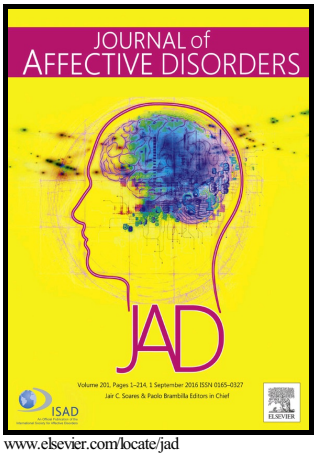

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The Critical Role of Internalized HIV-Related Stigma in the Daily Negative Affective Experiences of HIV-Positive Gay and Bisexual Men

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Abstract

Background: Research suggests that HIV stigma exerts a detrimental impact on the mental health of HIV-positive gay and bisexual men (GBM). We sought to better understand these processes by examining two forms of HIV stigma (i.e., anticipated and internalized) at two levels (i.e., individual and situational) in association with daily negative affective experiences.

Methods: We conducted a 21-day twice-daily ecological momentary assessment study of 51 HIV-positive GBM. Twice-daily stigma measures were disaggregated into individual-level averages and situational fluctuations and we utilized multilevel models to examine both concurrent and time-lagged effects of HIV stigma on anxious affect, depressed affect, anger, fatigue, and emotion dysregulation.

Results: Situational variability in internalized HIV stigma was associated with increased levels of anxious and depressed affect, anger, and emotion dysregulation in both concurrent and time-lagged analyses. Situational experiences of anticipated HIV stigma were only associated with anger and only within concurrent analyses; individual-level internalized HIV stigma was associated with anxious affect and emotion dysregulation in both concurrent and time-lagged models and with depressed affect and fatigue in time-lagged models.

Limitations: The small and high-risk sample limits generalizability and results should be replicated in larger and more diverse samples.

Conclusions: These findings suggest that, independent of the effects of individual-level stigma, situational experiences of internalized HIV stigma are associated with increases in event-level negative affective experiences. A combination of individually-delivered and mobile interventions may be successful at reducing the impact of internalized HIV stigma on negative affect and emotion dysregulation.

Keywords: HIV stigma; daily diary; gay and bisexual men; negative affect; internalized stigma; ecological momentary assessment.

Introduction

Supporting the mental health of HIV-positive gay and bisexual men (GBM) remains a priority in HIV care, particularly given evidence of elevated rates of mental health problems among this population as well as the role that mental health plays in physical health and health behaviors (Hanson et al., 2015; Mays & Cochran, 2001; Moore et al., 2016; O'Cleirigh, Magidson, Skeer, Mayer, & Safren, 2015). Implicated in these elevated rates of mental health problems among GBM are minority stressors, which are various forms of psychosocial stigma-related stress uniquely experienced by minority groups (Meyer, 1995, 2003). These minority stressors have been theorized to contribute to elevated levels of negative affect and emotion dysregulation, as well as interpersonal problems and cognitive processes that confer risk for psychopathology among GBM (Hatzenbuehler, 2009).

Among the types of minority stressors are experiences of various types of sexual minority and HIV-related stigmas. As detailed within the health stigma framework (Earnshaw & Chaudoir, 2009), stigma can take several forms, including *enacted* stigma (i.e., direct experiences of discrimination from others), *anticipated* stigma (i.e., fears or expectancies that others will stigmatize), and *internalized* stigma (i.e., shame, guilt, or negative emotions directed at oneself related to one's stigmatized status). In regard to sexual minority stigma, these three types may manifest as sexual orientation victimization (i.e., enacted), expectations of rejection (i.e.,

anticipated), and internalized homonegativity (i.e., internalized). The current paper however, focuses on a less-studied form of minority stress, HIV-related stigma.

Although not typically examined within the minority stress framework, similar forms of HIV-related psychosocial stressors have been demonstrated to impact the mental health of HIV-positive GBM (Berger, Ferrans, & Lashley, 2001; Parker & Aggleton, 2003; Rendina, Golub, Grov, & Parsons, 2012; Sayles et al., 2008; Sayles, Wong, Kinsler, Martins, & Cunningham, 2009). Furthermore, stigma represents a common problem experienced by many HIV-positive individuals (both sexual majority and minority individuals), as was shown in a recent large-scale observational trial of HIV-positive adults in the U.S. (Baugher et al., 2017). Of concern, HIV-related stigma has been linked with a range of adverse mental, behavioral, and physical outcomes for HIV-positive individuals, including anxious and depressed affect, anger, sadness, loneliness, and hopelessness (Lee, Kochman, & Sikkema, 2002; Stutterheim et al., 2012), psychological distress and reduced physical well-being (Miller et al., 2016), sexual compulsivity (Rendina et al., 2012), lower quality of life and reduced use of health services (Rueda et al., 2016), and reduced medication adherence (Sweeney, Mitzel, & Vanable, 2015).

In addition to these cross-sectional findings, a number of studies have substantiated the enduring impact of HIV stigma in longitudinal studies linking HIV-related stigma with subsequent adverse health outcomes. For example, Miller and colleagues (2016) found that HIV-related stigma predicted distress and well-being measured three and six months later. Similarly, Hatzenbuehler, O'Cleirigh, Mayer, Mimiaga, and Safren (2011) found that HIV stigma predicted higher levels of depression, anxiety, panic, and transmission risk behavior, three months later. Rendina et al. (2017) found that baseline levels of internalized HIV stigma predicted levels of sexual compulsivity, anxiety, depression, and HIV transmission risk behaviors six months later,

and that the impact on the mental health and transmission risk behaviors was partially mediated by emotion dysregulation. Cook and colleagues (2016) found that greater average rates of HIV stigma experiences reported in a 10-week daily diary study predicted greater exhaustion and inertia at the end of the 10-week period, and Turan and colleagues (Turan, Fazeli, Raper, Mugavero, & Johnson, 2016) found that individuals with higher global HIV stigma scores showed stronger links between poorer social support and lower treatment self-efficacy.

In addition to its direct effects, one of the ways in which stigma has been theorized to impact negative mental and behavioral health outcomes is by diminishing the capacity to cope with negative emotions. Within the literature on sexual minority stress, research has shown that global or chronic experiences of sexual minority stress are associated with poorer mental health outcomes through their impact on emotion dysregulation (Hatzenbuehler, 2009; Pachankis, Rendina, et al., 2015). Longitudinal research with HIV-positive GBM has extended this model to incorporate the role of HIV-related psychosocial stressors and showed that HIV-related stressors play a similar yet independent role alongside sexual minority stressors in influencing the negative mental health of these men (Rendina et al., 2017), and that emotion dysregulation plays a mediating role in the association between HIV-related stress and poorer mental health outcomes just as it does with sexual minority stressors. In addition to emotion dysregulation, other affective disruptions such as depression have been found to mediate the effect of internalized HIV stigma on behavioral health outcomes such as medication adherence (Turan, Smith, et al., 2016). Taken together, these findings suggest that the impact of HIV stigma on the behavioral and physical health of HIV-positive individuals may occur as a result of disruptions in affective and emotional processes.

Having established associations between HIV-related stress and a variety of psychosocial outcomes and the mediating role that emotional processing appears to play in this association, a yet

unanswered question is whether this association is the result of individual differences in the experience of stigma, unique situational experiences of stigma, or some combination of the two. Daily diary research with GBM has demonstrated the event-level effects of daily experiences of sexual minority stigma on daily affective outcomes (Eldahan et al., 2016). This work indicates that both global levels as well as daily experiences of sexual minority stigma may independently impact mental health outcomes. Put another way, individuals who tend experience higher levels of sexual minority stigma also experience more negative affect on a given day than those who tend to experience lower levels of sexual minority stigma; independent of one's tendencies toward or average levels of stigma, experiencing more stigma on a given day than one is used to experiencing is associated with experiencing more negative affect on that day (as well as on the following day). While longitudinal studies using global measures of HIV stigma have shown similar links between HIV-related minority stress and adverse mental health outcomes in HIV-positive men such as depression and anxiety (Rendina et al., 2017), investigating the event-level effects of HIV-related stigma on affective functioning remains a crucial next step in order to gain a greater understanding of the mechanisms by which HIV-related stigma wields its impact. To our knowledge, only one study to date has measured HIV stigma as a situationally-varying phenomenon. In their 7-day experience sampling study, Fazeli and colleagues (2016) noted that daily experiences of HIV-related discrimination were associated with increased symptoms of internalized HIV stigma; these day-level associations were moderated by several individual-level psychosocial characteristics. However, we are unaware of any studies to date that have examined situationally-varying HIV-related stigma as a predictor of affective or emotional processes.

Given the role that daily affective experiences play in general wellbeing and mental health and their demonstrated influence on a variety of behavioral and physical health outcomes such as

sexual risk, drug use, and medication adherence (Billings, Folkman, Acree, & Moskowitz, 2000; Grov, Golub, Mustanski, & Parsons, 2010; Mustanski, 2007), understanding the potential influence of HIV-related stigma on situational experiences of negative affect is an important step toward translating these basic findings into interventions to prevent adverse sequelae in HIV-positive GBM. Although the extant literature reviewed thus far suggests a more important role for internalized than anticipated stigma, these have been individual-level studies and we sought to determine whether the same would be true when examining situational experiences of stigma. The current study aimed to identify the extent to which there is situational variability in both of these forms of HIV stigma—anticipated and internalized—and their associations with various forms of negative affective experiences—anxious affect, depressed affect, anger, fatigue, and emotion dysregulation. Moreover, we sought to simultaneously examine both individual differences and situational variability in anticipated and internalized HIV stigma to understand not only which forms of stigma impact negative affect but also at which levels they operate to influence affect.

Method

Data for this paper were drawn from participants enrolled in the *day2day* pilot study, a 21-day twice-daily ecological momentary assessment study of HIV-positive GBM in the New York City metropolitan area.

Participants and Procedures

Recruitment efforts for the study primarily resulted from online advertising on social media websites and sexual networking apps. Participants were invited to complete an initial online screener assessing eligibility in regards to HIV status, age, male gender, and gay or bisexual sexual orientation/identity. Preliminarily eligible participants were then contacted by research staff to complete a more in-depth screener assessing whether the participant reported recent drug use (two

or more days of club drug use in the past 30 days), recent HIV transmission risk behavior (one or more act of condomless anal sex with a negative/unknown partner, excluding main partners who were on pre-exposure prophylaxis), being prescribed antiretroviral therapy, and having daily access to the internet via smartphone.

Eligible participants were sent a link to complete an online survey from home that lasted approximately one hour, from which basic demographic and background information is being used in the present analyses. After completing the at-home survey, participants completed an in-person baseline appointment at our research center during which they provided informed consent, produced proof of HIV-positive status (e.g., a medication bottle or lab result), and completed other procedures not being utilized for the present analyses (e.g., a timeline follow-back interview used to verify behavioral eligibility criteria). The participants completed a brief training with a staff member on how to use the twice-daily diary system. We pre-screened 194 potential participants over the phone, of whom 111 (57.2%) were deemed preliminarily eligible and scheduled for an in-office assessment. Of those 111 pre-eligible participants, 70 (63.1%) showed for their in-person assessment and 51 (72.9%) of those who showed for an in-office assessment were confirmed eligible during timeline follow-back and completed the assessment.

Beginning the day after the baseline assessment and continuing for 21 days, participants who were confirmed eligible were sent unique links twice a day—once at 12pm and once at 8pm—that took them to the online diary system within Qualtrics. Participants were given four hours to respond to each survey, meaning there was at least a 4-hour period in between the first and second surveys each day. The twice-daily surveys contained a series of measures focused on affect, stigma, and a variety of health behaviors—both the afternoon and nighttime surveys contained all measures utilized for the present analyses, meaning that the present analyses focus on

two measurement points per day. Participants were compensated $50 for the baseline assessment and participants could earn up to $42 dollars for completion of all diary surveys. All protocols were approved by the Institutional Review Board of the City University of New York.

Measures

Background information was captured in the survey completed prior to the in-person assessment. All other data were captured in the twice-daily ecological momentary assessment surveys. During each twice-daily survey, participants began by reporting on their affect and emotion dysregulation, after which they reported on experiences of HIV-related stress.

Background information

In the one-time survey, participants reported on a variety of sociodemographic factors including age, race/ethnicity, and relationship status as well as reporting their year of diagnosis with HIV (from which we calculated years living with HIV).

To adjust for the confounding role of psychiatric comorbidities on daily affect, participants completed the Overall Anxiety Severity and Impairment Scale (OASIS; Norman, Hami Cissell, Means-Christensen, & Stein, 2006) and the Overall Depression Severity and Impairment Scale (ODSIS; Bentley, Gallagher, Carl, & Barlow, 2014). Each is a 5-item scale rated from 0 to 4, with qualitative response anchors that are unique to each question. For example, one item on the OASIS asks, "In the past week, how often have you felt anxious?" with response options ranging from 0 (*No anxiety in the past week*) to 4 (*Constant anxiety. Felt anxious all of the time and never really relaxed*) and one item on the ODSIS asks, "In the past week, how often have you felt depressed?" with responses ranging from 0 (*No depression in the past week*) to 4 (*Constant depression. Felt depressed all the time*). The scales measure symptom severity and functional impairment due to anxiety and depression, respectively, and psychometric research has shown that a cutoff score of 8

on each has high sensitivity and specificity for classifying an anxiety disorder and mood disorder, respectively (Bentley et al., 2014; Campbell-Sills et al., 2009). As such, these clinically relevant thresholds for the two scales were used within analyses.

Situational HIV Stigma

Twice a day, participants were asked to complete a total of nine items that were adapted from several published measures on HIV-related stressors—the HIV Stigma Scale (Berger et al., 2001), the HIV/AIDS Stress Scale (Pakenham & Rinaldis, 2002), and the Impact of HIV on Self-Concept Scale (Golub, Rendina, & Gamarel, 2013a, 2013b). Items selected were those believed to have the potential to vary across situations, as opposed to those with more of a focus on global experiences. Four items pertained to anticipated HIV stigma (e.g., "I've wanted to hide my status" and "I've been worried people would judge me if they knew my status"), and five pertained to internalized HIV stigma ("I've been feeling guilty because of my HIV status" and "I've been feeling emotionally upset or overwhelmed by my status"). Participants were asked to rate the extent to which they had experienced each in the past few hours on a scale from 1 (*not at all*) to 4 (*completely*). The order of the items was randomly displayed during each survey and the average across each subscale was taken to calculate the score at each time point.

Situational Negative Affect

Twice a day, participants completed a 12-item shortened version of the Profile of Mood States scale (McNair, Lorr, & Droppleman, 1981) that was abbreviated and adapted in prior research in order to maximize suitability to detect situational variability (Cranford et al., 2006). Participants were asked to indicate how strongly they had been experiencing a range of emotional states over the past few hours on a scale of 0 (*Not at all*), 1 (*A little*), 2 (*Quite a bit*), and 3 (*Extremely*). Three items made up each of the four domains/types of negative affect—anxious (on

edge, anxious, and uneasy), depressed (sad, hopeless, and discouraged), anger (angry, resentful, and annoyed), and fatigue (fatigued, worn out, and exhausted). The order of the items was randomly displayed during each survey and the average of the three items in each subscale was taken to calculate the scores at each time point.

Situational Emotion Dysregulation

Situational experiences of emotion dysregulation was measured by responses to four items adapted from the Difficulties with Emotion Regulation Scale (Gratz & Roemer, 2004)—"I've been experiencing my emotions as overwhelming," "I've been having difficulty making sense of my feelings," "I have been experiencing my emotions as out of control," and "I've been confused about what emotion I'm feeling". Participants were asked to rate the extent to which they've been experiencing each in the past few hours on a scale from 0 (*not at all*) to 3 (*completely*). The order of the items was randomly displayed during each survey and the average across items was taken to calculate the score at each time point.

Statistical Analyses

All analyses reported herein were conducted within SPSS Version 24. After characterizing the demographic composition of the sample, we sought to examine the bivariate association between each situational measure—anticipated and internalized HIV stigma, affect (anxious, depressed, anger, and fatigue), and emotion dysregulation. Because these variables are nested within individuals and measured up to 42 times per person, a simple Pearson's correlation would have violated the assumption of independence. In order to approximate a correlation coefficient while taking into account the repeated nature of the data, we calculated a standardized multilevel linear regression coefficient between each pair of variables. Specifically, we conducted a series of multilevel models, one for each pair of variables, in which both variables were converted into *z*-

scores, a random intercept was specified, and one variable was entered as the outcome with the other entered as a fixed, Level 1 predictor of that outcome—we report these as bivariate associations that are both standardized and adjusted for nesting (i.e., non-independence). We also sought to capture univariate descriptive statistics for each of these variables, which we did by examining a null multilevel linear model for each outcome with only a random intercept specified—from these models, we report the fixed value of the intercept as the weighted mean of each variable (adjusted for nesting) and we also calculated the intraclass correlation (ICC) by dividing the random intercept variance by the sum of the random intercept and residual variances.

Having established the bivariate associations among the situational experiences of each variable, we next sought to establish the extent to which HIV-related stigma impacted each outcome. We were particularly interested in examining the impact of both forms of stigma—anticipated and internalized—at both the individual and situational levels. Put another way, for each form of stigma we were interested in knowing how an individual's average tendency to experience stigma across days (i.e., individual-level or between-person) as well as their fluctuations in experiencing stigma at a given time point (i.e., situational-level or within-person) were associated with each of the outcomes. We followed standard procedures for disaggregating the situational stigma measurements (Bolger & Laurenceau, 2013). Each person's average of anticipated and internalized stigma over time was subtracted from each of his individual measurements to produce a person-centered, Level 1 (i.e., varying within individuals) indicator of each type of stigma at that time point. Further, the grand mean of each anticipated and internalized stigma measurement for the entire sample was subtracted from each person's average for all of his measurements of anticipated and internalized stigma over time to create a grand mean-centered, Level 2 (i.e., varying between individuals but consistent within individuals) indicator of each

participant's average tendency to experience anticipated and internalized HIV stigma over time. In total, this produced four stigma variables—situational-level (i.e., within-person, Level 1) anticipated and internalized HIV stigma as well as individual-level (i.e., between-person, Level 2) anticipated and internalized HIV stigma.

We next performed a series of five multilevel generalized linear regressions, one for each outcome, in which a random intercept was specified along with random slopes for both situational (i.e., Level 1) anticipated and internalized HIV stigma within a variance components matrix for the random effects (i.e., the covariance between each random effect was not estimated). Due to the positive skew in each of the outcomes, we utilized a gamma distribution with a log link. We utilized a first-degree autoregressive moving average (ARMA1,1) covariance matrix for the repeated effects to adjust for the correlation among measurements over time. All five models were adjusted for both Level 1 (i.e., whether the report was made on a weekend, day of the cycle the report was made centered at day 11) and Level 2 (i.e., Black race, relationship status, grand mean-centered years since HIV diagnosis, grand mean-centered age, and dichotomous OASIS and ODSIS variables corresponding to their cutoffs) variables. Finally, we utilized robust estimation of the standard errors and relied on Satterthwaite approximation for the degrees of freedom, which restricts the Level 2 degrees of freedom based on the number of Level 2 units and is considered a more conservative estimation approach.

The prior models demonstrated the association between situational experiences of HIV stigma and negative affective outcomes experienced *concurrently* (i.e., reported within the same diary). In a final set of models, we sought to test whether there were time-lagged effects whereby situational HIV stigma reported in the afternoon (i.e., time 1) survey predicted negative affective outcomes experienced in the nighttime (i.e., time 2) survey. We re-ran the models described above

in a consistent fashion, using afternoon measures of HIV stigma as predictors and nighttime measures of affective variables as outcomes, with two notable differences. First, across models we found that the ARMA(1,1) covariance structure for the repeated measures was overly complex (i.e., the phi coefficient for the moving average was non-significant), and thus used the more restrictive (and more commonly used) first-degree autoregressive (AR1) structure. Second, in three of the five models we found that the random variance parameter for Level 1 anticipated HIV stigma was zero and was causing problems with model convergence in the Hessian matrix, and as such we fixed the Level 1 slope for anticipated HIV stigma across models.

Results

Of the 51 men in the study, one was missing data on the OASIS and ODSIS and excluded from the present analyses. The 50 men in the analytic sample completed 1,501 of the EMA surveys. The median number of surveys completed per participant was 35 (83.3% of sent) with an interquartile range extending from 25 (59.5%) to 38 (90.5%)—median completion for both afternoon and nighttime surveys were 17.0 and 17.5, respectively. For concurrent analyses, all 1,501 of the reports were analyzed; we were able to match a total of 663 afternoon and nighttime surveys from the same day to conduct the time-lagged and affective instability analyses—that is, 1,326 of the total 1,501 (88.3%) were same-day matches able to be used within analyses.

Table 1 reports on the demographic characteristics of the sample. As can be seen, the majority were men of color, gay-identified, unemployed, completed some college but not a 4-year degree, and were single. The mean age was 38.7 and the average amount of time living with HIV infection was 10.8 years. The prevalence of anxiety (40.0%) and mood (42.0%) disorders based on the OASIS and ODSIS thresholds were high; a total of 16 (32.0%) men met the threshold for both,

while 4 (8.0%) met only the threshold for anxiety and 5 (10.0%) met only the threshold for depression.

The bivariate associations between the day-level variables of interest and their descriptive statistics are presented within Table 2. As can be seen, daily measurements of all variables were significantly and positively associated with one another—the strongest association was between depressed and angry affect and the lowest association was between anticipated HIV stigma and anxious affect. The weighted means indicated that people reported slightly higher anticipated than internalized HIV stigma, on average. Relatedly, fatigue was reported most strongly, on average, whereas anger was reported least strongly, though all forms of stigma and affect were relatively low. All of the ICCs were high, indicating that anywhere between 45% (for angry affect) and 83% (for internalized HIV stigma) of the variability was due to between-person differences. The bivariate association between internalized HIV stigma and each affective outcome was consistently greater than that of anticipated HIV stigma.

The results of the multilevel models predicting each of the five negative affective outcomes by concurrent levels of situationally-varying (i.e., person-centered) stigma are presented in Table 3. The situational (i.e., Level 1) results suggest that, during situations when men experienced greater levels of internalized HIV stigma than were typical for them, they also experienced higher levels of anxious affect, depressed affect, anger, and emotion dysregulation; in addition to internalized HIV stigma, higher-than-usual levels of anticipated HIV stigma at Level 1 were associated with greater levels of anger, whereas neither form of stigma at Level 1 was associated with fatigue. The between-person (i.e., Level 2) effects showed that people who experienced higher levels of internalized HIV stigma, on average, also reported higher levels of anxious affect and emotion dysregulation on a given day compared to those with lower tendencies to experience

internalized HIV stigma; no other Level 2 associations were found between HIV stigma and the affective outcomes. People who met the threshold for anxiety disorders on the OASIS reported higher levels of emotion dysregulation on a given day than those who did not; neither threshold was associated with any other affective outcome.

The set of models presented in Table 4 show the time-lagged effects of HIV stigma on affect. Despite the smaller sample size due to combining both event-level assessments within each day, we found highly consistent patterns of significance and effects as those in the concurrent analyses. Specifically, on afternoons when men felt higher-than-typical levels of internalized HIV stigma, they subsequently reported higher levels of anxious affect, depressed affect, anger, and emotion dysregulation in the nighttime; the association between situationally-varying anticipated HIV stigma and anger was not present in the time-lagged models. Individuals who experienced higher-than-average levels of internalized HIV stigma also reported greater levels of anxious affect, depressed affect, fatigue, and emotion dysregulation in the evenings—both the depression and fatigue findings emerged in these models when predicting only evening affect despite not having reached significance in the concurrent models whereby affect at both time points was predicted. Neither the OASIS nor ODSIS cutoffs were associated with any of the affective outcomes in these time-lagged models.

Discussion

In the present study, we utilized a twice-daily ecological momentary assessment approach to capture event-level experiences of anticipated and internalized HIV stigma, and sought to examine their association with situational experiences of negative affect. Although we identified that approximately 80% of the variability in both forms of HIV-related stigma was due to individual differences, this nonetheless also showed that approximately one-fifth of the variability

in stigma experiences was due to within-person changes across situations. Put another way, this study demonstrated that, like general stress, stigma can be thought of as having both chronic and acute components to it. In fact, although most of the variability in stigma was due to individual differences, we saw that situational variability in internalized HIV stigma—over-and-above individual-level differences in experiences of internalized HIV stigma—was meaningfully associated with the negative affective experiences of HIV-positive individuals, with the exception of fatigue. Situationally-varying anticipated HIV stigma was only associated with experiences of anger. It is critical to point out that the two levels of HIV stigma—situationally-varying (i.e., Level 1, person-centered scores) and between-individual (i.e., Level 2, individual averages)—are orthogonal by design but were nonetheless adjusted for one another within models, suggesting that situational variability in HIV stigma operates independently of individual differences to influence affect.

These findings demonstrate that, regardless of one's tendency to experience stigma, unique situational experiences of stigma negatively impact the affective experiences of the average HIV-positive GBM. Moreover, we saw no significant random variability in the association between situational-level internalized HIV stigma and negative affective outcomes, suggesting that there were no individual differences in this *association*. Further research with larger samples is needed to further characterize whether there may, in fact, be individual differences in these effects and to examine individual-level predictors of these differences (e.g., what characteristics of a person make their affective responses more or less susceptible to an experience of stigma?). Such findings are critical to better understanding whether the effects of stigma on negative affective experiences may be contextually-specific or stronger among certain subgroups and can spur the development of tailored interventions.

We found that anticipated HIV stigma was associated with each of the affective variables in bivariate models, though at consistently lower levels than internalized HIV stigma. These bivariate associations were not sustained when examined in multivariable models adjusted for internalized HIV stigma and demographic factors, with the exception of concurrent anger, but the same was not true for time-lagged anger. One possibility that has been suggested to help explain this phenomenon is that anticipated (i.e., social) stigma contributes to the development and sustainment of internalized stigma (Fazeli et al., 2016). Such a hypothesis would suggest that anticipated HIV stigma is indirectly associated with affective experiences through resultant increases in internalized HIV stigma, and these results provide preliminary support for this. Moreover, because internalized stigma is directed at the self and, thus, potentially more threatening, it may have a more prominent impact on affective experiences. Although individual-level data have already begun to suggest that internalized stigma is the most central form to consider for mental and behavioral health outcomes, it was unclear whether these same findings would prove true at the situational level. Intensive longitudinal designs such as this one provide a particularly strong way of testing such a mediational model, and future research with larger samples should be conducted on this topic to test this hypothesis. Alternatively, in studies where surveys must be brief as is often the case, a primary focus on internalized stigma may be most appropriate.

Finally, we examined emotion dysregulation as an outcome itself in these exploratory analyses, though individual-level models would suggest that this may well mediate the impact of internalized HIV stigma on mental health outcomes such as negative affective experiences. As such, future studies, perhaps with three time points per day, should test the hypothesis that internalized HIV stigma experienced at one time influence emotion dysregulation at a second time

point which mediate its impact on negative affect at a third time point. Multilevel path models, such as autoregressive cross-lagged models, are particularly critical to test in future research with larger sample sizes and at least three time points per day.

We found high prevalence of meeting thresholds for possible anxious and mood disorders based on brief but validated measures of anxious and depressed symptomology. We conducted analyses both adjusted for these variables as well as without them (not shown), and found that their primary impact on the models was to reduce the overall strength of the effect of between-person (i.e., Level 2) internalized HIV stigma on each outcome, sometimes to the point of non-significance. These findings suggest a complex interplay between more long-term mental health problems, tendencies toward stigma, and situationally varying negative affective experiences.

The findings of the current study highlight the need to interrupt or buffer the impact of internalized HIV stigma on affective processes at both the individual and situational levels. Two recently conducted pilot intervention trials targeting sexual minority and syndemic stressors among HIV-negative (Pachankis, Hatzenbuehler, Rendina, Safren, & Parsons, 2015) and HIV-positive (Parsons et al., 2016) GBM have shown promise in reducing emotion dysregulation and negative mental health outcomes. To the extent that such interventions targeting sexual minority stressors, such as internalized homonegativity, may be easily adapted to target other forms of internalized stigma, such as that related to HIV status, such interventions may have promise for improving the negative affective experiences of men with chronically high levels of internalized HIV stigma. However, it is worth noting that both interventions were long and intensive, and it is unclear whether such interventions would translate to impact individuals who are not chronically high in internalized HIV stigma but nonetheless find themselves in situations in which they are experiencing acute increases in stigma. To provide reductions in such acute experiences of

situational stigma, mobile technologies might be leveraged to provide on-demand interventions, though current research has been mixed and a lack of theoretical basis for existing mobile interventions has been cited as a primary limitation of existing trials (Donker et al., 2013; Pellowski & Kalichman, 2012; Riley & Kalichman, 2015; Simoni, Kutner, & Horvath, 2015). As such, adapting theoretically-based and empirically-supported interventions currently delivered in-person for online and mobile delivery should remain a high priority for future research. Moreover, given the demonstrated impact of situationally-varying affect on relevant health behaviors such as medication adherence, drug use, and sexual transmission risk behavior (Billings et al., 2000; Grov et al., 2010; Mustanski, 2007), such interventions may also have broader impacts and might be tailored to address varying behavioral profiles of risk behavior.

Study Strengths and Limitations

The present study has numerous strengths as well as limitations that should be considered. This was a small pilot study of 50 men, though the primary goal was to show proof-of-concept for the notion that HIV stigma could be examined situationally in association with critical outcomes of interest. Although the results suggest we were adequately powered to detect many of the effects, particularly given the intensive longitudinal design, the findings should nonetheless be interpreted with caution and replication with larger samples should be a priority for future research. Although we considered it a strength of the study to focus on a population in great need of intervention, this was nonetheless a sample of high-risk HIV-positive GBM living in New York City, all of whom reported drug use and sexual HIV transmission risk behavior at baseline. Because experiences of stigma can vary across demographic groups and geographic regions, large-scale and nationwide studies should be undertaken to better understand these phenomena and how they may differ.

We considered it a strength to capture multiple forms of HIV stigma within the twice-daily diary and to disaggregate these into individual-level and situational effects, though it is important to point out that this came at some cost. These two forms of stigma were strongly associated and thus multicollinearity is of concern, which may be the primary reason that we found significant effects for anticipated stigma within bivariate but not multivariable models. The items capturing these two forms of stigma were drawn from existing, individual-level measures of HIV stigma, which we initially considered a strength, but this raises the concern that better items might be developed to tap into more situational variability than we found with the present measures. Future research is needed to focus specifically on the measurement of situationally-varying experiences of stigma—particularly internalized stigma—to more robustly test hypotheses about its event-level effects on mental and behavioral health outcomes. Additionally, as noted previously, the small sample size limits the ability to draw strong conclusions, particularly regarding the individual-level effects. Finally, the twice-daily surveys provided critical insights but may be infeasible in large studies, as they are both resource-intensive for researchers and burdensome for participants. Future studies may consider less frequent reporting or other reporting schedules (e.g., event-contingent, random sampling over a longer period of time); however, more frequent sampling (e.g., three times daily) may allow for testing of more sophisticated causal models, when feasible. Finally, it was a strength of this study that we examined both concurrent and time-lagged effects of stigma on negative affect, though future research with larger samples might use more sophisticated techniques such as multilevel path analysis to better understand such effects.

Conclusions

In this proof-of-concept pilot study of event-level experiences of HIV stigma, we examined both anticipated and internalized HIV stigma and disaggregated the event-level data into

individual-level tendencies and situationally-varying effects. We found that, for both forms of HIV stigma, the majority of the variability was due to between-person factors (i.e., individual differences), though one-fifth was attributable to within-person differences (i.e., situational variability) over time. Anticipated HIV stigma had consistently lower bivariate associations with negative affect in bivariate analyses than did internalized HIV stigma, and anticipated HIV stigma did not, for the most part, maintain an independent effect when entered simultaneously with internalized HIV stigma. Our findings complement existing studies measuring global experiences of stigma and negative affect, showing that individuals who chronically experience internalized HIV stigma at higher levels also tend to experience greater levels of negative affect and emotion dysregulation on a given day. Moreover, the findings add to this literature by suggesting that, independent of the effects of individual-level internalized HIV stigma, acute experiences of internalized HIV stigma in a given situation are also associated with increases in negative affect and emotion dysregulation, both concurrently and later in the day (i.e., the effect "spills over" into later time points). Future research is needed to develop reliable and valid measures of situationally-varying HIV stigma, using robust methods similar to those that have been used to improve the measurement of situational affective experiences. A combination of individually-delivered in-person interventions and mobile interventions may be most successful at reducing the negative impact of internalized HIV stigma on negative affect and emotion dysregulation, which may improve the mental health of HIV-positive GBM.

Contributors:

HJR was responsible for study design, data collection, data analysis, interpreting the results, and drafting of the manuscript. BMM was responsible for drafting of the manuscript. JTP

was responsible for study design and revising the manuscript. All three authors read, revised, and approved a final version of the manuscript.

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IRB:

This study's protocols were reviewed and approved by the Human Research Protections Program (HRPP) University-wide Institutional Review Board of the City University of New York (CUNY).

Conflicts of Interest

The authors declare no direct financial conflicts of interest nor any conflicts of immediate family members.

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Table 1. Demographic characteristics of the sample (N = 50).

	n	%
Race/Ethnicity		
Black	17	34.0
Latino	15	30.0
White	10	20.0
Multiracial/Other	8	16.0
Sexual Orientation		
Gay, queer, or homosexual	44	88.0
Bisexual	6	12.0
Employment Status		
Full-time	15	30.0
Part-time	6	12.0
Unemployed	29	58.0
Highest Educational Attainment		
High school diploma/GED or less	9	18.0
Some college or Associate's degree	28	56.0
Bachelor's or other 4-year degree	8	16.0
Graduate degree	5	10.0
Relationship Status		
Single	38	76.0
Partnered	12	24.0
OASIS Score		
Below threshold (< 8)	30	60.0
At or above threshold (≥ 8)	20	40.0
ODSIS Score		
Below threshold (< 8)	29	58.0
At or above threshold (≥ 8)	21	42.0
	M	*SD*
Age (*Mdn* = 35.0)	38.7	10.4
Years since HIV diagnosis (*Mdn* = 10.0)	10.8	6.8

Table 2. Bivariate associations and descriptive statistics for day-level measures.

	1	2	3	4	5	6	7
1. HIV Stigma - Anticipated	--						
2. HIV Stigma - Internalized	0.55***	--					
3. Affect - Anxious	0.20***	0.38***	--				
4. Affect - Depressed	0.24***	0.47***	0.59***	--			
5. Affect - Anger	0.31***	0.53***	0.60***	0.75***	--		
6. Affect - Fatigue	0.25***	0.36***	0.42***	0.46***	0.33***	--	
7. Emotion Dysregulation	0.33***	0.55***	0.39***	0.48***	0.38***	0.26***	--
M [a]	1.52	1.35	0.55	0.47	0.41	0.71	0.30
ICC	0.80	0.83	0.60	0.62	0.45	0.58	0.66
Possible Range	1-4	1-4	0-3	0-3	0-3	0-3	0-3

Note.
*p < 0.05
**p < 0.01
***p < 0.001

[a] Scale means are weighted averages (intercept estimates) calculated from a null multilevel model and bivariate associations are beta coefficients from a multilevel model of z-scored versions of each pair of variables (see Data Analysis Plan for full details).

Table 3.*Multilevel associations between situational HIV stigma and negative affective outcomes experienced concurrently.*

	Model 1: Anxious Affect		Model 2: Depressed Affect		Model 3: Anger		Model 4: Fatigue		Model 5: Emotion Dysregulation	
	B	95%CI	B	95%CI	B	95%CI	B	95%CI	B	95%CI
Fixed Components										
Level 1: Situational Level										
Intercept	0.35***	[0.23, 0.46]	0.26***	[0.15, 0.38]	0.26***	[0.16, 0.37]	0.40***	[0.26, 0.54]	0.16***	[0.09, 0.22]
Anticipated HIV Stigma	0.01	[-0.03, 0.06]	0.01	[-0.06, 0.08]	0.06*	[0.00, 0.12]	0.05	[-0.04, 0.13]	0.03	[-0.02, 0.08]
Internalized HIV Stigma	0.20**	[0.09, 0.30]	0.22**	[0.11, 0.33]	0.16*	[0.02, 0.29]	0.13	[-0.02, 0.28]	0.18**	[0.08, 0.28]
Day of cycle	0.00	[-0.01, 0.00]	0.00	[-0.01, 0.01]	0.00	[-0.01, 0.00]	-0.01**	[-0.01, 0.00]	0.00	[-0.01, 0.00]
Report on weekend (ref. = no)	-0.05**	[-0.08, -0.01]	0.01	[-0.03, 0.06]	0.00	[-0.04, 0.03]	-0.02	[-0.06, 0.03]	0.00	[-0.02, 0.02]
Level 2: Individual Level										
Anticipated HIV Stigma	-0.05	[-0.25, 0.16]	0.03	[-0.20, 0.26]	-0.03	[-0.22, 0.16]	-0.02	[-0.26, 0.22]	-0.09	[-0.28, 0.09]
Internalized HIV Stigma	0.28**	[0.10, 0.47]	0.24	[-0.01, 0.48]	0.22	[-0.11, 0.55]	0.24	[-0.04, 0.51]	0.43***	[0.27, 0.59]
Black race (ref. = no)	-0.21**	[-0.34, -0.07]	-0.17*	[-0.31, -0.03]	-0.09	[-0.22, 0.03]	-0.20*	[-0.37, -0.02]	-0.05	[-0.13, 0.04]
In a relationship (ref. = no)	0.07	[-0.07, 0.21]	0.01	[-0.18, 0.20]	0.01	[-0.15, 0.17]	0.09	[-0.11, 0.29]	0.10	[-0.03, 0.24]
Years living with HIV	0.00	[-0.01, 0.01]	0.00	[-0.01, 0.01]	0.00	[-0.01, 0.02]	0.00	[-0.02, 0.01]	0.00	[-0.01, 0.01]
Age	0.00	[-0.01, 0.01]	0.00	[-0.03, 0.03]	0.00	[-0.02, 0.02]	0.00	[-0.01, 0.01]	0.00	[0.00, 0.01]

OASIS Score (ref. = < 8)	0.15	[-0.01, 0.31]	0.11	[-0.09, 0.31]	0.10	[-0.07, 0.28]	0.16	[-0.07, 0.39]	0.14 *	[0.02, 0.25]
ODSIS Score (ref. = < 8)	0.08	[-0.07, 0.24]	0.14	[-0.03, 0.32]	0.06	[-0.12, 0.23]	0.10	[-0.11, 0.30]	-0.02	[-0.12, 0.08]
Random Components										
Intercept Variance	0.03 *	[0.02, 0.08]	0.03	[0.00, 0.20]	0.03 **	[0.02, 0.07]	0.07 ***	[0.04, 0.11]	0.01 *	[0.01. 0.04]
L1 Anticipated HIV Stigma Slope Variance	--	--	0.02	[0.01, 0.04]	0.00	[0.00, 0.06]	0.01	[0.00, 0.05]	0.00	[0.00, 3.33]
L1 Internalized HIV Stigma Slope Variance	0.03	[0.01, 0.08]	0.01	[0.00, 0.06]	0.03	[0.01, 0.10]	0.02	[0.00, 0.09]	0.03	[0.01, 0.08]
Residual Components										
ARMA(1,1) Diagonal	0.07 ***	[0.05, 0.09]	0.10 ***	[0.06, 0.16]	0.09 ***	[0.07, 0.10]	0.09 ***	[0.08, 0.10]	0.05 ***	[0.04, 0.06]
ARMA(1,1) ϕ	0.34 ***	[0.16, 0.50]	0.53 ***	[0.25, 0.73]	0.33 ***	[0.21, 0.43]	0.27 ***	[0.19, 0.33]	0.35 ***	[0.22, 0.48]
ARMA(1,1) ρ	0.93 ***	[0.74, 0.98]	0.95 ***	[0.82, 0.99]	0.89 ***	[0.73, 0.96]	0.78 ***	[0.60, 0.89]	0.91 ***	[0.75, 0.97]

Note. $*p < 0.05$; $**p < 0.01$; $***p < 0.001$. Random variability in the Level 1 anticipated stigma slope could not be estimated for Model 1.

Table 4. *Multilevel associations between afternoon experiences of situational HIV stigma and subsequent nighttime experiences of negative affective outcomes.*

	Model 6: T2 Anxious Affect		Model 7: T2 Depressed Affect		Model 8: T2 Anger		Model 9: T2 Fatigue		Model 10: T2 Emotion Dysregulation	
	B	95% CI	B	95% CI	B	95% CI	B	95% CI	B	95% CI
Fixed Components										
Level 1: Situational Level										
Intercept	0.34 ***	[0.22, 0.45]	0.26 ***	[0.14, 0.38]	0.22 **	[0.09, 0.36]	0.40 ***	[0.26, 0.55]	0.16 **	[0.08, 0.24]
T1 Anticipated HIV Stigma	-0.01	[-0.06, 0.05]	0.04	[-0.03, 0.10]	-0.03	[-0.12, 0.06]	0.03	[-0.03, 0.09]	-0.02	[-0.05, 0.02]
T1 Internalized HIV Stigma	0.13 *	[0.02, 0.24]	0.11 *	[0.01, 0.22]	0.20 **	[0.08, 0.32]	0.06	[-0.10, 0.22]	0.21 ***	[0.11, 0.31]
Day of cycle	0.00	[-0.01, 0.00]	0.00	[-0.01, 0.00]	0.00	[-0.01, 0.00]	-0.01 **	[-0.01, 0.00]	0.00	[-0.01, 0.00]
Report on weekend (ref. = no)	-0.05	[-0.09, 0.00]	0.03	[-0.02,	0.02	[-0.05,	0.01	[-0.05,	0.00	[-0.04,

	*			0.07]		0.08]		0.04]		0.04]
Level 2: Individual Level										
Anticipated HIV Stigma	-0.11	[-0.34, 0.12]	-0.02	[-0.25, 0.21]	-0.03	[-0.27, 0.22]	-0.16	[-0.43, 0.12]	-0.08	[-0.26, 0.10]
Internalized HIV Stigma	0.36 *	[0.06, 0.66]	0.31 *	[0.00, 0.62]	0.22	[-0.70, 1.14]	0.42 *	[0.01, 0.83]	0.43 ***	[0.23, 0.64]
Black race (ref. = no)	-0.21 *	[-0.36, -0.07]	-0.18	[-0.36, 0.01]	-0.12	[-0.27, 0.03]	-0.16	[-0.35, 0.04]	-0.09	[-0.21, 0.04]
In a relationship (ref. = no)	0.10	[-0.07, 0.27]	0.05	[-0.13, 0.23]	0.10	[-0.07, 0.27]	0.07	[-0.17, 0.30]	0.14	[-0.05, 0.32]
Years living with HIV	0.01	[-0.01, 0.02]	0.01	[-0.01, 0.02]	0.01	[-0.01, 0.02]	0.00	[-0.01, 0.02]	0.00	[-0.01, 0.01]
Age	0.00	[-0.01, 0.02]	0.00	[-0.02, 0.02]	0.00	[-0.04, 0.04]	0.00	[-0.01, 0.01]	0.00	[-0.01, 0.01]
OASIS Score (ref. = < 8)	0.20	[-0.04, 0.45]	0.17	[-0.07, 0.51]	0.12	[-0.08, 0.32]	0.28	[-0.01, 0.08]	0.13	[-0.01, 0.26]
ODSIS Score (ref. = < 8)	0.00	[-0.23, 0.23]	0.05	[-0.17, 0.27]	0.05	[-0.15, 0.25]	-0.05	[-0.37, 0.28]	-0.05	[-0.18, 0.08]
Random Components										
Intercept Variance	0.05 ***	[0.03, 0.09]	0.06 ***	[0.04, 0.10]	0.05 ***	[0.03, 0.08]	0.08 ***	[0.05, 0.14]	0.02 ***	[0.01, 0.04]
L1 Internalized HIV Stigma Slope Variance	0.01	[0.00, 0.09]	0.02	[0.01, 0.08]	0.01	[0.00, 0.25]	0.02	[0.00, 0.15]	0.02	[0.00, 0.08]
Residual Components										
AR(1) Diagonal	0.06 ***	[0.05, 0.07]	0.06 ***	[0.05, 0.07]	0.07 ***	[0.06, 0.08]	0.09 ***	[0.08, 0.10]	0.04 ***	[0.03, 0.04]
AR(1) ρ	0.19 **	[0.08, 0.30]	0.22 ***	[0.11, 0.32]	0.08	[-0.03, 0.19]	0.14 **	[0.04, 0.24]	0.10 *	[0.00, 0.19]

Note. *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

Research Highlights

- Experiences of HIV stigma vary meaningfully from situation-to-situation
- Negative affect resulted from both individual- and situational-level HIV stigma
- The effect of HIV stigma was driven by internalized, self-directed forms of stigma
- Men who typically experienced more HIV stigma also experienced more negative affect
- On days when men experienced more HIV stigma, they experienced more negative affect