Do Psychiatric Disorders Moderate the Relationship Between Psychological Distress and Sexual Risk-Taking Behaviors in Young Men Who Have Sex with Men? A Longitudinal Perspective

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Abstract

Young men who have sex with men (YMSM) account for two-thirds of new HIV infections in young people in the United States. Identifying between-person and within-person correlates of sexual risk-taking provides critical information for developing behavioral prevention efforts for this group. Possible predictors of sexual-risk behavior in YMSM include major depressive disorder (MDD), post-traumatic stress disorder (PTSD), and variation in psychological distress over time. To date, research has been equivocal with regard to the relationship between psychiatric disorders, psychological distress, and sexual risk behaviors. Participants included 119 16–20-year-old YMSM. Ethnicity/race of the participants included: black/African-American (46.2%), white (19.3%), Latino/Hispanic (12.6%), multiracial (11.8%), Asian/Pacific Islander (2.5%), and other (5.9%). Sexual risk outcomes included total number of male partners and unprotected anal sex acts across four waves of data collection (24 months). The study found that the between-person correlates, including ethnicity and age, predicted total male partners. Between-person correlates, including ethnicity, MDD, and a moderating effect of PTSD on psychological distress emerged as determinants of unprotected anal sex acts.

Introduction

Significant advances over the past decade in prevention and intervention efforts for human immunodeficiency virus (HIV) have been made; however, certain groups remain at disproportionate risk for HIV infection. One at-risk group includes young men who have sex with men (YMSM), who accounted for 68% of infections in all young people (ages 13–24) in the United States in 2008.[1] Despite the increased risk for HIV infection faced by YMSM, there is a paucity of research and interventions targeting this high-risk group.[2]

Until an efficacious biomedical prevention method is identified, human behavior is at the epicenter of HIV prevention efforts and is the primary modifiable factor in reducing future HIV infection.[3] High-risk sexual behavior is the primary manner through which individuals become infected with HIV. In 2009, 87% of diagnosed HIV infections were transmitted through sexual contact.[4] The most commonly studied high-risk sexual behavior in YMSM is unprotected anal sex,[5] although it may be equally important to examine the total number of male sexual partners as an indicator of risk. Having multiple sexual partners increases the likelihood of contact with an HIV+ partner and predicts new HIV infections among MSM.[6] Furthermore, recent evidence indicates that YMSM make frequent condom use errors that result in condom failure,[7] indicating that YMSM with multiple male sexual partners may be at risk for HIV acquisition even in the context of consistent condom use. Identifying correlates of both of these indicators of sexual risk in YMSM can inform future intervention and prevention programs for this relatively understudied group.[3]

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Exploring mental health as a predictor of sexual risk behavior is a worthwhile endeavor in order to inform emergent prevention and intervention efforts for YMSM. Two psychiatric disorders and their associated symptomatology, major depressive disorder (MDD) and post-traumatic stress disorder (PTSD), have higher prevalence rates in LGBT youth than in the general population[8–10] and have been implicated as possible correlates of sexual risk behaviors. Rates of MDD in YMSM range from 15 to 20%,[11,12] and 7–9% of LGBT youth meet full criteria for PTSD.[12,13]

Psychiatric disorders may theoretically be predictive of sexual risk behavior in YMSM.[2] For example, individuals meeting criteria for MDD may engage in reduced self-care and depressive symptoms may contribute to difficulties in engaging in healthy behaviors.[14] Individuals meeting criteria for PTSD are likely to experience elevated levels of anxiety and stress, which have been linked to increased risky behavior[15] and maladaptive coping.[16] The literature has been highly variable when reporting on the relationship between MDD and PTSD diagnoses and/or symptoms and sexual risk behaviors in both older adult MSM and YMSM.[17] This variability may be largely attributed to varying methodology in operationalizing mental health outcomes, which have been measured as symptom counts, dimensional measures of psychological distress, diagnoses, and affect states.[17] The majority of these studies have focused on symptoms of mental disorders and dimensional measures of distress rather than diagnoses, and evidence indicates that these types of measures may overestimate the prevalence of psychiatric diagnoses in this population.[12] Further clarity is needed to more accurately depict the relationship between mental health and sexual risk behaviors in YMSM, using more rigorous measures of psychiatric diagnoses.[12,18]

The link between MDD and/or depressive symptoms and sexual risk-taking behaviors in MSM and YMSM remains unclear.[17] Studies have identified a positive relationship,[19] whereas others have identified no relationship.[20] In a large sample of adolescent males that included YMSM, depressive symptoms were negatively associated with condom use; as symptoms increased, condom use decreased.[21] Furthermore, in a longitudinal study of YMSM specifically, youth who engaged in unprotected oral or anal sexual intercourse were more likely to be depressed; as symptoms improved over time, risky sexual behavior decreased.[22] However, another study found that depressive symptoms were not associated with higher rates of sexual risk behaviors in HIV+ African-American YMSM.[23]

The literature is less developed with regard to PTSD and trauma and its relationship with sexual risk behavior in YMSM. In HIV+ men and women, moderate-to-severe symptoms of PTSD were associated with unprotected sexual intercourse, whereas symptoms of re-experiencing were associated with greater number of sexual partners.[24] Furthermore, research on trauma in adult MSM suggests that traumatic experiences such as childhood sexual abuse may be related to sexual risk behaviors.[25–27] However, the mechanism through which childhood sexual abuse increases risk of HIV transmission is currently unknown, and may include factors such as increased psychological distress, higher rates of substance abuse, and/or higher likelihood of re-victimization, which all increase risky sexual behavior.[2] The only study to investigate the relationship between trauma and sexual risk behavior specifically in YMSM found that HIV+ African-American YMSM experienced high frequencies of trauma and that this was correlated with engaging in higher frequencies of unprotected anal sex.[23] Although there is limited prior research on YMSM and trauma, the relationship among trauma, PTSD, and sexual risk behavior in YMSM merits further investigation.

Whereas use of psychiatric disorders (i.e., MDD, PTSD) may have more clear clinical implications for intervention, dimensional measures of psychological distress in longitudinal studies may also have utility in identifying within-persons variability in negative affect as a more proximal predictor of risk. Recent evidence from a prospective daily diary study of sexual behavior in adult MSM indicates that certain affective states (e.g., anxious arousal and sexual activation) have a direct impact on sexual risk.[18] Understanding these within-persons effects in YMSM may provide insight into the equivocal findings in the literature on the association among depressive symptoms, trauma, and sexual risk, and help differentiate the effects of psychological distress from related psychiatric disorders. Furthermore, meeting criteria for a diagnosis of MDD and/or PTSD may be a moderator between more fleeting psychological distress and high-risk sexual behavior (e.g. individuals with MDD may be more or less sensitive to changes in psychological distress), although this more nuanced approach has not yet been studied in YMSM.

The current study is a prospective longitudinal investigation of YMSM, with an observation period spanning 24 months, utilizing both structured diagnostic interviews, the gold-standard in determining psychiatric diagnoses and symptoms, and a dimensional measure of psychological distress administered longitudinally (i.e., within-persons) across the 24 month period. Specifically, we were interested in exploring the main effects of psychiatric disorders and psychological distress on two sexual risk behaviors (i.e., total male partners, total unprotected anal sex acts), as well as the moderating effect of psychiatric disorders (i.e., MDD and/or PTSD) on the association between psychological distress and these two sexual risk behaviors, by simultaneously modeling within-person variability in psychological distress and between-person variability in psychiatric disorders.

Based on the literature, we predicted the following main effects: (1) Psychological distress will predict sexual risk behavior across time such that (a) increased psychological distress will be related to increased number of male partners and (b) increased psychological distress will be related to increased unprotected anal sex acts; (2) Psychiatric disorders (i.e., diagnosis of MDD and/or PTSD) at baseline will predict sexual risk behavior across time such that (a) presence of MDD and/or PTSD will be related to increased number of unprotected anal sex acts, and (b) presence of MDD and/or PTSD will be related to increased number of male partners; and (3) MDD and/or PTSD will moderate the effect of psychological distress, such that the presence of psychiatric disorders will increase the positive relationship between psychological distress and sexual risk behaviors.

Methods

Sample

Participants were a subset of YMSM from a longitudinal study of LGBT youth aged 16–20 at baseline ($n = 119$). At

baseline, mean age of the sample was 18.51 (SD=1.22). (See Mustanski[12] for a description of the full sample.) Only male participants who reported anal sexual intercourse with males were included in this sample. Ethnicity/race of the participants included: black/African-American (46.2%), white (19.3%), Latino/Hispanic (12.6%), multiracial (11.8%), Asian/ Pacific Islander (2.5%), and other (5.9%). When dichotomized for analyses, participant ethnicity was 54.6% African-American (including multiracial African-Americans) and 45.4% non-African-American. With regard to self-reported sexual orientation, at enrollment, 77.3% identified as homosexual/gay and 22.7% identified as bisexual, heterosexual (behaviorally bisexual), or questioning. In terms of gender identity, 90.8% identified as males, and 9.2% of the sample identified as being transgendered (male-to-female).

Procedures

Youth were recruited from 2007 to 2008 in a large metropolitan area in the Midwest. Participants were recruited using a modified respondent-driven sampling approach that involved an initial convenience sample (i.e., flyers in neighborhoods frequented by LGBT youth and college listservs; 38%) and subsequent waves of incentivized peer recruitment (62%). This methodology has been widely used to sample "hidden populations."[28] Eligibility screening included a question asking, "Project Q2 is a study for lesbian, gay, bisexual, transgender and other youth who do not use these terms but have same sex attractions. Does this include you?" This allowed for the inclusion of youth who did not identify with LGBT labels but had same-sex attractions and/or behaviors.

Prior to enrollment, trained staff used a two-step process to determine decisional capacity to consent.[12] The first step involved a determination of the youths' understanding of the study goals.[29] The second step involved evaluation of whether the youth could understand, appreciate, consider and express a choice about participation using a modified version of the evaluation to consent form.[30] If decisional capacity was impaired, study staff consulted with the principal investigator before proceeding. Institutional review boards (IRBs) approved a waiver of parental permission for minor participants under US 45CFR46.408(c), and appropriate mechanisms were put in place (i.e., youth advocate, federal certificate of confidentiality).[31] Written informed consent or assent was obtained.

Data for this analysis were taken from four waves of data collection between 2007 and 2010 (baseline, 6 month follow-up, 12 month follow-up, 18 month follow-up) with 87%, 91%, and 80% retention at 6, 12, and 18 month follow-up for the entire sample of LGBT youth. At baseline, participants reported on behavior in the previous 6 months, resulting in observation of reported risk behaviors for a total period of 24 months. Participants completed measures using audio computer-assisted self-interview during the first three waves in private rooms within a large LGBT community-based health center or university. Data from the fourth wave was collected via an online survey that could be completed remotely or at the project site, because a sizable portion of the population had relocated from the area. Baseline interview and 12 month follow-up took ∼2 h to complete and participants were paid $40 for participation. The 6 month and 18 month follow-up interview took ∼1 h to complete and participants were paid $25 for their participation in the 6 month interview and $15 for their participation in the 18 month interview.

Measures

General demographics. The demographics questionnaire was administered at baseline to assess for a number of participant characteristics including: age, ethnicity/race, and self-reported sexual orientation.

Diagnostic assessment. DSM-IV diagnoses were assigned through assessment with the Diagnostic Interview Schedule for Children (DISC) computerized version 4.0,[32] the most widely used structured interview to assess for psychiatric disorders in adolescents and young adults. A number of DISC modules were administered at baseline to determine diagnoses for the previous 12 month period. Extensive interviewer training was conducted consistent with the recommendations made by DISC developers. The DISC was administered by trained interviewers who were advanced psychology students or staff with experience in psychology and the target population, with a bachelors level degree or higher. Fidelity was assured by ongoing supervision by a licensed clinical psychologist. The computerized DISC 4.0 has demonstrated acceptable reliability and validity.[32]

Self-reported psychological distress. The Brief Stress Inventory (BSI-18)[33] is a self-report measure of experienced psychological distress over the previous week, and has been widely used as a psychiatric screening tool in both clinical and epidemiological studies. The BSI-18 shows adequate reliability and convergent validity.[34] The Global Severity Index (GSI) is computed by averaging the responses to all 18 questions. Scores range from 0 to 4 with higher scores indicating more severe distress. In this sample, α was acceptable (α=0.91).

AIDS-risk behavior assessment (ARBA). The ARBA[35] is a computerized self-administered interview that is specifically designed for use with adolescents and young adults to assess self-reported sexual and drug behaviors associated with risk for HIV. The ARBA has been used with a variety of youth populations including ethnically diverse youth, youth with psychiatric disorders, and YMSM.[35–37] Sexual risk questions assess type of sexual behavior (i.e., oral, anal, or vaginal), frequency of intercourse, and frequency of condom usage. Memory aids were used to facilitate accurate recall of this information. Two sexual risk outcome variables were selected to depict the multifaceted nature of sexual risk and included total male partners and total unprotected anal sex acts with male partners.

Analyses

Analyses were conducted using Hierarchical Linear Modeling (HLM) statistical software and procedures.[38] HLM is an appropriate choice given the need to account for dependency in observations in data that contain a multilevel structure. In this case, longitudinal assessments (Level 1) are nested within participants (Level 2). At Level 1, HLM estimates 1) age at each assessment point to explore maturation over time and the 2) within-participant effects of psychological distress. At

Level 2, HLM analyzes for main effects of differences between participants including 1) PTSD diagnosis, 2) MDD diagnosis, 3) age at baseline to explore cohort effects, and 4) ethnicity. Between-subjects characteristics can be evaluated as moderators of Level 1 effects, specifically the moderating effect of MDD and/or PTSD on the relationship between psychological distress and sexual risk.

Maximum likelihood estimation was used to model the two outcome variables. A Poisson distribution was used in estimating frequency of the outcome variables (i.e., total male partners and unprotected anal sex acts) and is appropriate, given that it is meant for distributions typical of count data. The models also account for over-dispersion in the outcome variables resulting from a large percentage of cases with zero counts. Estimates are from the population-average models using robust standard errors. When creating the two models, we Winsorized the outcome variables at three standard deviations from the mean to reduce the possible effects of outliers, as consistent with previous research.[39-41]

Results

Anal sex acts and male partners

All youth were included in analyses (i.e., $n = 119$). Over the four time points (24 months), the 119 participants reported an average of 1.37 ± 2.47 unprotected anal sex acts. Participants reported an average of 1.25 ± 1.36 male partners per wave.

Psychological distress

Over the four time points, participants reported a mean score of 0.73 ± 0.70 on total BSI (range $= 0 - 3.44$). Total BSI score was a mean of the 18 items of the BSI ranging from 0 to 4 (i.e., GSI score).

Psychiatric disorders

At baseline, 5.9% of participants ($n = 7$) met criteria for a diagnosis of PTSD over the past year. The mean number of PTSD symptoms reported was 2.98 ± 4.32. At baseline, 14.3% of participants ($n = 17$) met criteria for a diagnosis of MDD over the past year. The average number of MDD symptoms reported was 10.09 ± 4.61.

Psychological distress, psychiatric disorders, and sexual risk

Results for effects are presented using the event rate ratio (ERR). The ERR provides an estimate of the change in event rate of the outcome variable (e.g., number of unprotected anal sex) for each one unit increase in the independent variable. Thus, an ERR >1 indicates an increase in the event rate of the outcome variable, whereas an ERR of <1 suggests a decrease in the event rate of the outcome variable.

Total male partners. Estimates of the main and moderating effects in the total male partners model are shown in Table 1. At Level 1, age over time (i.e., maturational effect) was associated with total number of male partners (ERR = 0.78, $p < 0.001$); for each additional year aged over the course of the study, participants had 22% fewer partners. Higher psychological distress at each wave was not significantly associated with total number of male partners (ERR = 0.96, $p = 0.66$) over time. At Level 2, the following relationships were non-significant: PTSD and total male partners (ERR = 0.88, $p = 0.62$), MDD and total male partners (ERR = 1.34, $p = 0.36$), and age at baseline and total male partners (ERR = 0.99, $p = 0.89$). Ethnicity was significantly related to number of total male partners (ERR = 0.67, $p = 0.01$); African-American participants had 34% fewer partners than non-African-American participants (see Figure 1). No moderating effects of PTSD (ERR = 0.85, $p = 0.45$) or MDD (ERR = 0.95, $p = 0.73$) on the relationship between psychological distress and total male partners reached significance.

Unprotected anal sex acts. Estimates of the main and moderating effects for the unprotected anal sex model are shown in Table 2. At Level 1, age over time (i.e., maturational effect) was not associated with total number of unprotected anal sex acts (ERR = 1.03, $p = 0.78$), nor was higher psychological distress at each wave significantly associated with total number of unprotected anal sex acts (ERR = 1.03, $p = 0.85$) over

TABLE 1. EFFECT OF AGE, PSYCHOLOGICAL DISTRESS, PSYCHIATRIC DISORDERS, AND ETHNICITY ON TOTAL NUMBER OF MALE PARTNERS

Fixed effects	Total male partners						
	ERR	CI	Coef.	SE	t-ratio	df	p
Level 1							
Age at observation	0.78	0.68–0.90	−0.25	0.07	−3.56	355	<0.01
Psych distress	0.96	0.82–1.14	−0.04	0.08	−0.45	355	0.66
Cross-level moderators							
Psych Dist. X PTSD	0.85	0.57–1.29	−0.16	0.21	−0.76	355	0.45
Psych Dist. X MDD	0.95	0.71–1.27	−0.05	0.15	−0.35	355	0.73
Level 2							
Intercept	1.67	0.22–12.74	0.52	1.02	0.51	99	0.61
PTSD	0.88	0.51–1.50	−0.13	0.27	−0.49	99	0.62
MDD	1.34	0.72–2.51	0.29	0.32	0.93	99	0.36
Age at Wave 1	0.99	0.89–1.10	−0.01	0.05	−0.14	99	0.89
African Am.	0.67	0.50–0.90	−0.40	0.15	−2.73	99	<0.01

Level 1 denotes within-person effects; Level 2 denotes between-person effects; cross-level moderators denote the cross-level interaction between a Level 2 and Level 1 variable.

ERR, event rate ratio; PTSD, post-traumatic stress disorder; MDD, major depressive disorder.
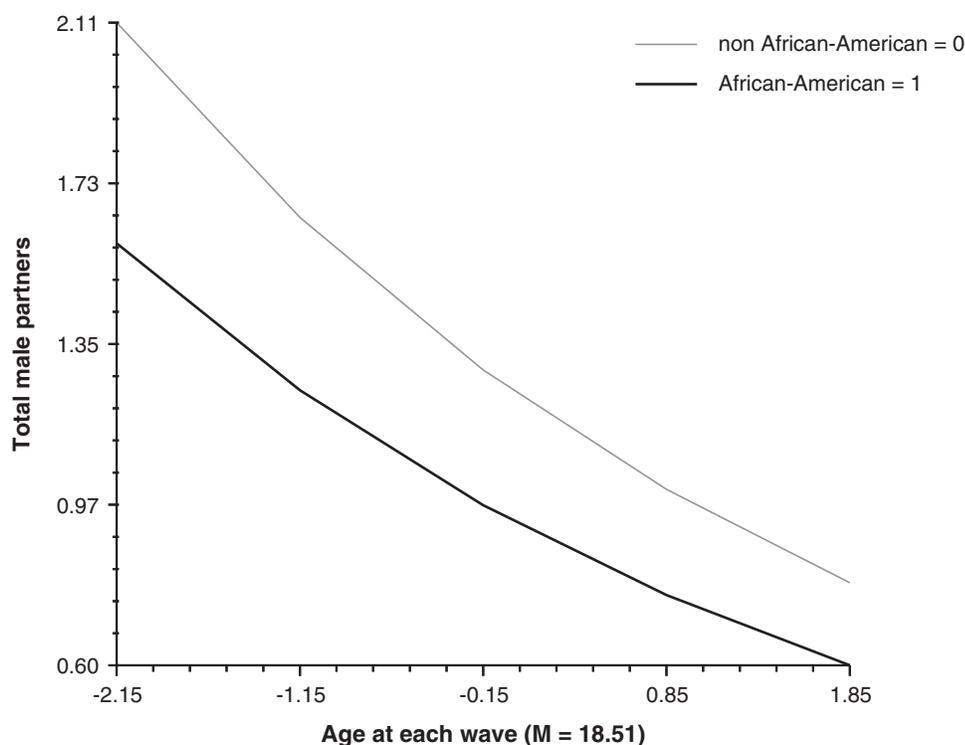
FIG. 1. Relationship between age, ethnicity and total male partners.

time. At Level 2, the main effect of PTSD on total unprotected anal sex acts (ERR = 0.80, p = 0.40) was non-significant. A main effect of MDD was significantly related to the number of unprotected anal sex acts (ERR = 0.51, p = 0.05); participants with MDD at baseline had 49% anal sex acts than did participants without MDD at baseline.

Age was not significantly related to number of unprotected anal sex acts (ERR = 1.00, p = 0.99). Ethnicity was significantly related to number of unprotected anal sex acts (ERR = 0.50, p < 0.01); African-American participants had 50% fewer unprotected sex acts than non-African-American participants. The moderating effect of PTSD on the relationship between psychological distress and unprotected

anal sex acts (ERR = 0.03, p < 0.001) was significant. Individuals who met criteria for PTSD had more unprotected anal sex at time points in which they showed low levels of psychological distress as compared to when they had higher levels of distress. For individuals who did not meet PTSD criteria, variability in psychological distress showed very little relationship with the rate of unprotected anal sex. However, given that only seven participants met criteria for PTSD, this is a very preliminary finding and the confidence intervals for the effect are wide. We encourage further investigation of this effect in future studies with large numbers of MSM meeting criteria for PTSD. The moderating effect of MDD on the relationship between psychological

TABLE 2. EFFECT OF AGE, PSYCHOLOGICAL DISTRESS, PSYCHIATRIC DISORDERS, AND ETHNICITY
ON TOTAL INCIDENTS OF UNPROTECTED ANAL SEX

	Total unprotected sex acts						
Fixed effects	ERR	CI	Coef.	SE	t-ratio	df	p
Level 1							
Age at observation	1.03	0.85–1.25	0.03	0.10	0.31	354	0.78
Psych. distress	1.03	0.74–1.43	0.03	0.17	0.19	354	0.85
Cross-level moderators							
Psych Dist. X PTSD	0.03	0.01–0.08	−3.63	0.57	−6.32	354	<0.01
Psych Dist. X MDD	0.54	0.19–1.53	−0.62	0.53	−1.16	354	0.25
Level 2							
Intercept	2.06	0.08–55.28	0.72	1.66	0.43	99	0.67
PTSD	0.80	0.48–1.35	−0.22	0.26	−0.85	99	0.40
MDD	0.51	0.26–1.00	−0.66	0.34	−1.97	99	0.05
Age at Wave 1	1.00	0.84–1.20	0.00	0.09	0.003	99	0.99
African Am.	0.50	0.32–0.78	−0.70	0.22	−3.13	99	<0.01

Level 1 denotes within-person effects; Level 2 denotes between-person effects; cross-level moderators denote the cross-level interaction between a Level 2 and Level 1 variable.

ERR, event rate ratio; PTSD, post-traumatic stress disorder; MDD, major depressive disorder.

distress and unprotected anal sex acts (ERR = 0.35, $p = 0.12$) was not significant.

Discussion

The current study found that between-person correlates including ethnicity and age predicted total male partners. Between person correlates (MDD, ethnicity) and a moderating effect of PTSD by psychological distress predicted unprotected anal sex acts. Importantly, the pattern of relationships varied depending upon which sexual risk behavior was being measured as the outcome variable, underscoring the important point that determinants may differ across aspects of sexual risk behaviors.[17,42] The one pattern replicated across the two sexual risk behaviors was that African-American participants were less likely to engage in both high-risk sexual behaviors (i.e., they had fewer male partners and fewer unprotected anal sex acts).

In the first model examining number of male partners, age and ethnicity emerged as important correlates. African-American YMSM had fewer total male partners than did non-African-American YMSM. This finding is counterintuitive, given disparities in rates of HIV infection in African-American YMSM,[43] but corroborates previous findings suggesting that African-Americans do not engage in higher sexual risk behavior than other ethnic groups.[6,41,44,45] One possible explanation for reduced sexual risk behavior in African-American YMSM may be that current targeted prevention efforts are effective in reducing sexual risk behavior in this population.[46] However, given the dearth of published prevention or intervention studies completed with YMSM, this seems unlikely. An alternative explanation for why HIV rates are highest in African-American YMSM, despite lower rates of sexual risk behavior, is that these young people tend to have smaller and more homophilous sexual networks. HIV is spread both from one's individual risk behaviors as well as the risk behaviors and HIV prevalence of others in his sexual network.[9] Given that African-American YMSM are more likely to have partners of their own race,[41,47] this phenomenon may contribute to higher rates of HIV infection in African-American YMSM.

Aging over time was related to total number of male partners. YMSM tended to have fewer partners over the course of the study as they grew older, indicating potential maturational effects. This finding may be explained by the fact that as YMSM aged over the course of the study, they were more likely to have a main partner, versus younger MSM who may have been engaged in more casual relationships with more partners. Little is known about how main partners are defined within MSM by age group.[48] Another potential explanation for the finding that YMSM tended to have fewer partners over the course of the study includes the possibility that participants were recruited at the time when they were most sexually active. However, given the peer-based recruitment strategy rather than recruitment at a sexually transmitted infection (STI) clinic, and that sexual activity was not an enrollment criteria, this possibility is unlikely.

In the second model exploring unprotected anal sex acts, MDD, ethnicity and a moderating effect of PTSD by psychological distress emerged as significant determinants. In this model, participants with a diagnosis of MDD engaged in fewer unprotected anal sex acts, African-American partici-

pants engaged in fewer unprotected anal sex acts, and PTSD significantly moderated the relationship between psychological distress and unprotected anal sex acts. In youth meeting criteria for PTSD, experiencing low rates of psychological distress resulted in higher frequencies of unprotected anal sex acts. On the other hand, experiencing high rates of psychological distress resulted in lower frequencies of unprotected anal sex acts. For the majority of youth who did not have PTSD, psychological distress did not influence unprotected anal sex. Because of the small sample size of individuals who met criteria for PTSD at baseline, this is a very preliminary finding.

Overall, the predictive relationships between mental health variables and longitudinal reports of sexual risk behaviors were not significant. When exploring psychological distress over time as a within-person correlate, the relationship did not emerge significantly across sexual risk behaviors. Furthermore, the majority of the expected main effects of diagnosis for both MDD and PTSD were not significant. Meeting criteria for a diagnosis of MDD was the only mental health correlate found to be significantly related to sexual risk behavior, in fact, reducing the likelihood of engaging in unprotected anal sex, which is contrary to previous findings.[21,22] A potential explanation could be that youth who were depressed were less likely to engage in sexual behavior because of anhedonia and decreased social interaction. Meeting criteria for a diagnosis of PTSD did not emerge as a correlate of either sexual risk behavior.

Prior studies have also found no associations between mental health variables and sexual risk behaviors,[17,23] whereas others have reported positive relationships.[21,24,49] These divergent results have two possible explanations.[17] The first possibility is that there is no true relationship between mental health indices and sexual risk behaviors. The second explanation is that methodological weaknesses in studies limit the ability to detect a true effect. Given that our findings corroborate previous studies, and the quality of methodological rigor in this study, it is possible that the first explanation is supported, and that psychiatric disorders do not increase sexual risk behaviors among YMSM. Instead, proximal predictors such as attitudes, norms, self-efficacy, and intentions may be more robust correlates of sexual risk behavior.[50]

Given the discrepant findings in the literature with regard to MDD and/or PTSD and sexual risk behavior, we were most interested in exploring the moderating influence of psychiatric disorders on the relationship between psychological distress and sexual risk behaviors. Specifically, given previous findings that psychiatric disorders might not be related to sexual risk behaviors,[17] we hypothesized that varying psychological distress over time might be a more proximal predictor of sexual risk outcomes, whereas psychiatric disorders might explain between-person differences in how psychological distress is related to sexual risk behavior. PTSD emerged as a moderator of the relationship between psychological distress and total number of unprotected anal sex acts. It is important to note caution in this finding, given that the percentage of YMSM meeting criteria for PTSD (5.9%) in the study was low, although consistent with epidemiologic data. However, we hope that this finding provides fodder for future longitudinal research examining the relationship among psychological distress, PTSD, and sexual risk behavior

in YMSM, which is sorely needed. This is particularly important given the higher than average base rates of trauma in YMSM[23] and PTSD in LGBT youth.[12]

These findings have implications for the understanding the relationship between two psychiatric disorders, psychological distress, and sexual risk outcomes; they support previous hypotheses that the relationship may not be consistent across people.[17,51] Youth experiencing psychiatric disorders and high levels of psychological distress may experience impairment that makes them less likely to engage in sexual activity. However, youth experiencing psychiatric disorders and low levels of psychological distress may engage in high-risk sexual behavior. These results suggest the importance of screening, assessment, and targeted treatment for YMSM presenting with psychological distress and/or mental health diagnoses.

A number of strengths of this study include the ability to prospectively follow an ethnically diverse sample of YMSM longitudinally, which affords the opportunity to examine both within-person and between-person correlates of sexual risk behaviors.[52] Additionally, the study includes two sexual risk behavior outcomes, which allows for a multifaceted perspective of sexual risk-taking in YMSM, and allows us to make comparisons between the various behaviors. Indeed, results were discrepant across the two sexual risk behaviors, suggesting that it is possible that important relationships could be missed if multi-outcome variables are not included. Finally, one of the limitations of previous studies examining the relationship between mental health and sexual risk behaviors has included the use of either symptoms or diagnoses, whereas we included both. This study utilized the gold standard for epidemiological research of a structured clinical interview for measuring mental health diagnoses.

Study limitations must be considered. The manner in which we categorized ethnicity, although used before,[40,41] is not ideal in that it created two groups: African-Americans and non-African-Americans. This did not allow us to explore other ethnic groups (e.g., Latinos). However, our sample did not allow for such analyses because of a low frequency of participants from other racial and ethnic groups. Additionally, the number of participants who met criteria for MDD and PTSD (especially the latter) was relatively small, which reduced our power to identify relationships, although several significant findings were observed. Further, given recent findings indicating the impact of drug use, particularly crystal methamphetamine,[53,54] and partner characteristics on high risk sexual behavior, it is a limitation that we did not include these variables in our models.[2] A number of possible mediators were not measured, and provide avenues for future research, such as motivation to use condoms,[55] self-efficacy,[19] and cognitive escape.[16] Also, analyses may have been underpowered at Level 2, especially the categorical predictors (i.e., MDD and PTSD), which may have contributed to non-significant results for small effects. Finally, there were limitations in how sexual risk behaviors were measured, specifically relying on retrospective self-report and not differentiating between receptive and insertive anal sex, which carry different levels of risk for HIV transmission.[6]

The findings of the current study have implications for YMSM and mental health screening and assessment. The results of this study and others[56] suggest that the effects of psychological distress may differ based on the presence of a psychiatric disorder. This suggests the need to conduct thorough assessments of psychiatric disorders in youth when they first present for treatment, as well as for continued monitoring of psychological distress, and most importantly assessing of HIV risk behaviors. This will allow mental health providers to identify which youth are most in need of what kind of intervention. It is our hope that the results of this study can contribute to the much-needed development of prevention and intervention efforts targeting YMSM from a psychological standpoint.[57] We believe that evidence-based prevention and intervention development should consider a modularized approach,[58] targeting subgroups of YMSM, including ethnicity, age cohorts, and mental health status.

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Author Disclosure Statement

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References

1. Centers for Disease Control and Prevention. HIV Surveillance in Adolescents and Young Adults, 2010. http://www.cdc.gov/hiv/topics/surveillance/resources/slides/adolescents/index.htm Atlanta, GA: U.S. Department of Health and Human Services.

2. Mustanski BS, Newcomb ME, Du Bois SN, Garcia SC, Grov C. HIV in young men who have sex with men: A review of epidemiology, risk and protective factors, and interventions. J Sex Res 2011;48:218–253.

3. DiClemente RJ, Wingood GM, Blank MB, Metzger DS. Future directions for HIV prevention research: charting a prevention science research agenda. J Acquir Immune Defic Syndr 2008;47(Suppl 1):S47–48.

4. Centers for Disease Control and Prevention. HIV Surveillance Report, 2009. http://www.cdc.gov/hiv/surveillance/resources/reports/2009report Atlanta, GA: U.S. Department of Health and Human Services.

5. Marks G, Crepaz N, Janssen RS. Estimating sexual transmission of HIV from persons aware and unaware that they are infected with the virus in the USA. AIDS 2006;20:1447–1450.

6. Koblin BA, Husnik MJ, Colfax G, Huang Y, Madison M, Mayer K, et al. Risk factors for HIV infection among men who have sex with men. AIDS 2006;20:731–739.

7. DuBois S, Emerson E, Mustanski BS. Condom-related problems among a racially diverse sample of young men who have sex with men. AIDS Behav 2011;15:1342–1346.

8. Kessler RC, Chiu WT, Demler O, Merikangas KR, Walters EE. Prevalence, severity, and comorbidity of 12-month DSM-IV disorders in the National Comorbidity Survey Replication. Arch General Psychiatry 2005;62:617–627.

9. Tieu HV, Murrill C, Xu G, Koblin BA. Sexual partnering and HIV risk among black men who have sex with men: New York City. J Urban Health 2010;87:113–121.

10. Turner RJ, Gil AG. Psychiatric and substance use disorders in South Florida: Racial/ethnic and gender contrasts in a young adult cohort. Arch General Psychiatry 2002;59: 43–50.

11. Kipke MD, Kubicek K, Weiss G, Wong C, Lopez D, Iverson E, et al. The health and health behaviors of young men who have sex with men. J Adolesc Health 2007;40:342–350.

12. Mustanski BS, Garofalo R, Emerson EM. Mental health disorders, psychological distress, and suicidality in a diverse sample of lesbian, gay, bisexual, and transgender youths. Am J Public Health 2010;100:2426–2432.

13. D'Augelli AR, Grossman AH, Starks MT. Childhood gender atypicality, victimization, and PTSD among lesbian, gay, and bisexual youth. J Interpers Violence 2006;21:1462–1482.

14. Allgöwer A, Wardle J, Steptoe A. Depressive symptoms, social support, and personal health behaviors in young men and women. Health Psychol 2001;20:223–227.

15. Kashdan TB, Collins RL, Elhai JD. Social anxiety and positive outcome expectancies on risk-taking behaviors. Cognitive Ther Res 2006;30:749–761.

16. McKirnan DJ, Ostrow DG, Hope B. Sex, drugs and escape: a psychological model of HIV-risk sexual behaviours. AIDS Care 1996;8:655–669.

17. Crepaz N, Marks G. Are negative affective states associated with HIV sexual risk behaviors? A meta-analytic review. Health Psychol 2001;20:291–299.

18. Mustanski BS. The influence of state and trait affect on HIV risk behaviors: a daily diary study of MSM. Health Psychol 2007;26:618–626.

19. Alvy LM, McKirnan DJ, Mansergh G, Koblin B, Colfax GN, Flores SA, et al. Depression is associated with sexual risk among men who have sex with men, but is mediated by cognitive escape and self-efficacy. AIDS Behav 2011;15:1171–1179.

20. Bradley MV, Remien RH, Dolezal C. Depression symptoms and sexual HIV risk behavior among serodiscordant couples. Psychosom Med 2008;70:186–191.

21. Shrier LA, Harris SK, Sternberg M, Beardslee WR. Associations of depression, self-esteem, and substance use with sexual risk among adolescents. Prev Med 2001;33:179–189.

22. Rotheram–Borus MJ, Rosario M, Reid H, Koopman C. Predicting patterns of sexual acts among homosexual and bisexual youths. Am J Psychiatry 1995;152:588–595.

23. Radcliffe J, Beidas R, Hawkins L, Doty N. Trauma and sexual risk among sexual minority African American HIV-Positive young adults. Traumatology 2010;17:24–33.

24. Gore–Felton C, Koopman C. Traumatic experiences: Harbinger of risk behavior among HIV-positive adults. J Trauma Dissociation 2002;3:121–135.

25. Kalichman SC, Sikkema KJ, DiFonzo K, Luke W, Austin J. Emotional adjustment in survivors of sexual assault living with HIV-AIDS. J Trauma Stress 2002;15:289–296.

26. Mimiaga MJ, Noonan E, Donnell D, Safren S, Koenen K, Gortmaker S, et al. Childhood sexual abuse is highly associated with HIV risk-taking behavior and infection among MSM in the EXPLORE study. J Acquir Immune Defic Syndr 2009;51:340–348.

27. O'Leary A, Purcell D, Remien RH, Gomez C. Childhood sexual abuse and sexual transmission risk behaviour among HIV-positive men who have sex with men. AIDS Care 2003;15:17–26.

28. Heckathorn DD. Respondent-driven sampling: A new approach to the study of hidden populations. Soc Probl 1997;44:174–200.

29. Dunn LB, Jeste DV. Enhancing informed consent for research and treatment. Neuropsychopharmacol 2001;24:595–607.

30. Moser DJ, Schultz SK, Arndt S, Benjamin ML, Fleming FW, Brems CS, et al. Capacity to provide informed consent for participation in schizophrenia and HIV research. Am J Psychiatry 2002;159:1201–1207.

31. Mustanski BS. Ethical and regulatory issues with conducting sexuality research with LGBT adolescents: A call to action for a scientifically informed approach. Arch Sex Behav 2011;40:673–686.

32. Shaffer D, Fisher P, Lucas CP, Dulcan MK, Schwab–Stone ME. NIMH Diagnostic Interview Schedule for Children Version IV (NIMH DISC-IV): description, differences from previous versions, and reliability of some common diagnoses. J Am Acad Child Adolesc Psychiatry 2000;39:28–38.

33. Derogatis L. Administration, Scoring, and Procedures Manual. Minneapolis: National Computer Systems, 2000.

34. Zabora J. A new psychosocial screening instrument for use with cancer patients. Psychosomatics 2001;42:241–246.

35. Donenberg GR, Emerson E, Bryant FB, Wilson H, Weber–Shifrin E. Understanding AIDS-risk behavior among adolescents in psychiatric care: Links to psychopathology and peer relationships. J Am Acad Child Adolesc Psychiatry 2001;40:642–653.

36. Garofalo R, Herrick A, Mustanski BS, Donenberg GR. Tip of the Iceberg: young men who have sex with men, the Internet, and HIV risk. Am J Public Health 2007;97:1113–1117.

37. Nappi CM, Thakral C, Kapungu C, Donenberg GR, DiClemente R, Brown L. Parental monitoring as a moderator of the effect of family sexual communication on sexual risk behavior among adolescents in psychiatric care. AIDS Behav 2009;13:1012–1020.

38. Raudenbush S, Byrk A. Hierarchical Linear Models: Applications and Data Analysis Methods. Thousand Oaks, CA: Sage Publications, 2002.

39. Mustanski BS, Viken RJ, Kaprio J, Winter T, Rose RJ. Sexual behavior in young adulthood: A population-based twin study. Health Psychol 2007;26:610–617.

40. Newcomb ME, Clerkin EM, Mustanski BS. Sensation seeking moderates the effects of alcohol and drug use prior to sex on sexual risk in young men who have sex with men. AIDS Behav 2011;15:565–575.

41. Clerkin EM, Newcomb ME, Mustanski BS. Unpacking the racial disparity in HIV rates: The effect of race on risky sexual behavior among Black young men who have sex with men (YMSM). J Behav Med 2011;34:237–243.

42. Mustanski BS, Viken RJ, Kaprio J, Winter T, Rose RJ. Sexual behavior in young adulthood: A population-based twin study. Health Psychol 2007;26:610–617.

43. Centers for Disease Control and Prevention. HIV and AIDS in the United States: A Picture of Today's Epidemic. Atlanta, GA: U.S. Department of Health and Human Services.

44. Millet G, Flores SA, Peterson J, Bakeman R. Explaining disparities in HIV infection among black and white men who have sex with men: A meta-analysis of HIV risk behaviors. AIDS 2007;21:2083–2091.

45. Millett G, Peterson J, Wolitski RJ, Stall R. Greater risk for HIV infection of black men who have sex with men: A critical literature review. Am J Public Health 2006;96:1007–1019.

46. Jones K, Gray P, Whiteside YO, Wang T, Bost D, Dunbar E, et al. Evaluation of an HIV prevention intervention adapted

for Black men who have sex with men. Am J Public Health 2008;98:1043–1050.

47. Raymond HF, McFarland W. Racial mixing and HIV risk among men who have sex with men. AIDS Behav 2009;13: 630–637.

48. Sullivan PS, Salazar L, Buchbinder S, Sanchez TH. Estimating the proportion of HIV transmissions from main sex partners among men who have sex with men in five US cities. AIDS 2009;23:1153–1162.

49. Seth P, Raiji PT, DiClemente RJ, Wingood GM, Rose E. Psychological distress as a correlate of a biologically confirmed STI, risky sexual practices, self-efficacy and communication with male sex partners in African-American female adolescents. Psychol Health Med 2009;14:291–300.

50. Crepaz N, Marks G. Towards an understanding of sexual risk behavior in people living with HIV: a review of social, psychological, and medical findings. AIDS 2002;16:135–149.

51. Safren SA, Traeger L, Skeer MR, O'Cleirigh C, Meade CS, Covahey C, et al. Testing a social-cognitive model of HIV transmission risk behaviors in HIV-infected MSM with and without depression. Health Psychol 2010;29:215–221.

52. Cooper ML. Toward a person x situation model of sexual risk-taking behaviors: Illuminating the conditional effects of traits across sexual situations and relationship contexts. J Pers Soc Psychol 2010;98:319–341.

53. Rajasingham R, Mimiaga MJ, White JM, Pinkston MM, Baden RP, Mitty JA. A systematic review of behavioral and treatment outcome studies among HIV-infected men who have sex with men who abuse crystal methamphetamine. AIDS Patient Care STDs 2012;26:36–52.

54. VanDevanter N, Duncan A, Burrell–Piggott T, Bleakley A, Birnbaum J, Siegel K, et al. The influence of substance use, social sexual environment, psychosocial factors, and partner characteristics on high-risk sexual behavior among young Black and Latino men who have sex with men living with HIV: A qualitative study. AIDS Patient Care STDs 2011;25: 113–121.

55. Mustanski BS, Donenberg G, Emerson E. I can use a condom, I just don't: The importance of motivation to prevent HIV in adolescent seeking psychiatric care. AIDS Behav 2006;10:753–762.

56. Elkington KS, Bauermeister JA, Zimmerman MA. Psychological distress, substance use, and HIV/STI risk behaviors among youth. J Youth Adolesc 2010;39:514–527.

57. Donenberg GR, Pao M. Youths and HIV/AIDS: Psychiatry's role in a changing epidemic. J Am Acad Child Adolesc Psychiatry 2005;44:728–747.

58. Chorpita BF, Daleiden EL. Mapping evidence-based treatments for children and adolescents: Application of the distillation and matching model to 615 treatments from 322 randomized trials. J Consult Clin Psychol 2009;77:566–579.

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