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ORIGINAL ARTICLE

Extending the Minority Stress Model to Incorporate HIV-Positive Gay and Bisexual Men's Experiences: a Longitudinal Examination of Mental Health and Sexual Risk Behavior

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Abstract

Background Minority stress theory represents the most plausible conceptual framework for explaining health disparities for gay and bisexual men (GBM). However, little focus has been given to including the unique stressors experienced by HIV-positive GBM.

Purpose We explored the role of HIV-related stress within a minority stress model of mental health and condomless anal sex.

Methods Longitudinal data were collected on a diverse convenience sample of 138 highly sexually active, HIV-positive GBM in NYC regarding sexual minority (internalized homonegativity and gay-related rejection sensitivity) and HIV-related stressors (internalized HIV stigma and HIV-related rejection sensitivity), emotion dysregulation, mental health (symptoms of depression, anxiety, sexual compulsivity, and hypersexuality), and sexual behavior (condomless anal sex with all male partners and with serodiscordant male partners).

Results Across both sexual minority and HIV-related stressors, internalized stigma was significantly associated with mental health and sexual behavior outcomes while rejection sensitivity was not. Moreover, path analyses revealed that emotion dysregulation mediated the influence of both forms of internalized stigma on symptoms of depression/anxiety and sexual compulsivity/hypersexuality as well as serodiscordant condomless anal sex.

Conclusions We identified two targets of behavioral interventions that may lead to improvements in mental health and reductions in sexual transmission risk behaviors—maladaptive cognitions underlying negative self-schemas and difficulties with emotion regulation. Techniques for cognitive restructuring and emotion regulation may be particularly useful in the development of interventions that are sensitive to the needs of this population while also highlighting the important role that structural interventions can have in preventing these disparities for future generations.

Keywords Gay and bisexual men · HIV-positive · Minority stress · Stigma · Mental health · Sexual behavior

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Across studies employing diverse methodologies, researchers have consistently found that exposure of gay and bisexual men (GBM) to sexual minority stigma largely explains their disproportionate experience of adverse mental health outcomes, including depression, anxiety, and sexual compulsivity [1–5]. GBM are also disproportionately affected by the HIV epidemic in the USA [6], and a growing body of research demonstrates that sexual minority stigma may also contribute to

HIV risk behaviors among GBM, such as lack of condom use and avoidance of HIV status disclosure [7–9].

Minority stress theory currently represents the most plausible explanation for sexual orientation disparities in mental and behavioral health outcomes. Minority stress refers to the stigma-related stress to which sexual minority individuals such as GBM are disproportionately exposed as a result of their devalued social status [10–12]. Minority stress compounds general life stress to contribute to a disproportionate burden of disease among stigmatized groups. Minority stress originates in stigmatizing social structures that perpetuate stigma and discrimination across workplaces, schools, religious institutions, neighborhoods, and families [13–17]. Repeated exposure to this stigma and discrimination can yield chronic, anxious expectations of rejection, known as rejection sensitivity [18], as well as the internalization of heterosexist attitudes as negative self-schemas, known as internalized homonegativity [19, 20]. Both rejection sensitivity and internalized homonegativity are associated with adverse mental health outcomes across studies [1, 11, 12, 15, 19, 21, 22]. Although HIV-positive GBM are typically included in studies of sexual minority stress, few studies have examined the unique minority stressors experienced by HIV-positive GBM and none that we are aware of have investigated the influence of HIV-related stigma alongside sexual minority stigma.

Similar to sexual minority stigma, HIV-related stigma operates through unjust social structures to negatively influence health [4, 23–27]. Similar to the evidence for sexual minority stigma, research shows that chronic exposure to HIV-related stigma might lead HIV-positive people to internalize negative messages about themselves and other HIV-positive individuals [28]. Internalized HIV-related stigma has been associated with a range of negative mental health factors, including depressive symptoms, general psychological distress, low self-esteem, poor psychological well-being, and sexual compulsivity [4, 29]. Evidence also suggests that internalized HIV-related stigma is associated with HIV transmission-related risk behaviors, including suboptimal antiretroviral adherence, condomless sex, and avoidance of medical services and HIV status disclosure [22, 30–32]. To our knowledge, no studies have examined anxious expectations of rejection related to one's HIV-positive status or the relationship between HIV rejection sensitivity and mental and sexual health, although related constructs (e.g., expectations of stigma) have shown consistent relationships with depression, low self-esteem, and poor social support across studies [28, 33].

Sexual minority stress theory proposes that proximal stressors such as internalized homonegativity and rejection sensitivity negatively impact health outcomes through maladaptive coping responses, such as emotion dysregulation [10]. Emotion dysregulation includes maladaptive ways of experiencing, coping with, and expressing emotion and represents a core feature of several mental health problems [34, 35] and HIV distress and

risk [36, 37]. In fact, emotion dysregulation has been shown to mediate associations between sexual minority stigma and anxious and depressive symptoms in sexual minority adolescents [38] as well as depressive and anxious symptoms and sexual compulsivity in highly sexually active GBM [3].

Despite the recognized importance of attending to co-occurring forms of stigma [4, 39–46], studies have yet to extend minority stress models to understand the simultaneous influence of HIV-related stigma on the health of HIV-positive GBM. Accordingly, we propose that HIV-positive GBM are exposed to both sexual minority and HIV stigma-related stressors (i.e., internalized GBM-related and HIV-related stigma, GBM-related and HIV-related rejection sensitivity) that lead to the development of emotion dysregulation over time; this inability to regulate emotions simultaneously leads to a cascade of depression, anxiety, sexual compulsivity, and HIV transmission risk behavior. By testing a model that incorporates stressors related to both sexual minority and HIV-related stigma into a single framework, we aim to provide an extension of minority stress theory capable of identifying effective intervention targets for HIV-positive GBM. Testing such a model longitudinally allows us to more rigorously test the association between stigma-related stressors (i.e., internalized stigma, rejection sensitivity), stigma mechanisms (i.e., emotion dysregulation), and purported emotion dysregulation-driven health outcomes (i.e., condomless anal sex, depression, anxiety, sexual compulsivity) than can be done with cross-sectional data. Such an investigation is particularly important as HIV-related stigma remains a significant driver of the HIV epidemic [24–26, 47] and the extension of minority stress frameworks to include HIV-related stigma has the potential to provide a more comprehensive understanding of the influence of stigma on the mental and sexual health of HIV-positive GBM [40, 48].

Method

Analyses for this paper were conducted using baseline and 6-month follow-up data from *Pillow Talk*, a longitudinal study that focused on issues related to sexual compulsivity among highly sexually active GBM in New York City. The primary goal of the study was to enroll both HIV-negative and HIV-positive GBM who were similar with regard to the amount of sexual behavior in which they were engaging but different in the extent to which these behaviors were causing problems in their lives that were consistent with sexual compulsivity. Of the 376 men enrolled in the study, 169 (44.9 %) were confirmed to be HIV-positive at baseline (the other 55.1 % were HIV-negative). Two of these participants provided insufficient baseline data for analyses, and 29 (17.2 %) did not return for the 6-month follow-up resulting in a sample of 138 HIV-positive GBM for mental health outcomes. Finally, two men

completed their follow-up survey from home but had relocated and were unable to complete the timeline followback (TLFB) interview, resulting in a sample of 136 for analyses with sexual behavior outcomes.

Participants and Procedures

Beginning in February of 2011, we began enrolling participants utilizing a combination of recruitment strategies: (1) respondent-driven sampling, (2) Internet-based advertisements on social and sexual networking websites, (3) email blasts through New York City gay sex party listservs, and (4) active recruitment in New York City venues such as gay bars/clubs, concentrated gay neighborhoods, and ongoing gay community events. All participants completed a brief, phone-based screening interview to confirm eligibility, which was defined as (1) at least 18 years of age, (2) biologically male and self-identified as male, (3) at least nine male sexual partners in the prior 90 days, (4) self-identification as gay or bisexual, (5) able to complete assessment in English, and (6) daily access to the Internet in order to complete Internet-based portions of the study. For the purposes of this project, we operationalized highly sexually active as having at least nine sexual partners in the 90 days prior to enrollment based on prior research [49–51], including a probability-based sample of urban MSM [52, 53] that found that nine partners was two to three times the average number of sexual partners among sexually active GBM. Sexual partners were those with whom the participant engaged in any sexual contact that could lead to an orgasm. All eligibility criteria were confirmed at the baseline appointment, with sex criteria being confirmed using the TLFB interview in which a calendar is used to recall one's daily sexual behavior [54]. HIV-positive status was confirmed using proof of status such as an active HIV medication prescription, HIV-related lab results (e.g., viral load), or a doctor's note.

Participants were excluded from the project if they demonstrated evidence of serious cognitive or psychiatric impairment that would interfere with their participation or limit their ability to provide informed consent, as indicated by a score of 23 or lower on the Mini-Mental Status Examination (MMSE) [55] or evidence of active and unmanaged symptoms on the psychotic symptoms or suicidality sections of the Structured Clinical Interview for the DSM-IV-IR (SCID) [56].

Participation in the study involved both at-home (Internet-based) and in-office assessments. After a member of the research staff confirmed participants' eligibility over the phone, participants were sent a link to complete an Internet-based survey at home prior to their first in-office appointment that took approximately 1 h to complete. Informed consent was obtained for both online and in-person portions of the study. Participants were compensated $50 for the baseline and $55 for the 6-month visits. All procedures were reviewed and approved by the Institutional Review Board of the City University of New York (CUNY). This paper focuses on data collected during the baseline and 6-month at-home surveys as well as the 6-month in-person assessment.

Measures

All quantitative measures used for these analyses were completed as part of the at-home survey prior to the baseline appointment. After providing online consent to continue with the survey, participants completed measures of sexual compulsivity and hypersexuality and the demographic questionnaire. All later measures were grouped into thematic blocks (e.g., stigma, sexuality, mental health), and the order of blocks within the survey and measures within blocks were both randomized in order to evenly distribute the order effects that can result from serial positioning and priming. Alpha coefficients representing the internal consistency of each measure can be found in Table 1.

Table 1 Baseline demographic characteristics of the sample ($N = 138$)

	N	%
Race/ethnicity		
Black	43	31.2
Latino	21	15.2
White	58	42.0
Multiracial/other	16	11.6
Sexual orientation		
Gay, queer, or homosexual	129	93.5
Bisexual	9	6.5
Employment status		
Employed	55	39.9
Unemployed	83	60.1
Highest educational attainment		
Less than a 4-year degree	82	59.4
Bachelor's or other 4-year degrees	35	25.4
Graduate degree	21	15.2
Relationship status		
Single	105	76.1
Partnered	33	23.9
Self-reported undetectable viral load		
No	41	29.7
Yes	97	70.3
	M	SD
Age (Mdn = 42.0)	40.2	10.1
Years living with HIV (Mdn = 8)	10.4	7.9

Demographics

Participants reported several demographic characteristics including age, race/ethnicity, sexual orientation, and relationship status. Participants also reported the year in which they were diagnosed with HIV which was used to create a variable for the number of years since diagnosis at the baseline visit. They also self-reported whether their latest viral load test was undetectable, with those responding "yes" coded as 1 and those responding "no" or "I don't know" coded as 0.

Internalized Homonegativity

Participants completed the Internalized Homophobia Scale [57] which contains nine items that are rated from 1 (*strongly disagree*) to 5 (*strongly agree*). Item responses were averaged to form an overall score ranging from 1 to 9 with good internal consistency.

Gay-Related Rejection Sensitivity

Participants completed the Gay-Related Rejection Sensitivity Scale [18], which consists of 14 vignettes to which the participant responded regarding how *concerned/anxious* he would be that the situation occurred as a result of his sexual orientation from 1 (*very unconcerned*) to 6 (*very concerned*) and how *likely* it would be that the situation occurred as a result of his sexual orientation from 1 (*very unlikely*) to 6 (*very likely*). As is typical in the rejection sensitivity paradigm [58], anxiety and likelihood responses were multiplied for each vignette and then averaged across vignettes to form a total score ranging from 1 to 36.

Internalized HIV Stigma

We administered the 13-item negative self-image subscale of the HIV Stigma Scale [28] to assess the extent to which participants had internalized a negative view of themselves as a result of their HIV-positive status. The responses ranged from 1 (*strongly disagree*) to 4 (*strongly agree*) and were summed to form an overall score.

HIV-Related Rejection Sensitivity

Because no current measure of HIV-related stress currently exists, we utilized two questions to assess the extent to which participants were vigilant about status-based rejection in their sexual and romantic lives. Participants responded to the statements "Since getting infected with HIV, no one wants to date or become involved with me" and "Since I got infected, people do not want to have sex with me" on a scale ranging from 1 (*strongly disagree*) to 4 (*strongly agree*) and responses to the two items were averaged to get an overall score.

Emotional Dysregulation

Participants completed the 36-item Difficulties with Emotion Regulation Scale (DERS) [59], which measures general problems regulating emotions. Participants responded on a scale from 1 (*almost never* [0–10 %]) to 5 (*almost always* [91–100 %]). For the purposes of these analyses, we utilized the full-scale score which is calculated as the summed response across the 36 items.

Symptoms of Depression and Anxiety

Participants completed the anxiety and depression items of the Brief Symptom Inventory (BSI) [60]. Each of the two subscales contains six items intended to measure the symptoms of depression or anxiety in the prior week. Response options range from 0 (*not at all*) to 4 (*extremely*), and each subscale score was calculated by averaging across its six items.

Problematic Hypersexuality

We used the Hypersexual Disorder Screening Inventory (HDSI), which was proposed by the American Psychiatric Association's *DSM-V* workgroup on Sexual and Gender Identity Disorders [61]. The measure was designed in an attempt to unify the various definitions proposed for SC and similar problems (e.g., compulsive sexual behavior, sexual addiction) and has been shown to be highly reliable [62]. The scale consists of a total of seven items split into two sections (sections A and B) measuring criteria met within the prior 6 months. Section A consists of five items measuring recurrent and intense sexual fantasies, urges, and behaviors, and section B contains two items measuring distress and impairment as a result of these fantasies, urges, and behaviors. Responses ranged from 0 (*never true*) to 4 (*almost always true*) and were summed to provide a total severity score ranging from 0 to 28.

Sexual Compulsivity Symptomatology

Because the syndrome captured by the HDSI was ultimately not included in the *DSM-V*, we also included the Sexual Compulsivity Scale (SCS) [63, 64], which is the most commonly used measure of sexual compulsivity in studies of GBM [65]. The SCS consists of ten items, which were rated on a Likert-type scale from 1 (*not at all like me*) to 4 (*very much like me*). Responses to each item were summed to get an overall score ranging from 10 to 40. The SCS has been shown to have high reliability and validity across multiple studies [65–67].

Sexual Behavior

Participants completed a retrospective TLFB interview [54] for the 6 weeks (i.e., 42 days) prior to each assessment. Using a computerized TLFB calendar, a research assistant coded for substance use and sexual activity each day. On days when sex occurred, a detailed behavior was recorded for each sex partner, including the types of sexual behavior with that partner (e.g., oral sex, anal sex with and without a condom). For the purposes of these analyses, we calculated the total number of condomless anal sex acts with any partner as well as the total number with serodiscordant (i.e., HIV-negative or status unknown) partners.

Analysis Plan

We began by examining the demographic characteristics of the sample. Following this, we examined the bivariate associations among all of the scales using Pearson's (for associations among scales) and Spearman's (for associations with counts) correlations. We next conducted two path analyses using *Mplus* version 7.4 [68]. This approach allowed for the simultaneous testing of multiple regressions as well as the computation of both direct and indirect effects as well as their corresponding standard errors. Baseline minority stress variables (and demographic covariates) were used to predict 6-month data on emotion dysregulation, mental health outcomes, and sexual risk behavior. We utilized the default of maximum likelihood estimation and, for calculating the bootstrapped standard errors, requested 10,000 bootstrap draws. We utilized standard indices of model fit [69–75], which included a non-significant chi-square statistic for the model, a root mean square error of approximation (RMSEA) less than 0.06, a comparative fit index (CFI) greater than 0.95, a Tucker-Lewis index (TLI) greater than 0.95, and a standardized root mean square residual (SRMR) less than 0.08.

The anxiety and depression symptom subscales were set to load onto a single latent factor representing overall levels of anxiety and depression; similarly, the HDSI and SCS were set as indicators of a general sexual compulsivity factor. The count outcomes for condomless anal sex and serodiscordant condomless anal sex were modeled with a Poisson distribution using an offset equal to the log of the total number of anal sex acts reported by participants at the 6-month visit. The effect of this offset is to model the rate of condomless anal sex and serodiscordant condomless anal sex given the overall amount of anal sex rather than a standard count of each behavior which is otherwise biased by the number of *opportunities* an individual had to engage in condomless anal sex—this can also be thought of as the probability of the outcome during a given sex event. All individual regressions within each path analysis were adjusted for the role of age, whether or not the participant was in a relationship, race/ethnicity (Black, Latino,

and other race were each entered with White race as the reference), years living with HIV, and whether or not the participant self-reported an undetectable viral load—each of these characteristics was based on the baseline measurement. Within each model, we used Cohen's standards for classifying the effect size for standardized coefficients [76].

Results

Table 1 contains the demographic characteristics of the sample, which was diverse with regard to race/ethnicity, employment, and education. A majority was gay-identified and single and self-reported an undetectable viral load at baseline. The sample was 40.2 years of age on average (ranging from 20 to 64) and had been living with HIV for 10.4 years on average (ranging from 0 to 28).

Table 2 displays the descriptive statistics and bivariate correlations for each of the variables of interest. It is worth noting that each of the minority stress variables was significantly and positively associated with the others with the exception of non-significant associations between internalized homonegativity and each form of rejection sensitivity. Moreover, with the exception of gay-related rejection sensitivity, all of the minority stress variables were significantly associated with emotion dysregulation at the bivariate level.

Figure 1 depicts the mediation model whereby sexual minority-related and HIV-related stressors predict mental health outcomes through emotion dysregulation (adjusting for demographic characteristics). The indices of model fit all surpassed accepted standards, suggesting a well-specified model. The latent factor for symptoms of anxiety and depression explained 80.3 % of the variation in anxious symptoms and 79.2 % of the variation in depressive symptoms, and the latent factor for sexual compulsivity explained 63.9 % of the variation in SCS scores and 92.2 % of the variation in HDSI scores. Baseline internalized homonegativity ($p = 0.01$) and internalized HIV stigma ($p = 0.003$) were both significantly and positively associated with 6-month emotion dysregulation, while baseline gay-related rejection sensitivity ($p = 0.76$) and HIV-related rejection sensitivity ($p = 0.44$) were not. The standardized beta for the association between internalized homonegativity and emotion dysregulation was small-to-moderate, whereas the standardized beta for internalized HIV stigma on emotion dysregulation was moderate. Emotion dysregulation at 6 months was, in turn, significantly and positively associated with both of the latent outcomes at 6 months—anxious/depressive symptoms ($p < 0.001$) and symptoms of sexual compulsivity/hypersexuality ($p < 0.001$). The standardized betas suggest large effects of emotion dysregulation on both latent mental health outcomes.

The indirect effects with bootstrapped standard errors revealed significant mediational pathways from baseline

Table 2 Correlations among minority stress and outcome variables

	1	2	3	4	5	6	7	8	9	10	11
1. Internalized homonegativity (BL)	–										
2. Gay-related rejection sensitivity (BL)	0.07	–									
3. Internalized HIV stigma (BL)	0.41***	0.27***	–								
4. HIV-related rejection sensitivity (BL)	0.07	0.19*	0.45***	–							
5. Emotion dysregulation (6M)	0.35***	0.08	0.40***	0.22**	–						
6. Anxiety (6M)	0.12	0.04	0.18*	0.21*	0.58***	–					
7. Depression (6M)	0.23**	0.06	0.22**	0.27***	0.57***	0.80***	–				
8. Sexual compulsivity (6M)	0.31***	0.15	0.34***	0.17*	0.44***	0.21*	0.22**	–			
9. Problematic hypersexuality (6M)	0.37***	0.14	0.38***	0.20*	0.51***	0.29***	0.32***	0.77***	–		
10. Condomless anal sex acts (6M)	−0.01	0.14	0.01	0.01	−0.10	−0.07	−0.14	0.17*	0.15	–	
11. Serodiscordant condomless anal sex acts (6M)	0.00	0.07	0.03	0.17*	0.04	0.00	0.06	0.13	0.13	0.68***	–
M	1.65	13.93	27.04	1.89	76.74	0.60	0.85	21.46	11.43	8.29	4.59
SD	0.75	8.19	8.32	0.78	24.74	0.73	0.86	7.27	6.12	14.25	12.33
Cronbach's α	0.89	0.92	0.92	0.89	0.96	0.89	0.89	0.91	0.89	–	–

All correlations are Pearson's r with the exception of those with sexual behavior variables (9 and 10) for which Spearman's ρ is utilized due to the non-parametric nature of the count data (all correlations with sexual behavior are based on $n = 136$)

BL baseline, *6M* 6-month follow-up

internalized homonegativity and internalized HIV stigma to anxious/depressive symptoms ($\beta = 0.14$, S.E. = 0.06, $p = 0.02$, and $\beta = 0.20$, S.E. = 0.07, $p = 0.002$, respectively) as well as sexual compulsivity/hypersexuality ($\beta = 0.12$, S.E. = 0.05, $p = 0.02$, and $\beta = 0.16$, S.E. = 0.07, $p = 0.02$, respectively) at 6 months. Overall, the model explained 23.4 % of the variation in emotion dysregulation, 44.0 % of the variation in latent anxiety and depression symptoms, and 31.9 % of the variation in latent sexual compulsivity and hypersexuality symptoms.

Figure 2 depicts the results of the second mediation model in which sexual minority and HIV-related stressors predict sexual risk behavior outcomes through their influence on emotion dysregulation. Unlike the model with continuous outcomes, the analysis of count outcomes does not produce indices of model fit. Baseline internalized homonegativity ($p = 0.01$) and internalized HIV stigma ($p = 0.007$) were both significantly, positively associated with emotion dysregulation at 6 months, while baseline gay-related rejection sensitivity ($p = 0.96$) and HIV-related rejection sensitivity ($p = 0.49$) were not. Emotion dysregulation at 6 months was not significantly associated with the total number of condomless anal sex acts with male partners in general at 6 months (adjusted rate ratio [ARR] = 1.00, $p = 0.59$), though it was significantly associated with the total number of condomless anal sex acts with serodiscordant male partners at 6 months (ARR = 1.02, $p = 0.006$) such that every 1-unit increase in emotion

dysregulation (range: 1–36) was associated with a 2 % increase in the rate of serodiscordant condomless anal sex.

As might be expected as a result of the lack of association between emotion dysregulation and condomless anal sex acts with male partners in general, neither internalized homonegativity ($\beta = 0.00$, S.E. = 0.01, $p = 0.63$) nor internalized HIV stigma ($\beta = 0.01$, S.E. = 0.01, $p = 0.60$) had indirect effects on that outcome. The indirect effect from internalized homonegativity ($\beta = 0.04$, S.E. = 0.02, $p = 0.07$) to serodiscordant condomless anal sex acts did not reach statistical significance. Internalized HIV stigma ($\beta = 0.06$, S.E. = 0.03, $p = 0.04$) at baseline had significant and positive indirect effects on the number of condomless anal sex acts with serodiscordant male partners at 6 months.

Exploratory Analysis of Direct Effects

The model fit indices for the mental health model suggested that we had a well-specified model, and we confirmed that there was no need to include direct effects by consulting modification indices. In contrast, the count outcomes of the sexual behavior model made it impossible to produce model fit statistics, and thus, we sought to explore whether the sexual behavior model may have been misspecified by examining the need to allow for direct effects from any of the sexual minority or HIV-related stressors to the sexual behavior outcomes. Due to the large number of paths, the results of this
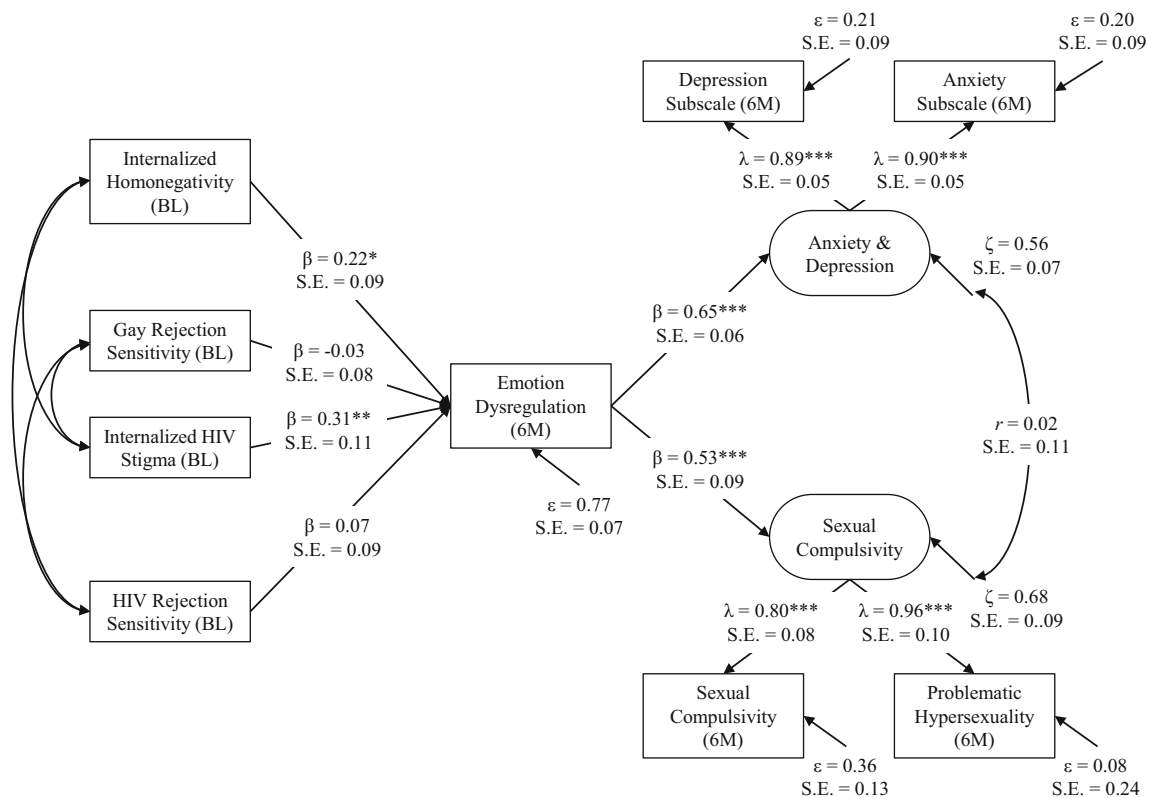
Fig. 1 Results of the structural equation model ($n = 138$) predicting mental health outcomes—all effects displayed are standardized, with significant paths indicated with *asterisks* (not displayed for residual terms). As can be seen, both internalized homonegativity and internalized HIV stigma were significantly associated with emotion dysregulation as well as indirectly associated with anxiety and depression and sexual compulsivity (results in *text*). Note that the two mental health outcomes are latent variables with two manifest *indicators* each. The model was adjusted for age, relationship status, race/ethnicity, years living with HIV, and undetectable viral load. Assessment time points are indicated as *BL* (baseline) and *6M* (6 months). *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$

model are displayed in Table 3 rather than in a figure; the model was run with the same specifications as the model in Fig. 2 with the exception that it includes direct effects from all four minority stress variables to each sexual behavior outcome. We found that internalized homonegativity had a significant, positive direct effect on condomless anal sex acts with all partners whereas internalized HIV stigma had a significant, negative direct effect on this outcome. We also found that internalized HIV stigma had a significant, negative direct effect on condomless anal sex with serodiscordant partners whereas HIV-related rejection sensitivity had a significant, positive direct effect on this outcome.

Discussion

This study investigated a longitudinal model of sexual minority stress that simultaneously examined the role of HIV-related stressors in the mental health (i.e., symptoms of depression/anxiety and sexual compulsivity/hypersexuality) and sexual transmission risk behaviors (i.e., condomless anal sex in general and with serodiscordant partners) of highly sexually active

HIV-positive GBM. For both sexual minority and HIV-related stressors, internalized stigma (i.e., internalized homonegativity, internalized HIV stigma) was significantly associated with poorer mental health and increased sexual transmission risk behavior while rejection sensitivity was not. The effect of HIV-related stress on mental health and sexual behavior was also slightly stronger than was sexual minority stress, though these effects were not statistically significant. These findings underscore the critical role of internalized sexual minority and HIV-related stigmas in influencing these outcomes.

For both sexual minority and HIV-related stressors, the results of the present study showed that internalized stigma was independently associated with emotion dysregulation, mental health, and sexual behavior, while rejection sensitivity was not. These results are consistent with the original research on sexual minority stress that found that internalized homonegativity was more strongly associated with several mental health outcomes than expectations of rejection or experiences of prejudice [12]. Both internalized stigma and rejection sensitivity involve cognitive and affective elements of self-evaluation [58, 77]. However, internalized stigma is closer to the self. That is, whereas rejection sensitivity may represent a functional
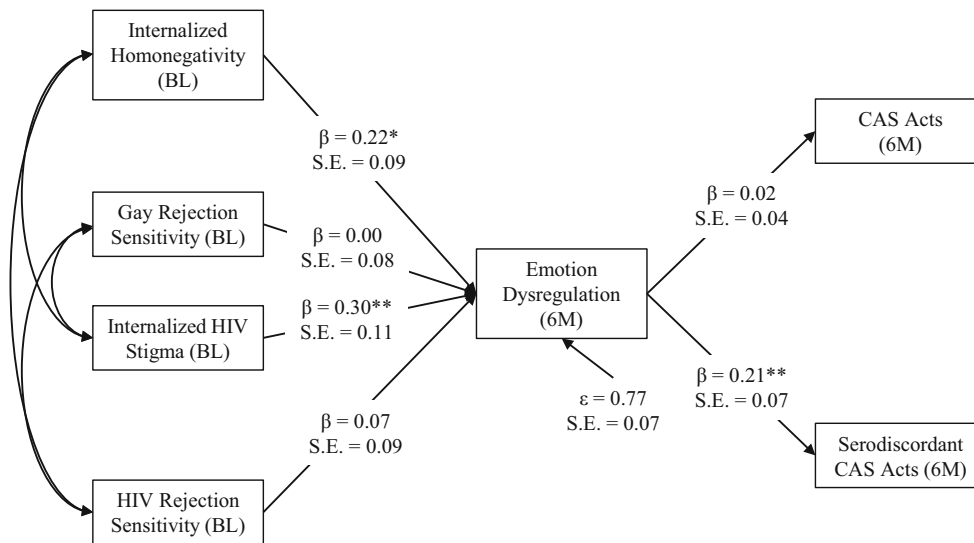
Fig. 2 Results of the path analysis model ($n = 136$) predicting sexual risk behavior outcomes as Poisson distributed counts—all effects displayed are standardized, with significant paths indicated with *asterisks* (not displayed for residual terms). Internalized homonegativity and internalized HIV stigma were significantly associated with emotion regulation; neither was indirectly associated with condomless anal sex acts in general, but both were associated with serodiscordant condomless anal sex acts. The model was adjusted for age, relationship status, race/ethnicity, years living with HIV, undetectable viral load, and 6-month symptoms of sexual compulsivity and hypersexuality; we also included an offset variable equal to the log of the total number of anal sex acts. Assessment time points are indicated as *BL* (baseline) and *6M* (6 months). *CAS* condomless anal sex. *$p < 0.05$; **$p < 0.01$

adaptation to hostile social climates, internalized homonegativity is the personal acceptance of societal stigma as applied to the self and similar others [18]. Thus, internalized stigma could be expected to more severely disrupt mental health and sexual behavior than rejection sensitivity, which might represent an adaptive response to actual threat.

Across models, the effect sizes for internalized HIV-related stigma were somewhat larger and more significant than sexual minority stressors, though post hoc analyses (not shown) revealed these differences to be non-significant. Previous research has demonstrated that internalized HIV stigma was more strongly associated with sexual compulsivity than internalized homonegativity [4] and underscored the importance of simultaneously investigating multiple forms of identity-related stress in models of mental health [41]. The adverse health consequences of any stigmatized identity are no doubt influenced by the presence of other identities that may be positively or negatively associated with health. As all identities occur within specific cultural and historical contexts [78], research on the intersection of multiple identities must take into account the particular meaning associated with each identity at a given point in time. For example, with increasing visibility and social acceptance of sexual minorities [79–81], HIV-positive GBM may experience more stigma and stress as

Table 3 Exploratory sexual behavior path model with direct effects of minority stressors on sexual behavior outcomes

	Emotion dysregulation (6M)			Number of condomless anal sex acts (6M)				Number of serodiscordant condomless anal sex acts (6M)			
	β	S.E.	p	β	S.E.	ARR	p	β	S.E.	ARR	p
Emotion dysregulation (6M)	–	–	–	0.02	0.04	1.00	0.62	0.19	0.07	1.02	0.01
Internalized homonegativity (BL)	0.22	0.09	0.01	0.07	0.03	1.18	0.03	0.11	0.08	1.33	0.16
Gay-related rejection sensitivity (BL)	0.00	0.08	0.96	0.04	0.03	1.01	0.15	−0.07	0.07	0.99	0.34
Internalized HIV stigma (BL)	0.30	0.11	0.007	−0.06	0.03	0.99	0.03	−0.18	0.08	0.96	0.02
HIV-related rejection sensitivity (BL)	0.07	0.09	0.49	0.03	0.03	1.08	0.26	0.21	0.07	1.66	0.003

$n = 136$. As with the model displayed in Fig. 2, the present model was adjusted for age, relationship status, race/ethnicity, years living with HIV, self-reported undetectable viral load, and 6-month sexual compulsivity and hypersexuality symptoms; the model also included an offset equal to the log of the total number of anal sex acts. All beta coefficients are standardized effects

BL baseline, *6M* 6 months, *ARR* adjusted rate ratio

a result of their HIV status than their sexual orientation, particularly among other GBM [82]. This phenomenon may be particularly true in major metropolitan areas such as New York City with greater visibility of GBM.

The present study points to several targets for minority stress interventions. All forms of stigma and minority stress are the result of unjust and unequal societal patterns of mistreatment and devaluation rather than an individual-level problem [83–86]. As a result, structural interventions that target the source of this internalized stigma and change societal norms and messages about both sexual orientation and HIV are likely to provide the greatest benefits over the long run. Such structural interventions should include the elimination of HIV stigma being exploited within HIV prevention messaging, school-based sexuality and health curriculum sensitive to the needs of non-heterosexual youth, and the support of policies that promote equity for both sexual minorities and people living with HIV. However, until the societal structures that perpetuate stigma are fundamentally improved, behavioral interventions that attempt to address the mechanisms through which minority stress "gets under the skin" to negatively influence the health of HIV-positive GBM remain a crucial public health priority.

Results suggest that behavioral interventions be developed to alter two psychological processes. First, intervening upon the maladaptive cognitions that underlie internalized stigma may provide direct benefits. Cognitive-behavioral techniques such as cognitive restructuring as well as affirmative and validating intervention approaches are likely to assist in directly modifying internalized stigmas [87, 88]. Second, the mediating role of emotion dysregulation points to the critical role that difficulties interpreting, regulating, and acting upon emotional experiences play in influencing both mental health difficulties and sexual risk behavior. Therapeutic approaches that combine common cognitive-behavioral techniques such as cognitive restructuring with techniques for increasing emotional awareness and regulation may be particularly beneficial for improving both outcomes [89–91]. Such approaches have recently been shown to be efficacious for the treatment of minority stress-related emotion dysregulation, mental health, and health difficulties among HIV-negative GBM [92].

Strengths and Limitations

This current study had many strengths that are worth noting. First, we utilized longitudinal data to test a model in which antecedent minority stressors were associated with subsequent disruptions in emotion regulation as well as mental health and sexual risk outcomes. Second, we utilized comparable measures of sexual minority and HIV-related stressors, allowing for an investigation of the same processes for both forms of stigmatized identity. Third, we utilized multiple health-relevant outcomes that disproportionately affect GBM in order to validate the model. We specified the mental health outcomes as latent

variables with two indicators each, which has the benefit of reducing measurement error and simplifying the model and its interpretation [93]. We used an offset to model the sexual transmission risk behavior count outcomes—unlike a traditional Poisson regression, this effectively adjusts the model for the overall amount of anal sex the participants were having, taking into account their number of opportunities to engage in risk and modeling the probability of engaging in the outcome during sex events. Despite weak bivariate associations with these count outcomes when using Spearman's correlations—a nonparametric correlation method—the modeling of these data with a Poisson distribution and an offset revealed significant associations, underscoring the utility of this approach in health behavior research. Taken together, these strengths bolster the reliability and validity of the findings and suggest the need for future research to replicate the current study.

Despite these strengths, the current study was not without limitations. The sample consisted of highly sexually active GBM living in the New York City area. Though the sample size was adequate for analyses, a larger sample would provide greater confidence in the results, allow for the inclusion of additional mediators or examining additional intersecting identities (e.g., race/ethnicity, socioeconomic status), and provide greater power to statistically compare the effects of sexual minority and HIV-related stressors. The lack of an existing measure of HIV-related rejection sensitivity led to the use of two items that were not measured in the same format as common rejection sensitivity scales. The development and psychometric evaluation of a scale to assess HIV rejection sensitivity should be a priority for research. As noted above, these findings may be specific to highly sexually active men or GBM in New York City, and future research should also examine similar models among larger, diverse national samples. Analyzing only two time points limited the types of analyses that could be undertaken, and additional follow-ups would allow for the testing of more rigorous models such as autoregressive path analyses to test changes in predictors and outcomes over time. Finally, mixed results were found when simultaneously examining the direct and indirect effects of sexual minority and HIV-related stressors on the sexual behavior outcomes and more research, particularly event-level research, is needed to better understand these findings.

Conclusions

This study demonstrated the importance of attending to multiple stigmatized identities within minority stress research [40] and highlighted the prominent role that internalized HIV stigma can play in such models for HIV-positive GBM in addition to the more frequently examined role of internalized homonegativity. Similarly, the self-directed internalization of stigma emerged as a prominent predictor while the more

socially-oriented rejection sensitivity constructs did not. We found that emotion dysregulation plays an important mediating role in the association between both HIV and sexual minority stress on both mental health and sexual transmission risk behavior outcomes. Focusing on problems that disproportionately affect GBM, we provided a meaningful set of outcomes upon which to test the proposed model and the use of longitudinal data further strengthened this approach.

Future research is needed to better test the causal hypotheses of this model in order to examine the extent to which situational variability in sexual minority and HIV-related stigma is associated with emotion dysregulation and negative mental and behavioral health outcomes over time. Moreover, testing interventions aimed at reducing these negative mental health and behavioral outcomes through reductions in minority stress and emotion regulation may provide further evidence of this model's utility. We propose that existing and emerging techniques for cognitive restructuring and emotion regulation be utilized to develop interventions that are uniquely sensitive to the needs of this population while also highlighting the important role that structural interventions can and should play in preventing these disparities for future generations.

Compliance with Ethical Standards

Conflict of Interest H. Jonathon Rendina, Kristi E. Gamarel, John E. Pachankis, Ana Ventuneac, Christian Grov, and Jeffrey T. Parsons declare that they have no conflict of interest.

Ethical Standards All procedures were reviewed and approved by the institutional review board of the corresponding authors' institution.

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