need to be better understood among this population. In order to design future resilience-based interventions for this sub-population of MSM most burdened by HIV, it is vital that research efforts aimed at understanding the risk and protective factors for both substance use and sexual risk behavior are applied to YBMSM. Strengths-based interventions, such as Strengths-Based Case Management [67], have been shown to be effective in reducing problematic substance use. Researchers have also suggested that interventions that seek to increase supportive relationships and a sense of community among YBMSM may be particularly useful for reducing substance use and sexual risk behavior [35, 38, 43].

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## Compliance with Ethical Standards

**Conflict of interest** All authors declare that no conflicts of interest exist.

**Ethical Approval** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Informed Consent** Informed consent was obtained from all individual participants included in the study.

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