

**Developmental and Racial Differences in a Situational Model of Sexual Risk in  
Men Who Have Sex With Men**

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## TABLE OF CONTENTS

<u>CHAPTER</u>	<u>PAGE</u>
I. INTRODUCTION .....	1
A. Background and significance .....	1
B. Situational Approach to Studying Sexual Risk.....	4
C. Model #1: Sexual Partnerships Characteristics and Sexual Risk .....	6
D. Model #2: Substance Use and Sexual Risk.....	10
E. Model #3: Affective Influences on Sexual Risk .....	14
F. Model #4: Information, Motivation, Behavioral Skills (IMB) and Sexual Risk .....	16
G. Significance of Proposed Investigation .....	19
II. METHODS .....	21
A. Participants.....	21
B. Procedures & Design .....	22
C. Measures .....	25
D. Analyses .....	30
III. RESULTS .....	33
A. Sexual Behavior and Group Differences .....	33
B. Model #1: Sexual Partnership Characteristics and Sexual Risk .....	34
C. Model #2: Substance Use and Sexual Risk.....	37
D. Model #3: Affective Influences on Sexual Risk .....	39
E. Model #4: Information, Motivation, Behavioral Skills (IMB) and Sexual Risk .....	40
IV. DISCUSSION.....	44
A. Model #1: Sexual Partnership Characteristics and Sexual Risk .....	44
B. Model #2: Substance Use and Sexual Risk.....	49
C. Model #3: Affective Influences on Sexual Risk.....	52
D. Model #4: Information, Motivation, Behavioral Skills (IMB) and Sexual Risk .....	55
E. General Conclusions .....	58
F. Study Limitations.....	64
G. Concluding Statement.....	67
V. CITED LITERATURE .....	91
VI. APPENDIX A.....	108
VII. VITA .....	128

## LIST OF TABLES

<u>TABLE</u>	<u>PAGE</u>
I. PARTICIPANT DEMOGRAPHICS: MEN WHO HAVE SEX WITH MEN RECRUITED ONLINE, 2011 .....	68
II. FACTOR LOADINGS FROM FACTOR ANALYSIS OF TRAIT AFFECT ITEMS.....	69
III. SEXUAL PARTNERSHIP CHARACTERISTICS AND SEXUAL RISK.....	70
IV. ALCOHOL USE AND SEXUAL RISK .....	71
V. SUBSTANCE USE AND SEXUAL RISK .....	72
VI. AFFECTIVE INFLUENCES ON SEXUAL RISK.....	73
VII. INFORMATION, MOTIVATION, BEHAVIORAL SKILLS (IMB) AND SEXUAL RISK... ..	74
VIII. MODERATING EFFECTS OF IMB VARIABLES ON THE ASSOCIATION BETWEEN SEXUAL RISK BEHAVIOR AND RISK APPRAISALS .....	75

## LIST OF FIGURES

<u>FIGURE</u>	<u>PAGE</u>
1. Model 1: Sexual Partnership Characteristics and Sexual Risk .....	76
2. Model 2: Substance Use and Sexual Risk.....	77
3. Model 3: Affective Influences and Sexual Risk .....	78
4. Model 4: Information, Motivation, Behavioral Skills (IMB) and Sexual Risk .....	79
5. Moderating Effect of Participant Race on the Association between Sexual Partner Age and Odds of Unprotected Anal or Vaginal Intercourse .....	80
6. Three-Way Interaction Between Participant Race, Participant Age, and Sexual Partner Age in Predicting Odds of Unprotected Anal or Vaginal Intercourse .....	81
7. Moderating Effect of Participant Race on the Association Between the Number of Previous Sexual Encounters with a Partner and Odds of Unprotected Anal or Vaginal Intercourse .....	82
8. Moderating Effect of Participant Race on the Association Between Sexual Partner's Perceived HIV Status and Odds of Unprotected Anal or Vaginal Intercourse.....	83
9. Moderating Effect of Participant Age on the Association Between Drinking Prior to Sex and Odds of Unprotected Anal or Vaginal Intercourse .....	84
10. Moderating Effect of Sensation Seeking on the Association Between Drinking Prior to Sex and Odds of Unprotected Anal or Vaginal Intercourse .....	85
11. Moderating Effect of Baseline Quantity-Frequency of Alcohol Use on the Association Between Drinking Prior to Sex and Odds of Unprotected Anal or Vaginal Intercourse.....	86
12. Moderating Effect of Perceived Risk at Baseline on the Association Between Odds of Unprotected Anal or Vaginal Intercourse and Perceived Risk of the Sexual Encounter .....	87
13. Moderating Effect of HIV Knowledge on the Association Between Odds of Unprotected Anal or Vaginal Intercourse and Perceived Risk of the Sexual Encounter .....	88

14. Moderating Effect of Perceived Severity of HIV Infection on the Association Between Odds of Unprotected Anal or Vaginal Intercourse and Perceived Risk of the Sexual Encounter .....	89
15. Moderating Effect of Motivation for Safer Sex on the Association Between Odds of Unprotected Anal or Vaginal Intercourse and Perceived Risk of the Sexual Encounter .....	90

## LIST OF ABBREVIATIONS

AA	Anxious arousal
AIDS	Acquired Immune Deficiency Syndrome
$\alpha$	Cronbach's alpha measure of internal consistency
ARBA	AIDS Risk Behavior Assessment
$\beta$	Coefficient value
BSSS	Brief Sensation Seeking Scale
CDC	Centers for Disease Control and Prevention
<i>df</i>	Degrees of freedom
$\delta$	Level 1 effects in Hierarchical Linear Modeling
$\eta$	Estimated effect size of the dependent variable in Hierarchical Linear Modeling
<i>e</i>	Level 1 error in Hierarchical Linear Modeling
EMA	Ecological momentary assessment
ERR	Event-Rate Ratio
FTM	Transgender female-to-male
$\gamma$	Level 2 effects in Hierarchical Linear Modeling
HIV	Human Immunodeficiency Virus
HIV+	Infected with the Human Immunodeficiency Virus
HIV-	Uninfected with the Human Immunodeficiency Virus
HIV-KQ-18	Brief HIV/AIDS Knowledge Questionnaire
HLM	Hierarchical Linear Modeling
ICC	Intraclass correlation coefficient

IMB	Information, Motivation, and Behavioral Skills Model
IP	Internet protocol address
LGBT	Lesbian, gay, bisexual, and transgender
<i>M</i>	Mean
M4M	Men seeking men
MASQ	Mood and Anxiety Symptom Questionnaire
MDMA	Methylenedioxymethamphetamine
MSM	Men who have sex with men
MTF	Transgender male-to-female
NA	Negative activation
OR	Odds Ratio
<i>p</i>	Measure of statistical significance
PA	Positive activation
PANAS	Positive and Negative Affect Schedule
QF	Quantity-frequency index of alcohol use
SA	Sexual activation
<i>SD</i>	Standard deviation
STI	Sexually transmitted infection
<i>u</i>	Level 2 error in Hierarchical Linear Modeling
UAI	Unprotected anal intercourse
UAVI	Unprotected anal or vaginal intercourse

## SUMMARY

Men who have sex with men (MSM) are at substantially increased risk for HIV infection, and there are striking differences between racial/ethnic and age groups in terms of HIV incidence. Research on sexual risk behavior has tended to examine group differences based on global predictors of risk (i.e., between-subjects variables), and has largely failed to account for within-persons variability in condom use. The current investigation examined four distinct models of sexual risk in MSM: 1) sexual partnership characteristics, 2) alcohol and substance use, 3) affective influences, and 4) Information-Motivation-Behavioral Skills. Participants were 143 MSM who were diverse in terms of both age and racial/ethnic background and were recruited online. To improve upon previous daily diary approaches that followed participants for one month, prospective weekly diary surveys were utilized in order to observe a larger number of sexual encounters over a 12-week follow-up period. Analyses were conducted with Hierarchical Linear Modeling. Results indicate that it is important to consider both situational within-persons variables as well as group differences in predicting sexual risk, and most predictors did not exert their effects in the same manner for all groups of MSM. This study confirms that several key variables consistently predict sexual risk behavior for all MSM, including alcohol and substance use. For young Black MSM, having older and repeat partners was associated with greater odds of sexual risk. Higher scores on measures of condom use self-efficacy and social norms of condom use were associated with less sexual risk, and a variety of other cognitive variables were associated with risk appraisals of sexual encounters, including HIV knowledge, motivation to stay safe, perceived severity of HIV infection, and perceived riskiness of past sexual behavior. Implications for future research and intervention development are discussed.

## I. INTRODUCTION

### A. Background and significance

Men who have sex with men (MSM) account for more than half (approximately 53%) of all new HIV/AIDS diagnoses in the United States each year (CDC, 2011), despite the fact that gay men are estimated to represent 2-4% of the general population (Savin-Williams & Ream, 2007). Currently, MSM are the only risk group in which rates of new infections are increasing, while rates of new infections have declined in heterosexuals and injection drug users. Within MSM, young people ages 13 to 29 accounted for the most new infections in 2009 (an estimated 12,900), followed by an estimated 8,000 in MSM ages 30 to 39, and an estimated 6,000 in MSM ages 40 to 49 (Prejean et al., 2011). Moreover, young MSM ages 13 to 24 showed the highest increase in new infections between 2005 and 2008 (CDC, 2010a), with a 73% increase among the Black MSM of this age group.

In men, there are striking differences between racial/ethnic groups in terms of HIV/AIDS prevalence. The prevalence of HIV in Black men is nine times higher than that of White men, while the prevalence in Hispanic/Latino men is twice that of White men (CDC, 2008). Within MSM, incidence of new HIV infections also differs by both racial/ethnic and age groups. Overall, younger Black MSM currently experience the highest rates of new HIV infections, and 63% of HIV infections among young MSM ages 13-24 occurred in young Black MSM (CDC, 2010a). However, white MSM ages 30-40 experienced the second highest rates of new HIV infections this same year, indicating that developmental differences in risk behavior are likely not consistent across racial groups. Despite these disparities in incidence of new infections between racial/ethnic and developmental cohorts, little is known

about the differences in risk behaviors that are driving these disparities(see Millett, Peterson, Wolitski, & Stall, 2006).

Given the striking differences in rates of new HIV infections between young MSM and adult MSM, it is critically important to sample from multiple developmental age groups of MSM when studying risky sexual behavior (including adolescents, emerging adults, and adults) and to examine the potential for differential predictors of risk between these groups. Failing to adopt a developmentally informed approach to the investigation of predictors of risk could lead to the misapplication of prevention techniques based on risk factors that may not generalize across development. Regrettably, very little research has been conducted on HIV risk among young MSM, limiting knowledge of HIV risk factors in this population and developmental differences in terms of risk(Mustanski, Newcomb, Du Bois, Garcia, & Grov, 2011).

Individuals face myriad challenges in terms of psychosocial and sexual development throughout the lifespan, and the ways in which individuals approach these challenges may vary across different developmental stages. In particular, adolescence is a developmental period of relatively rapid and profound change (Jessor, 1992), and as a result, promoting health during adolescence is often difficult because late adolescence and early adulthood are developmental periods in which young people experiment with behaviors as a way of establishing independence and autonomy. While some experimentation during these stages is both normative and adaptive, extreme levels of experimentation with some risk behaviors, including drug use and risky sex, may compromise mental and physical health (Bates & Labouvie, 1997; Jessor, 1998).

In addition to the psychosocial changes faced by young people, adolescence is characterized by several critical neurocognitive changes that exert a strong influence on risk behavior (for a review, see Steinberg, 2008). The onset of puberty coincides with changes in patterns of dopaminergic activity. Dopaminergic pathways play a key role in affective and motivational regulation, which leads to an increase in sensation seeking behavior in the absence of fully developed impulse control. Also during adolescence, social and peer relations become increasingly important and social stimuli in concert with increased sensation seeking can lead to a greater likelihood of risk-taking behavior. Given that the maturation of the cognitive control system (i.e., structural and functional changes in the prefrontal cortex) does not occur until early adulthood, adolescents have difficulties engaging in long-term planning and inhibiting impulsive behavior in the face of rewarding stimuli. Moreover, increased connectivity between the cortical and subcortical areas that coordinate social and emotional processing during early adulthood leads to an increased ability to make rational decisions with regard to social stimuli and allows for greater resistance to peer influences.

Recent research has highlighted the importance of further distinguishing between adolescence and emerging adulthood as distinct developmental periods. Emerging adulthood is a period in which individuals, roughly between the ages of 18 and 25, become more independent from parents or guardians and in turn face new challenges with regard to love, work and worldviews (Arnett, 2000). It is plausible that predictors of risky sex in adolescents may shift as the individual becomes more independent and experiences shifts in other areas of psychosocial functioning. What's more, it is likely that predictors will continue to shift as the individual gains even more independence upon moving into

adulthood. Finally, longitudinal analyses indicate that trajectories of subjective independence between emerging adulthood and adulthood differ by racial/ethnic group (Cohen, Kasen, Chen, Hartmark, & Gordon, 2003). Given the multiple psychosocial and neurocognitive changes that occur between adolescence and adulthood, it is critically important to examine age differences in predictors of risk-taking behavior across these developmental periods.

### **B. Situational Approach to Studying Sexual Risk**

Research on predictors of risky sexual behavior has tended to focus on individual differences in cognitions, personality variables, and global patterns of alcohol and drug use (Mustanski, 2007a). This emphasis on the use of trait-like predictor variables fails to account for within-person variability in these and a variety of other predictors of risk. While it is important to evaluate these global factors in order to determine which predictors of risk are common to all or certain groups of MSM, it is possible that certain variables may significantly predict risk between-persons while not predicting risk behaviors within-persons. Some investigations of predictors of risk have advocated using a more contextual (i.e., event-level) approach to measuring predictors specific to individual sexual encounters that vary within-persons. For example, Mustanski (2007a) found opposite effects when comparing within-person vs. between-person associations between Internet sex-seeking and unprotected sex. Similar patterns of inconsistent findings between these differing methodologies have been reported for the association between alcohol use and risky sex (e.g., Leigh et al., 2008). As such, modeling between-persons and within-persons predictors of risk simultaneously can aid in disentangling these disparate findings and help to identify the processes underlying risk behaviors.

One method for gathering within-persons data on situational predictors of risk involves the use of sexual diaries in which participants prospectively record sexual behaviors and situational factors associated with these encounters as they occur. Coxon(1994) describes the benefits of using this approach to data collection on sexual risk behavior: “That sexually risky behaviour takes place is important, but if people are to be encouraged to lessen or avoid risk then we need to know the significance of such behaviour to the person, and we also need to identify its context in order to find out whether risk-taking varies systematically by situation, rather than simply by individual (p. 126).” Moreover, evidence suggests that diary methodology may be more accurate in evaluating predictors of sexual risk behavior than retrospective questionnaires (Coxon, 1999; Mustanski, 2007a). Retrospective questionnaires tend to underestimate sexual risk because participants are asked to estimate frequencies or averages of sexual risk behaviors which are more prone to bias in recall than when an individual is asked to report on behaviors associated with one specific encounter. However, reactivity (i.e., changes in behaviors over time as a result of participating in data collection) is a potential risk with prospective data collection, and it is critical to test for reactivity and dependency in data when conducting these types of studies.

The current investigation used a combined retrospective/prospective approach to data collection in which participants completed weekly diary entries of sexual encounters and associated situational predictors of risk that varied within-persons across sexual encounters. This allowed for the extension of the diary methodology past the typical one-month assessment period in order to increase the likelihood that participants would have engaged in multiple sexual encounters with multiple partners. This investigation also accounted for differences in the effects of within-persons predictor variables by investigating group

differences in situational predictors (i.e., moderating effects of age and race/ethnicity). Finally, in recognizing that certain between-persons variables are important in predicting more global patterns of risk, the current investigation evaluated differences in global sexual risk by a variety of demographic variables, personality traits, and cognitive processes. As such, we examined four distinct models of sexual risk in MSM based on the following domains: 1) sexual partnership characteristics, 2) alcohol and substance use, 3) affective influences, and 4) Information-Motivation-Behavioral Skills (IMB; Fisher & Fisher, 1992). Furthermore, the current study also examined whether three separate situational models of sexual risk (i.e., models 1-3) added to our knowledge of risky sexual behavior in MSM over and above the information provided by the IMB model (model 4), a widely-used framework for predicting HIV risk-reduction behavior that included mostly between-persons predictors of risk.

### **C. Model #1: Sexual Partnership Characteristics and Sexual Risk**

In the HIV risk literature, a significant amount of attention has been paid to the role of sexual partnership characteristics in predicting sexual risk in both young and adult MSM. Given that any sexual activity that puts the individual at risk for HIV acquisition involves at least one other person, the sexual dyad is an important unit of investigation, and the characteristics of the sexual partner must be considered in order to fully understand sexual risk (Coxon, 1994). Extant research indicates that MSM are more likely to have unprotected sex with main/steady sexual partners as opposed to casual partners (Crepaz et al., 2000; Hays, Kegeles, & Coates, 1997; Koblin et al., 2003; Macaluso, Demand, Artz, & Hook, 2000; Poppen, Reisen, Zea, Bianchi, & Echeverry, 2005; Semple, Patterson, & Grant, 2000; Zea, Reisen, Poppen, & Bianchi, 2009). In fact, a recent study estimated that 68% of all new

HIV infections in MSM resulted from sex with main partners using data from two surveillance studies from the late-1990s and mid-2000s (Sullivan, Salazar, Buchbinder, & Sanchez, 2009). This elevated transmission rate with main partners resulted from a higher number of sex acts, more frequent receptive roles in anal sex, and more frequent unprotected sex. Sex with new or casual partners, on the other hand, tends to elicit both higher levels of arousal and greater concern about risky sexual behavior (Vanable et al., 2004), which in turn leads to greater vigilance and a higher likelihood of engaging in safer sexual behaviors.

In addition to relationship status, evidence suggests that MSM make decisions about condom use based on a variety of other sexual partnership characteristics, including partner's race (Clerkin, Newcomb, & Mustanski, 2011; Raymond & McFarland, 2009), gender (Mustanski, Newcomb, & Clerkin, 2011), and perceived serostatus (Snowden, Raymond, & McFarland, 2009). Serosorting (i.e., selective condom use based on sexual partners' perceived serostatus) may reduce HIV transmission risk in certain contexts, but evidence suggests that it may also increase transmission risk by enhancing the likelihood of condom use with serodiscordant or unknown status partners (Snowden, et al., 2009). Despite the fact that it is less effective in preventing HIV than consistent condom use, serosorting is not uncommonly used amongst young and adult MSM (Eaton, Kalichman, O'Connell, & Karchner, 2009; Wei et al., 2011). Taken together, these findings indicate that MSM would be more likely to use condoms with partners they perceive to be at higher risk for being HIV+, and condom use would be more likely with Black (and to a lesser degree Latino), male (as opposed to female) and HIV+ partners.

Sexual partnership characteristics have also been studied in order to better understand racial disparities in HIV prevalence in MSM. More specifically, partnership characteristics

may help to explain the perplexing finding that Black MSM experience the highest rates of new HIV infections despite consistently reporting comparable or lower rates of HIV risk behaviors as compared to other racial groups (Millett, et al., 2006). One potential explanation for this paradox is that sexual partnership characteristics and sexual network factors underlie the racial disparity in HIV rates rather than individual behavioral differences. These factors have been found to underlie differences in risk among heterosexual adolescents (Laumann & Youm, 1999). For example, Bingham and colleagues (2003) studied the effects of partner age and race on HIV prevalence in order to examine disparities between Black and White young MSM using cross-sectional data. Black young MSM in this study were 4.4 times more likely to be HIV+ compared to White young MSM. However, this difference was reduced by 20% when controlling for history of having older partners and having Black partners, indicating that having these types of sexual partners may be associated with sexual risk and/or HIV seroconversion. This pattern suggests it may not be differences in individual behavior that underlie racial disparities among young MSM but rather racial differences in the influence of partner characteristics on sexual risk.

Meeting sexual partners online is another characteristic of sexual partnerships that has received significant attention as a predictor of sexual risk. Most research investigating this relationship has used retrospective accounts of past sexual behavior. Several of these studies have found evidence for a link between sexual risk and meeting partners online (Benotsch, Kalichman, & Cage, 2002; Elford, Bolding, & Sherr, 2001; Garofalo, Herrick, Mustanski, & Donenberg, 2007; Kim, Kent, McFarland, & Klausner, 2001) while others have not (Mettey, Crosby, DiClemente, & Holtgrave, 2003). In young MSM, Garofalo and colleagues (2007) found that 48% reported using the Internet to meet sex partners and only 53% of these

individuals reported using condoms consistently. Furthermore, 47% of the individuals who had met sex partners online reported that these sex partners were significantly older (> 4 years). Despite these striking numbers, the analysis found that only a previous history of unprotected anal intercourse (UAI) predicted risky sexual behavior with partners met online. It remains unclear what role, if any, the Internet plays in predicting risky sex in young MSM who are inconsistent in their condom use.

Mustanski(2007a) used a combined retrospective and prospective approach to investigate the relationship between meeting partners online and risky sexual behavior in adult MSM participating in an online daily diary study. Results from these analyses indicated that the relationship between these two variables was opposite when comparing retrospective versus prospective accounts. In retrospective accounts of sexual behavior, history of meeting sex partners online was associated with a higher number of sex partners, more frequent UAI, increased number of one-time partners, and failure to discuss sexual history with partners. However, daily diary data indicated that occasions where partners were met online were actually associated with less risky sexual behavior (i.e., more frequent condom use). These results indicate that men who are already engaging in high-risk sex are using the Internet as a tool to find sex partners, but that meeting partners online is not directly associated with risky sex, per se.

The current investigation aimed to expand on previous findings by simultaneously modeling the effects of multiple sexual partnership characteristics on sexual risk across multiple sexual encounters within-persons. Few previous studies have investigated these within-persons situational predictors of risk using prospective accounts of multiple sexual encounters. What's more, few studies have examined differences in the effects of these

situational predictors of risk based on demographic characteristics (i.e., participant age and race). These potential differences are critical in developing group-tailored HIV prevention interventions as well as advancing research on sexual risk.

#### **D. Model #2: Substance Use and Sexual Risk**

Despite theoretical support for the association between alcohol use and risky sex (e.g., alcohol myopia theory; Steele & Josephs, 1990), research findings in both general populations and in MSM have been equivocal. These inconsistencies are likely related to the multitude of methodologies that can be used to examine this relationship. Global association studies examine average rates of alcohol and condom use and make behavioral comparisons between-persons. Research using this methodology generally points to positive associations between risky sex and alcohol use in both general populations (Cooper, 2002; Weinhardt & Carey, 2000) and MSM (Hirshfield, Remien, Humberstone, Walavalkar, & Chiasson, 2004; Stall & Purcell, 2000). However, it is difficult to make causal inferences using this approach because it does not map an episode of alcohol consumption directly onto an episode of sexual risk-taking.

Others have used a situation-matched correlation approach to examine this relationship in which alcohol use and sexual risk are examined during a specific sexual encounter. Reviews of studies using this approach conclude that alcohol use is not significantly related to condom use at last sex (Cooper, 2002; Leigh, 2002). However, when assessing only one sexual encounter it is not possible to disentangle stable personality characteristics from situational predictors of risk (Mustanski, 2008). Event-level analyses of multiple occasions of alcohol use and sex in the same person over time improve upon this approach by accounting for within-persons variability in alcohol and condom use. These

types of analyses have been conducted using both retrospective accounts of behavior and prospective daily diaries. Both of these approaches have yielded mixed results in MSM, with some reporting positive associations between alcohol use and sexual risk (Colfax et al., 2004; Kalichman, Tannenbaum, & Nachimson, 1998; Mustanski, 2008), and others finding no association (Gillmore et al., 2002; Venable, et al., 2004; Weatherburn et al., 1993).

There is scant empirical research examining the relationship between alcohol use and sexual risk in young MSM using event-level methodology. Mustanski(2008)used a daily diary approach to examine age as a moderator of the relationship between alcohol consumption and risky sex in MSM over the age of 18. Findings from this event-level analysis indicated that age moderated the relationship between these two variables, such that the strength of this positive relationship increased with age. Mustanski's review of prior studies suggested a pattern whereby significant associations were more likely to have been reported in samples with older mean age. This assertion is supported by recent research indicating a null relationship between drinking and risky sex in most groups of young MSM (Newcomb, Clerkin, & Mustanski, 2011), which highlights the importance of studying alcohol use across a range of developmental periods. Unfortunately, few studies have been conducted on the event-level effects of substance use on risky sex in young MSM. Contrary to Mustanski's findings, a meta-analysis of event-level studies in heterosexual populations found that alcohol use was related to risky sex in younger participants engaging in their first sexual experiences, but the variables were unrelated in older participants (Leigh, 2002). These inconsistencies highlight the importance of investigating further the role that alcohol plays in predicting sexual risk in young MSM. While it is possible that the relationship between alcohol use and sexual risk differs between heterosexual and non-heterosexual

youth, the inconsistencies may also result from the influence of third variables that moderate this relationship.

The association between the use of certain drugs and sexual risk has been more consistent, particularly for stimulants and “club drugs” (i.e., ecstasy, MDMA, ketamine, etc.) (for a review see Drumright, Patterson, & Strathdee, 2006). Evidence suggests that these drugs have played an important role in recent increases in HIV/STIs in MSM populations in a number of urban centers, particularly amongst young MSM (Clatts, Goldsamt, & Yi, 2005a, 2005b; Garofalo, Mustanski, McKirnan, Herrick, & Donenberg, 2007; Stueve, O'Donnell, Duran, San Doval, & Geier, 2002; Waldo, McFarland, Katz, MacKellar, & Valleroy, 2000). Furthermore, young MSM are using drugs at alarmingly high rates. In the *Young Men's Survey*, 66% of MSM ages 15-22 reported illicit drugs use in the six months prior to the interview, 29% used drugs on a regular basis, and 28% reported polydrug use (Stueve, et al., 2002). Young MSM may be at particularly high risk for engaging in risky sexual behavior while under the influences of drugs because they may lack the skills needed to monitor the short-term effects of these substances on their behavior and the long-term consequences of engaging in risk behavior.

Evidence suggests that certain drugs may be differentially associated with sexual risk but few investigations have investigated these differential effects using event-level analyses of multiple sexual encounters. In one notable exception, Drumright and colleagues (2006) used a timeline follow-back analysis of the three most recent sexual partners of MSM who had been recently diagnosed with HIV. The results of this analysis found that sexual risk was associated with the use of methamphetamine and marijuana for all partner types (i.e., main/steady and casual), while sexual risk was associated with the use of erectile dysfunction

medications with primary partners only. The results indicate that direct associations may be present between certain substances and risky sex, but that a more comprehensive prospective analysis of the use of substances in concert with other situational risk factors is necessary in order to determine the effects of other drugs, including alcohol, on risky sex across development. These results further indicate that the influence of drug use on sexual risk may also vary within-persons over time based on other situational variables (e.g., partner type). Evidence that the influence of drug use varies within-person based on partner type has also been found amongst adolescent MSM (Stueve et al., 2002).

Some have hypothesized that differences in personality characteristics and cognitive processes may predict which individuals will increase their risk-taking under the influences of alcohol and drugs in variable contexts (Bryant, 2006; Cooper, 2002; Dingle & Oei, 1997; Weinhardt & Carey, 2000). These third variables may also help to clarify why alcohol use is positively associated with risky sex in some individuals but not others. Sensation seeking, in particular, has received significant attention as a correlate of alcohol and drug use. Sensation seeking is a personality characteristic that is associated with a desire to engage in varied and novel sensations and experiences, and this trait has been found to be associated with myriad risk-taking behaviors, including both alcohol and drug use (Bancroft et al., 2003; Hittner & Swickert, 2006; Zuckerman, 1994). Evidence suggests that high sensation-seeking young and adult MSM show stronger associations between sexual risk and both alcohol and drug use as compared to low sensation-seeking MSM (Kalichman, et al., 1998; Newcomb, et al., 2011). Sexual enhancement expectancies (i.e., the belief that alcohol and drugs will enhance sexual experiences) have also been studied as a cognitive process that may explain why certain individuals have a positive association between alcohol use and sexual risk and others do not.

Several studies have found a relationship between this cognitive dimension and sexual risk in MSM (Bimbi et al., 2006; Kalichman, et al., 1998).

While several studies have examined the influence of both alcohol and drug use on sexual risk using event-level data, few studies have examined the potential differences in the situational influences of these substances on sexual risk between different demographic groups of MSM. The current investigation used a sample that was diverse in terms of both age and race and therefore allowed for the examination of the differential influence of substance use on risk based on these demographic characteristics.

### **E. Model #3: Affective Influences on Sexual Risk**

Research on the relationship between affect and risky sexual behavior has largely focused on either negative emotional experiences or mood disorders, such as depressive symptomatology, and results have been inconsistent in terms of the relationships between these components of affect and sexual risk (for a review see Crepaz & Marks, 2001). However, most of this research has been cross-sectional in nature and some have suggested that this approach may not have been sensitive enough to capture the within-person effects of changes in affective states on sexual risk (Kalichman & Weinhardt, 2001). According to the mood-maintenance hypothesis (Isen & Patrick, 1983), positive emotional states are thought to be associated with being more risk averse because one has more to lose by engaging in a risky behavior that has a potentially negative outcome. In terms of negative emotional states, individuals tend to engage in riskier behaviors when experiencing negative emotions. This does not seem to occur because individuals view risky behaviors as “less risky” when in a negative emotional state, rather they are less likely to make rational decisions overall in these states (Leith & Baumeister, 1996).

Mustanski(2007b) used an online daily diary of sexual behavior to examine the effects of multiple components of state and trait affect on sexual risk in adult MSM using Clark and Watson's (1991) tripartite model of affective states as a framework. This model describes three independent dimensions of affect: positive activation (PA), negative activation (NA), and anxious arousal (AA). The literature generally recognizes two broad dimensions of affect, PA and NA, that are only weakly negatively correlated (Russell & Carroll, 1999; Tellegen, Watson, & Clark, 1999; Watson & Tellegen, 1999). High PA is characterized by joy, enthusiasm, energy, and alertness, while low PA is characterized by anhedonia and lethargy. On the other hand, high NA is characterized by fear, anger, sadness, and disgust, while low NA is characterized by calmness and serenity. Watson and Clark proposed that AA is a third affective dimension that is specific to experiences of anxiety given that previous research indicated that while NA was consistently associated with symptoms of anxiety, PA was found to be largely unassociated with anxious mood (Brown, Chorpita, & Barlow, 1998; Clark & Watson, 1991; Jolly, Dyck, Kramer, & Wherry, 1994). Mustanski expanded on the tripartite model by examining a fourth dimension of affect, sexual activation (SA), which is comprised of physiological changes and emotional expressions that contribute to engagement in sexual behaviors and reproduction.

Mustanski(2007b)found that MSM are not always consistent in their use of safer sex materials (e.g., condoms) and that their decisions to engage in risky behaviors may depend in part on different patterns of state and trait affect. In this study, trait PA was positively associated with number of sexual partners, but state PA was negatively correlated with sexual risk (i.e., unprotected sex). State AA was protective against sexual risk, but state SA had the opposite effect and was positively associated with both number of sexual partners and sexual

risk. No relationships were found with either trait or state NA. Further research is needed in order to replicate these findings in samples that are more diverse in terms of age and race. Additionally, given the previously discussed differences in HIV incidence by age and race, an examination of differences in these relationships by demographic variables is warranted. Extending sexual diary methodology past the typical one-month time period to weekly diaries over the course of three months would help to better understand the role that affect plays in predicting sexual risk by allowing for the observation of more sexual encounters in varying affective states. While retrospective accounts of state affect during a sexual encounter occurring during the previous week are prone to some bias in recall, research indicates that emotional states can be recalled more accurately when rooted in specific episodic memories (e.g., a sexual encounter; Robinson & Clore, 2002). However, retrospective inquiries about emotional states should consistently reference specific episodic memories, otherwise individuals will infer their emotional state by reporting how they generally tend to feel in similar situations or how they felt overall during the time period in question.

#### **F. Model #4: Information, Motivation, Behavioral Skills (IMB) and Sexual Risk**

While the IMB Model is one of the most widely used frameworks for studying HIV risk behavior in MSM (Fisher, Misovich, & Fisher, 1992), research linking the components of this model to sexual risk has been mixed. This is particularly true of the link between sexual risk-reduction information (i.e., HIV knowledge) and actual sexual risk behavior. Some recent studies have found that lack of knowledge or erroneous beliefs about HIV/AIDS transmission is positively related to sexual risk (Dilley et al., 2002; Halkitis, Zade, Shrem, & Marmor, 2004; Huebner & Gerend, 2001) while others have found no relationship (Halkitis,

Siconolfi, Fumerton, & Barlup, 2008; van der Snoek et al., 2006). Conceptually speaking, these inconsistent findings are not surprising. While sexual risk-reduction knowledge may be necessary for reducing one's risk for HIV acquisition, it is likely not sufficient for engaging in behavioral change which is often complex in nature and requires the integration of a number of skills. Huebner and Gerend(2001) suggest that lack of knowledge and erroneous beliefs related to prevention may not actually lead to sexual risk, but instead having risky sex may cause an individual to establish erroneous beliefs as part of a rationalization process. In fact, Dilley and colleagues found that a single counseling session that focused on combating these "self-justifications" (i.e., thoughts, attitudes or beliefs that allow an individual to engage in risky sex) was effective in reducing frequency of UAI in MSM with non-primary partners of unknown or discordant serostatus as compared to a control group.

Fisher and Fisher (1992) also note that simply having accurate information about HIV transmission and prevention is not enough to reduce risk, but an individual must be motivated to do so. These authors use Fishbein and Ajzen's(1975) theory of reasoned action as a framework for describing the factors that contribute to motivation for engaging in sexual risk-reduction behavior. According to Fishbein and Ajzen, engaging in an action or behavior is a function of behavioral intentions, or a combination of the individual's personal attitudes toward performing the act in question and perceived norms about engaging in the act. Furthermore, personal attitudes toward performing a behavior are a function of both the objective consequences of engaging (or failing to engage) in the behavior and the individual's evaluations about these consequences. In terms of sexual behavior, motivation to engage in sexual risk-reduction would therefore be a combination of multiple factors,

including the individual's personal attitudes toward HIV/AIDS and condom use, perceptions of peer norms surrounding condom use, evaluations of the objective consequences of risky sexual behavior, and appraisals about the severity of these consequences.

Research supports the association between several of these components of motivation to engage in sexual risk-reduction and sexual risk behavior. Several studies have found that perceived peer norms for non-condom use are associated with increased sexual risk-taking, particularly in younger samples of MSM (Berg, 2008; Chesney et al., 2003; Kok, Hoppers, Harterink, & De Zwart, 2007; Rosario, Mahler, Hunter, & Gwadz, 1999; Waldo, et al., 2000). Furthermore, sexual risk-taking has been found to be associated with higher perceived vulnerability to HIV infection (Huebner & Gerend, 2001; Remafedi, 1994), lower perceived severity of becoming infected (van der Snoek, et al., 2006), and negative attitudes toward condom use (Kok, et al., 2007). However, few studies have examined the influence of these variables using prospective event-level data, and it is therefore difficult to make causal inferences about the influence of these variables on sexual risk. What's more, it is possible that the effects of knowledge and motivation may vary within-persons based on the individual's perception of risk associated with each partner. It is also important to note that individual developmental and cultural groups may influence motivation to engage in sexual risk-reduction. While these variables may not directly affect motivation, differences in developmental stage and cultural group may influence the relative importance of the above-mentioned determinants of motivation to engage in sexual risk-reduction.

Fisher and Fisher (1992) further discuss the importance of sexual risk-reduction skills and self-efficacy (i.e., personal beliefs about one's ability to engage in safer sex behaviors) in predicting sexual risk. These researchers cite Bandura's (1989) work on self-efficacy and

state that simply having sexual risk-reduction skills is not enough to lead to decreases in sexual risk-taking. Individuals must also possess the belief that they are able to use these skills effectively in multiple contexts in order to consistently engage these skills. Studies have consistently found that low self-efficacy for HIV risk-reduction is linked to sexual risk (Berg, 2008; Chesney, et al., 2003; Diaz, Stall, Hoff, Daigle, & Coates, 1996; Dilley, McFarland, Sullivan, & Discepola, 1998; Kok, et al., 2007; Mao, Van de Ven, & McCormick, 2004; Waldo, et al., 2000; Zea, Reisen, Poppen, Bianchi, & Echeverry, 2005). Zea and colleagues used event-level data to examine the influence of sexual risk-reduction self-efficacy on sexual risk behavior across multiple sexual encounters in a sample of Latino MSM. This study not only found that higher self-efficacy was negatively associated with sexual risk, but individuals who were higher in self-efficacy were able to consistently use condoms with partners in variable contexts across sexual encounters, such as across situations with variable levels of sexual desire. MSM in this study who had lower self-efficacy were more susceptible to the influence of contextual variables in terms of sexual risk. These results indicate that sexual risk-reduction self-efficacy may also moderate other within-persons predictors of sexual risk, including individuals' perceptions of partner risk.

### **G. Significance of Proposed Investigation**

In general, much of the literature on sexual risk in MSM has focused on global predictors of risky sex and there has been a dearth of research devoted to understanding the multiple situational predictors of risky sexual behavior in MSM that may differ across sexual encounters (Mustanski, 2007). In the few studies that have used an event-level approach to evaluate situational risk factors, the analyses have tended to be retrospective in nature (and have therefore been prone to bias in terms of recall of events) and have focused on single

situational factors rather than the interplay between multiple factors in predicting sexual risk, the focus of the current investigation. The current study also helps to better understand differences between subgroups of MSM in terms of the influence of situational risk factors for the acquisition of HIV, including both age group and racial/ethnic groups.

In order to achieve the broad goal of better understanding the variables that influence risky sex in MSM, it is important to recognize that situational factors likely cannot account for all the variance in risky sexual behavior. As such, several between-subjects variables that have previously been identified as important in predicting sexual risk behavior were included in the models, including personality characteristics, cognitive processes, and trait affect. These between-subjects variables were considered alongside key demographic factors built into the sampling plan (age and race/ethnicity).

Based on previous research, three models examining situational influences on sexual risk in MSM were examined in order to evaluate whether situational models provide information on predictors of risk over and above the information gained from a fourth model based on the widely-used IMB framework (Fisher, et al., 1992). Model 1 (see Figure 1) examined the influence of sexual partnership characteristics (i.e., sexual partner type, partner age, partners' perceived HIV status, partner race/ethnicity, partner gender, number of previous sexual encounters with the partner, and venue in which the partner was met) on sexual risk, as well as the moderating effects of participant demographic characteristics (i.e., age and race) on these situational variables. Model 2 (see Figure 2) examined the situational influence of alcohol and drug use prior to or during a sexual encounter on sexual risk, as well as the moderating effects of participants' sensation seeking, sexual enhancement expectancies for substance use, and demographic characteristics on these situational effects.

Model 3 (see Figure 3) examined the influence of trait and state affect (PA, NA, AA, and SA) on sexual risk, as well as differences of these effects based on participant demographic characteristics. Finally, Model 4 (Figure 4) examined a model based on the IMB framework (i.e., HIV knowledge, motivation, social norms, and behavioral skills) and potential differences in these influences based on demographic characteristics. This model also examined whether these between-subjects variables from the IMB framework moderated the effect of perceived subjective risk associated with a sexual encounter on actual sexual risk-taking, a cognitive factor that has not been well studied in the extant literature. By examining these four models, we can more confidently describe *which* situational influences are important in predicting risk in *which* MSM and whether situational models of risk provide information over and above what is gained with the widely-used IMB framework for HIV risk-reduction.

## II. METHODS

### **A. Participants**

One hundred forty-three MSM were enrolled in the current investigation, and these men were diverse in terms of both age and racial/ethnic background (see Table 1). The mean age of the sample was 27.53 (SD = 7.33), they ranged in age from 16 to 40, and 9.1% were under the age of 18 at the time of enrollment. The majority of the sample was White/Caucasian (37.1%), followed by Hispanic/Latino (27.3%), Black/African American (22.4%), Asian (4.2%), and Other or Multi-racial (9.1%). Racial groups did not differ significantly in terms of mean age,  $F = 1.87$  (3, 142),  $p = .136$  (i.e., comparing White, Black, Latino and Other). In terms of self-identified sexual orientation, 77.6% identified as gay,

20.3% as bisexual, and 2.1% as heterosexual (with same-sex sexual behavior). Finally, participants in the current study were geographically diverse, with 29.4% living on the West Coast, 28.0% in the Midwest, 25.9% in the Northeast/East Coast, and 16.8% in the South/Southeast.

Participants were excluded from the current study if they did not meet the following four criteria: 1) had engaged in recent sexual activity with another man (defined as having had oral and/or anal sex with another man within the six months prior to screening), 2) were between the ages of 16 and 40, 3) were not in a sexually-monogamous relationship, and 4) were HIV- or of unknown serostatus at the time of enrollment. These inclusion criteria were utilized in order to increase the likelihood that participants would have multiple sexual encounters and/or sexual partners within the period of assessment. The age range was limited to 16 to 40 in order to facilitate comparisons between age and racial groups that are currently at highest risk for HIV acquisition (i.e., young Black MSM and White MSM ages 30-40). HIV+ MSM were excluded from the study, because the psychosocial experiences of HIV+ MSM likely differ from those of HIV- MSM, and it is plausible that situational predictors of risky sex may also differ based on serostatus.

## **B. Procedures & Design**

All participants were recruited online. Advertisements were posted on Craigslist and Facebook. Craigslist ads were posted in the “M4M” (i.e., men seeking men) section, and Facebook ads targeted men whose profiles indicated sexual attraction to other men. Online recruitment targeted postings in the following states within the United States: California, the District of Columbia, Florida, Georgia, Illinois, Louisiana, New York, and Texas. These states were chosen for the following reasons: 1) the presence of metropolitan areas that

contain large populations of LGBT individuals, and 2) state laws allowed adolescents to receive a variety of medical services without parental consent (including HIV/STI testing; Guttmacher Institute, 2011), which allowed for justification of recruiting MSM ages 16 and 17 without parental consent (see below for more details).

Prior to completing the Eligibility Screener, participants were provided with an Information Sheet that contained an abridged version of the Informed Consent/Assent document and detailed key information regarding research subjects' rights and issues related to confidentiality. Providing this information prior to administering the Eligibility Screener also allowed for the evaluation of capacity to provide consent or assent, an issue that is particularly important for 16-17 year old participants (Dunn & Jeste, 2001). Capacity to consent/assent was evaluated in the Eligibility Screener by administering four multiple choice questions that evaluated participants' ability to: (1) name things they will be expected to do during the study, (2) explain what they would do if they no longer wished to participate in the study, (3) explain what they would do if they experienced distress during the study and (4) identify potential risks for participating in the study (University of California, 2003). The Eligibility Screener additionally assessed whether the participant met the previously mentioned inclusion criteria. Participants who met all inclusion criteria and demonstrated capacity to consent/assent were instructed to provide several pieces of contact information, complete the Informed Consent/Assent, review the Project Instructions sheet, and complete several baseline measures of between-subjects variables (personality characteristics, cognitive dimensions, trait affect, and IMB questionnaires) using SNAP Survey Software.

The current study utilized a combined prospective and retrospective approach of completing weekly online diaries of sexual encounters over a 3-month period (12 weekly

diary surveys total). Once-weekly diary surveys were administered with SNAP Survey Software and detailed the specific activities of up to three sexual encounters from the previous week (i.e., type of sexual act(s) and condom use) as well as situational variables associated with these encounters (i.e., sexual partnership characteristics, alcohol and substance use, and state affect). Participants were allotted 48 hours to complete each diary survey and were sent e-mail reminders if they failed to complete a weekly diary survey within 24 hours of the target date. Participants who failed to complete two consecutive weekly diaries were contacted via email or phone call. In terms of payment, participants were paid 10 dollars for completing baseline questionnaires, 25 dollars for completing at least 4 diary surveys, 40 dollars for completing at least 8 diary surveys, and 60 dollars for completing 10 or more diary surveys. Retention of participants across the 3-month assessment period was high, and participants completed 83.7% of all diary surveys.

Finally, in order to avoid the potential for an individual to enroll more than once or to “fake” eligibility, we collected a variety of different pieces of demographic and contact information, including names, email addresses, home addresses, date of birth, race/ethnicity and the IP addresses from which the Eligibility Screener was completed. For each individual who completed the screener and met inclusion criteria, we searched a database of all participants who had completed the screener thus far for duplicates of the following pieces of information: name, email address, and IP address. In the event that duplicates were discovered, we checked all other pieces of demographic information for inconsistencies in reports. Individuals who completed the screener more than once but were consistent in their responses were allowed to enroll in the study while those who were inconsistent were

removed from the study. Two participants were removed due to inconsistencies in reports on the Eligibility Screener.

### **C.Measures**

*General Demographics.* The demographic questionnaire assessed a number of participant characteristics, including participant's age, race/ethnicity, self-reported sexual orientation, and geographic location.

*Sexual Behavior.* In the weekly diary, participants reported the number of sex partners they had during the previous week. Participants then reported on specific sexual behaviors (e.g., receptive/insertive oral sex, receptive/insertive anal sex, vaginal sex, etc.) that occurred with each of up to three sexual encounters during the week (i.e., the three most recent sexual encounters) and whether or not a condom was used for each behavior. A sexual risk behavior variable was calculated to identify unprotected anal or vaginal intercourse (UAVI). The sexual risk variable was dichotomous, such that UAVI was calculated as a risk episode (coded 1), and all other encounters were considered non-risk episodes (coded 0).

*Alcohol Use.* At baseline, participants were asked two items assessing quantity and frequency of alcohol use (Bartholow & Heinz, 2006; Greenfield, 2000). For the frequency item, participants were asked to report how many days they had consumed alcohol during the 30 days prior to baseline. The quantity item assessed the average number of drinks consumed on drinking days during the past 30 days (responses range from 1 = "1 drink" to 6 = "6 or more drinks"). A baseline alcohol quantity-frequency (QF) variable was calculated by multiplying these two items together. During weekly diary assessments, participants were asked whether or not that had consumed alcohol prior to or during each sexual

encounter reported in the diary. Participants who endorsed drinking prior to or during sexual encounters were asked how many drinks they had consumed.

*Substance Use.* Components of the AIDS Risk-Behavior Assessment (ARBA; Donenberg, Emerson, Bryant, Wilson, & Weber-Shifrin, 2001) were used to assess substance use at baseline and during the weekly diary portion of the study. At baseline, participants were asked to name which substances they had used in their lifetime, including both illicit and prescription medications. Substance options included: marijuana, cocaine/crack, heroin/opiates, stimulants/uppers, methamphetamine, depressants/downers, psychedelics, club drugs (Ecstasy, MDMA, Liquid G, Special K, etc.), poppers, other inhalants (glues, nail polish remover, lighter fluid, etc.), or any other drugs not used for prescription purposes. During weekly diary assessments, participants were asked whether or not they had used any of these same drugs prior to or during their sexual encounters. Two composite variables were created for analysis of the effects of situational drug use (i.e., event-level) on UAVI. First, a dichotomous variable was created indicating whether or not participants used any drugs prior to or during sex (0 = no drug use, 1 = any drug use). Next a dichotomous variable for stimulant use prior to sex was created (0 = no stimulant use, 1 = stimulant use) and included use of cocaine/crack, methamphetamine, and other stimulants/uppers (e.g., Ritalin, Dexedrine, etc.). A dichotomous variable also created for club drug use prior to sex included club drugs (Ecstasy, MDMA, Liquid G, Special K, etc.) and poppers (0 = no club drug use, 1 = club drug use). Finally, a variable was created to measure polydrug use prior to sex and was a count of the number of different types of drugs (including alcohol) used prior to or during sexual encounters.

*State and Trait Affect.* State and trait positive activation (PA) and negative activation (NA) were measured using items from the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988). For trait PA and NA items, responses indicated “how you generally feel, that is, how you feel on average.” Responses were measured on a 5-item Likert scale ranging from “not at all” to “extremely.” Trait anxious arousal (AA) was measured using items from the Mood and Anxiety Symptom Questionnaire (MASQ; Watson & Clark, 1991) and items from the MASQ were presented in the same format as the PANAS items. Trait sexual activation was measured using items from Mustanki’s (2007b) adaptation of the PANAS. These items measured state and trait feelings of “sexual interest”, “sexual arousal”, and “horniness,” and were presented in the same format as the PANAS items. Trait affect scales were calculated by taking the mean of all items so that they ranged from 1 to 5. For state affect, all the same items were used and measured “to what extent you felt this way before the sexual encounter.”

An exploratory factor analysis was conducted to confirm the factor structure of the affect components. Three clear factors emerged that explained 51.4% of the variance: NA, PA, and SA (see Table 2). Most items from AA loaded more strongly on the NA scale, and no further analysis of the AA scale was pursued. Internal consistency was evaluated by assigning individual items to scales based on their factor loadings, and these measures of trait affect had good internal reliability (Cronbach’s  $\alpha$ : PA = .71, NA = .87, SA = .88).

*Brief Sensation Seeking Scale (BSSS).* The BSSS is Hoyle’s (Donohew et al., 1999) 8-item adaptation of the original Zuckerman sensation seeking scale, which measures propensity to seek out novel experiences. Two items measure each of the four dimensions of sensation seeking, including experience seeking, boredom susceptibility, thrill and adventure

seeking, and disinhibition. Scores range from 1 to 5, with low scores indicating low sensation seeking and high scores indicating high sensation seeking. Cronbach's  $\alpha$  was .79 in this sample, which is comparable to other studies of ethnically-diverse MSM (e.g., Newcomb, et al., 2011).

*Alcohol and Drug Use Expectancies.* Sexual enhancement expectancies for alcohol and drug use were assessed at baseline using Kalichman and colleagues' (1998) 10-item questionnaire. Eight items assessed beliefs about the effects of alcohol and drugs on sexual experiences, and example items included, "I feel horny or sexual after I have been drinking," and "I'm a better lover after I've been drinking." Two additional items reflected beliefs that alcohol and drugs interfere with safer sex, and example items included, "Safer sex is harder after I have been drinking," and "It is difficult to use condoms after drinking." All items were measured using a 4-point Likert scale, ranging from "strongly disagree" to "strongly agree." Two parallel measures were administered to evaluate sexual enhancement expectancies of both alcohol and drug use separately. This measure has good internal reliability (Kalichman, et al., 1998; Kalichman, Weinhardt, DiFonzo, Austin, & Luke, 2002), and internal reliabilities for both alcohol and drug use expectancies were also high in this sample (Cronbach's  $\alpha = .90$  and  $.95$ , respectively).

*Information, Motivation, & Behavioral Skills (IMB).* The brief HIV/AIDS Knowledge questionnaire (HIV-KQ-18) is an 18-item true-false self-report instrument assessing knowledge of transmission and prevention (Carey & Schroder, 2002). The HIV-KQ-18 demonstrates strong internal consistency, test-retest stability, and strong correlations with other measures of HIV knowledge. The HIV-KQ-18 has been used successfully with young adults (Jaworski & Carey, 2007). Four additional items were added to this scale to assess

MSM-specific HIV knowledge, and example items included, “A person cannot get HIV from having sex with someone who is HIV+ but has an undetectable viral load” and “A person cannot get HIV from being the ‘top’ or insertive partner during anal sex.” Cronbach’s  $\alpha$  in this sample was .73 and the mean number correct was 17.80 ( $SD = 3.12$ ).

HIV/AIDS Motivation and Behavioral Skills is a 17-item self-report measure adapted from (Kalichman, Picciano, & Roffman, 2008) and it assessed: Motivation (e.g., intentions to use condoms, motivation to become safer), Social Norms (e.g., partners, friends, or family members opinions about condom use), and Behavioral Skills (e.g., condom use self-efficacy). Additional questions were added to assess perceived severity/consequences of becoming infected with HIV/AIDS (e.g., “How concerned would you be about your future if you became HIV positive?”). Internal reliabilities of these sub-scales ranged from .57 to .91 (Cronbach’s  $\alpha$ : intentions = .91, social Norms = .69, self-efficacy = .85, and perceived severity = .57). Motivation to stay safe or become safer was assessed with a single item: “How would you describe your motivation to become safer/stay safe?” Perceived riskiness of previous sexual behavior was also assessed with a single item: “Based on your sexual behavior over the past three months, how much do you think you have been at risk for being infected with HIV or other STDs?” Recent evidence suggests that the individual components of motivation and behavioral skills may contribute uniquely to HIV risk (Kalichman, et al., 2008). As such, all components of the HIV/AIDS Motivation and Behavioral Skills measure were analyzed as separate constructs.

*Additional Situational Variables.* Several additional situational variables were assessed for each sexual encounter reported in the weekly diary assessments. These variables included actual/perceived age of the sexual partner, number of previous sexual encounters

with the partner, perceived HIV status of the partner, race/ethnicity of the partner, sexual partner's gender, context or venue in which the participant met the sexual partner, and perceived riskiness of the sexual encounter (i.e., HIV risk). Partner age was measured on a 7-point Likert scale (-3 = 10+ years younger, -2 = 5-10 years younger, -1 = 1-4 years younger, 0 = same age, 1 = 1-4 years older, 2 = 5-10 older, and 3 = 10+ years older than participant). The variable denoting the number of previous sexual encounters with a partner was winsorized at three standard deviations from the mean to reduce the effects of outliers (winsorized range was 0-333). Perceived HIV status of partner was measured on a 5-point Likert scale (0 = I know this person is HIV negative, 1 = I think this person is HIV negative, 2 = I don't know this person's HIV status, 3 = I think this person is HIV+, and 4 = I know this person is HIV+). Partner race was dichotomized into two variables to capture the experiences of Black (1 = Black, 0 = Other) and Latino (1 = Latino, 0 = Other) partners and to allow for dummy coding. Partner gender was dichotomized based on biological birth sex (1 = female, 0 = male). The venue variable was dichotomized into 1 = partner met online or on a mobile device, and 0 = partner met offline or in-person.

#### **D. Analyses**

All analyses were conducted using Hierarchical Linear Modeling (HLM) 7.0 statistical software and procedures outlined by Raudenbush and Bryk (2002). HLM is well suited to evaluate situational predictors of risk because it is designed to account for dependency in observations in data that contains a nested or multilevel structure. In this case, sexual encounters (Level 1) are nested within participants (Level 2). At Level 1, HLM estimates the within-participant effects of situational influences (e.g., partnership characteristics, substance use, state affect) on UAVI. At Level 2, HLM allows for the

analysis of the main effects of differences between participants in UAVI (e.g., demographic variables, personality characteristics, trait affect). Also at Level 2, between-subjects characteristics can be evaluated as moderators of Level 1 effects (e.g., the moderating effect of sensation seeking on the effect of alcohol and drug use prior to sex on UAVI).

Maximum likelihood estimation was used to model unprotected sex as the dependent variable. As recommended by Raudenbush & Bryk (2002), a Bernoulli distribution was used in estimating sexual risk as this technique helps to account for deviations from normality in dichotomous outcome variables, and all results are presented as odds ratios (OR). The models also accounted for over-dispersion in the outcome variable (i.e., over-preponderance of cases with values of zero). Robust standard errors were used in estimating significance for all effects.

Each of the four models of sexual risk was tested independently, and all four models used the same analytical procedures. As an example, the following equation was used to estimate the effects of within- and between-persons effects on sexual UAVI in the sexual partnership characteristics and risk model:

#### Level 1 Model

$$\text{Probability(UAVI} = 1 \mid \beta) = \Phi$$

$$\text{Log} [\Phi / (1 - \Phi)] = \eta$$

$$\eta_j = \delta_{0j} + \delta_{1j}(\# \text{ Previous Sexual Encounters}) + \delta_{2j}(\text{Partner Age}) + \delta_{3j}(\text{Partner HIV Status}) + \delta_{4j}(\text{Partner Gender}) + \delta_{5j}(\text{Partner Race}) + \delta_{6j}(\text{Venue of Meeting}) + e_j$$

#### Level 2 Model

$$\delta_{0j} = \gamma_{00} + \gamma_{01}(\text{Participant Age}) + \gamma_{02}(\text{Participant Race}) + u_j$$

$$\delta_{1j} = \gamma_{10} + \gamma_{11}(\text{Participant Age}) + \gamma_{12}(\text{Participant Race}) + u_j$$

$$\delta_{2j} = \gamma_{20} + \gamma_{21}(\text{Participant Age}) + \gamma_{22}(\text{Participant Race}) + u_j$$

$$\delta_{3j} = \gamma_{30} + \gamma_{31}(\text{Participant Age}) + \gamma_{32}(\text{Participant Race}) + u_j$$

$$\delta_{4j} = \gamma_{40} + \gamma_{41}(\text{Participant Age}) + \gamma_{42}(\text{Participant Race}) + u_j$$

$$\delta_{5j} = \gamma_{50} + \gamma_{51}(\text{Participant Age}) + \gamma_{52}(\text{Participant Race}) + u_j$$

$$\delta_{5j} = \gamma_{60} + \gamma_{51}(\text{Participant Age}) + \gamma_{52}(\text{Participant Race}) + u_j$$

All predictor variables entered into the equation were entered as either uncentered or centered, and the centering process affects the estimated value of the intercept in the equation. HLM 7.0 estimates the value of the intercept when the predictor variable value is equal to zero. Therefore, a predictor variable should only be entered as uncentered if its zero value is interpretable. Variables are entered into the model as centered around the grand mean of the variable (i.e., the mean across all sexual encounters) when the value of “0” does not carry interpretive meaning. For example, sexual partner age is entered into the model as grand mean centered because an age of “0” is not interpretable. As such, the intercept  $\gamma_{00}$  refers to the odds of UAVI when all uncentered variables are equal to “0” and all grand mean centered variables are equal to the mean value across all sexual encounters across all participants. Additionally,  $\gamma_{10}$ ,  $\gamma_{20}$ ,  $\gamma_{30}$ ,  $\gamma_{40}$ ,  $\gamma_{50}$ , and  $\gamma_{60}$  refer to the main effects of number of previous sexual encounters, partner age, partners’ perceived HIV status, partner gender, partner race, and venue of meeting, respectively, on UAVI. At Level 2,  $\gamma_{01}$  and  $\gamma_{02}$  refer to the main effects of participant age and participant race on UAVI, respectively. Finally, both participant age and participant race are considered as moderators of Level 1 situational effects on UAVI (e.g.,  $\gamma_{11}$  and  $\gamma_{12}$ ).

### III. RESULTS

#### A. Sexual Behavior and Group Differences

Seven participants were removed from analyses by HLM because they did not report any sexual encounters in any of the 12 weekly diary surveys and therefore did not have any Level 1 data. This left an analytic sample of 136 MSM (see Table 1 for demographic characteristics of both full and analytic samples) who reported a total of 1,189 episodes of sex across all participants and diaries. Participants reported a median of one sexual encounter per week (range 0-15), and 4.2% of participants reported having more than three sexual encounters during any week. Across all participants, 27% of reported sexual encounters were unprotected anal or vaginal sex acts. In HLM, we first ran an unconditional (null) model of the odds of UAVI with no predictor variables entered at Level 1 or Level 2 in order to evaluate the extent to which variability in UAVI was due to individual/group differences (between-subjects characteristics) or change over time (within-persons factors). With dichotomous outcome variables, a weighted Kappa can be calculated to evaluate to what extent variability in the outcome is due to between- or within-subjects effects (i.e., “agreement” within-persons) and the interpretation of the weighted Kappa is equivalent to the intraclass correlation coefficient (ICC; Fleiss & Cohen, 1973). Weighted Kappa in this unconditional model was .26, indicating that approximately 26% of the variance in UAVI was due to between-subjects characteristics and 74% was due to within-subjects factors.

Next we entered a variable denoting the week of data collection for each sexual encounter to test for reactivity across the 12-week diary assessment period. Week of data collection was not associated with odds of UAVI (OR = 1.00,  $p = .889$ ), suggesting that reactivity was not present in the current study. Finally, we entered several key demographic covariates (i.e.,

age, race ethnicity) at Level 2 to evaluate group differences in UAVI across the entire 12-week assessment period. Likelihood of UAVI did not differ by participant age (OR = 1.00,  $p = .963$ ). In terms of racial differences, Black MSM were 51% less likely to report UAVI (OR = .49,  $p < .05$ ), and Latino MSM were 99% more likely to have UAVI (OR = 1.99,  $p < .05$ ). All additional results will be presented separately for each of the four models being tested in the current study.

### **B. Model 1: Sexual Partnership Characteristics and Sexual Risk**

Across all participants and sexual encounters, 12% of sexual encounters occurred with female partners, and 22% of participants reported sexual encounters with women during the course of the 12-week diary period. Sexual partners were approximately the same age as participants on average ( $M = 0.03$ ,  $SD = 1.56$ ). There was a negative association between participant age and sexual partner age ( $\beta = -0.04$ ,  $p < .001$ ), such that younger participants were more likely to have older partners. However, there were no differences in average age of sexual partners by participant race. In terms of perceived HIV status, most sexual partners were perceived to be HIV- by participants ( $M = 1.00$ ,  $SD = 0.97$ ), and 4% of partners were known to be HIV+. Finally, 29% of partners were met in some type of online venue (e.g., dating site, sex partner finders, applications for mobile device) while all other partners were met in-person.

All further analyses of predictors of UAVI were conducted while controlling for key demographic covariates (age and race/ethnicity). All final models were trimmed; statistically insignificant results that were not theoretically relevant were removed from final models to maximize power to detect effects. Results for Model 1 are presented in Table 3. Across the sample as a whole, two within-persons sexual partnership characteristics emerged as

significant main effects on the odds of UAVI. First, analyses revealed a significant main effect for partner's gender (OR = 4.40,  $p < .001$ ), such that MSM were 4.4x more likely to have UAVI with female sexual partners than with male sexual partners. MSM were also more likely to have UAVI with Latino partners (OR = 1.57,  $p < .05$ ), and odds of UAVI were 57% higher with partners of this racial group. All other main effects of sexual partnership characteristics were non-significant, including relationship status (OR = 1.00,  $p = .414$ ), partner's age (OR = 1.01,  $p = .922$ ), partner's perceived HIV status (OR = 1.12,  $p = .479$ ), partner's race (Black v. Other; OR = 1.03,  $p = .883$ ), partners met online vs. offline (OR = 0.85,  $p = .493$ ) and number of previous sexual encounters with the partner (OR = 1.00,  $p = .529$ ). Note that none of these null effects was significant when examined as a bivariate effect, except for the number of previous sexual encounters with the partner (OR = 1.01,  $p < .05$ ).

Several demographic variables were significant moderators of the associations between sexual partnership characteristics and odds of UAVI. First, participant race was a significant moderator of the relationship between sexual partner's age and odds of UAVI (OR = 1.34,  $p < .05$ ), such that having an older sexual partner was associated with increased odds of UAVI among Black MSM (Figure 5). Participant age did not moderate this relationship (OR = 1.00,  $p = .194$ ), but in a follow-up analysis there was a significant three-way interaction between participant age, participant race (Black vs. Other), and sexual partner's age in predicting odds of UAVI (Figure 6; OR = 0.96,  $p < .05$ ). Young Black MSM had the strongest positive relationship between sexual partner age and odds of UAVI, and they were the most likely to have UAVI with older partners. Alternatively, there was a negative relationship between sexual partner age and UAVI amongst older non-Black MSM,

such that this group was the least likely to have UAVI with older partners but the most likely to have unprotected sex with younger partners.

Participant race was also a significant moderator of the relationship between the number of previous sexual encounters with partners and odds of UAVI ( $OR = 1.04, p < .01$ ). Amongst Black MSM, there was a positive association between number of previous sexual encounters with a partner and the odds of UAVI (Figure 7), and follow-up analysis of this effect indicated that it was quadratic amongst Black MSM ( $OR = 1.01, p < .05$ ). Finally, there was a positive relationship between partner's perceived HIV status and odds of UAVI amongst Latino MSM ( $OR = 1.81, p < .05$ ), such that Latino MSM were more likely to have UAVI with partners they perceived to be HIV+ (Figure 8). Further investigation of this effect revealed a significant interaction between participant race (Latino vs. Other) and sexual partner's perceived HIV status in predicting relationship type ( $\beta = -0.32, p < .05$ ). More specifically, participants who had HIV+ partners were more likely to be in serious relationships with these partners as opposed to casual relationships, and this effect was particularly strong in Latino MSM. All demographic covariates (i.e., participant age and race/ethnicity) were tested as moderators of the effects of all sexual partnership characteristics on odds of UAVI, and no other moderating effects reached significance.

We conducted several follow-up analyses on this model to examine rates of within-race sexual partnerships and cross-race sexual partnerships. Across all Black participants, the majority of sexual encounters occurred with Black partners (45.0%), followed by White (30.5%), Latino (17.6%) and Other (6.9%). For Latino participants, the majority of sexual encounters occurred with White partners (46.5%), followed by Latino (34.0%), Other (10.2%), and Black (9.3%). Finally, for White participants, the majority of sexual encounters

occurred with White partners (56.7%), followed by Latino (23.8%), Black (12.1%), and Other (7.4%). We next examined racial differences in the likelihood of having partners who were Black, Latino, or White. Black MSM were the most homophilous racial group, and they were nearly 11 times more likely than other racial groups to have Black partners (OR = 10.94,  $p < .001$ ). Latino MSM were nearly three times more likely than other racial groups to have Latino partners (OR = 2.81,  $p < .001$ ), and White MSM were approximately twice as likely to have White partners compared to other racial groups (OR = 2.30,  $p < .01$ ).

### **C. Model #2: Substance Use and Sexual Risk**

All analyses were conducted while controlling for several key demographic covariates (age and race/ethnicity), as well as sexual partner's gender and the number of previous sexual encounters with the partner. Two models were run to separately evaluate the effects of alcohol use and substance use on the odds of UAVI in this sample. Results for the final trimmed alcohol use model are presented in Table 4, and results for the final trimmed substance use model are presented in Table 5.

In the alcohol use model, two additional covariates were included to evaluate for group differences in odds of UAVI based on the personality dimension of sensation seeking and baseline alcohol QF. Across the 12-week assessment period, sensation seeking was positively associated with odds of UAVI (OR = 1.65,  $p < .05$ ), such that the odds UAVI increased by 65% for each one-unit increase in sensation seeking (range 1-5). Baseline alcohol QF was not associated with odds of UAVI (OR = 1.00,  $p = .470$ ). There were no significant group differences in likelihood of drinking prior to sex, including participant age (ERR = 1.00,  $p = .706$ ), race (Black vs. other; ERR = 0.94,  $p = .774$ ), and race (Latino vs. other; ERR = 1.15,  $p = .449$ ). Note that "ERR" refers to "event-rate ratio," which provides

an estimate of the change in the event-rate of the outcome variable (e.g., number of drinks prior to sex) for each one-unit increase in the independent variable.

Drinking prior to sex was associated with increased odds of UAVI in this sample (OR = 1.15,  $p < .01$ ). Odds of UAVI increased by approximately 15% for every drink consumed (range 0-18). Moreover, this relationship was stronger amongst younger MSM (Figure 9; OR = 0.99,  $p < .05$ ), and those with higher sensation seeking scores (Figure 10; OR = 1.16,  $p < .05$ ). Baseline alcohol QF was also a significant moderator of the relationship between alcohol use prior to sex and odds of UAVI (OR = 0.99,  $p < .001$ ), such that there was a stronger positive relationship between alcohol use and UAVI for MSM with lower baseline alcohol QF (Figure 11). Participant race (OR = 1.03,  $p = .632$ ) and sexual enhancement expectancies for alcohol use (OR = 1.08,  $p = .112$ ) were not significant moderators of the effect of alcohol use prior to sex on odds of UAVI.

In terms of the substance use model, we evaluated the influence of four within-subjects substance use variables on odds of UAVI (any drug use, stimulant use, club drug use, and polysubstance use), and there were substantial group differences in these drug use variables. Overall, substance use prior to sex increased significantly across the age span for all substance use variables, including any drug use (OR = 1.04,  $p < .05$ ), stimulant use (OR = 1.14,  $p < .001$ ), club drug use (OR = 1.08,  $p < .001$ ), and polysubstance use (ERR = 1.04,  $p < .01$ ). In terms of racial differences, Latino MSM were more likely to use club drugs (OR = 3.03,  $p < .05$ ) and multiple substances (ERR = 1.88,  $p < .05$ ) prior to sex compared to White and Black MSM, and a trend indicated Latino MSM were also somewhat more likely to use stimulants (OR = 2.50,  $p < .09$ ) compared to these two groups. A statistical trend also

indicated that Black MSM were less likely than White and Latino MSM to use stimulants prior to sex (OR = 0.31,  $p < .07$ ).

To evaluate the effects of substance use prior to sex on odds of UAVI, we added each of the four substance use variables into the model separately in order to avoid issues of collinearity. Any drug use prior to sex was associated with a 24% increase in the odds of UAVI (OR = 1.24,  $p < .05$ ). There was a stronger effect for stimulant use prior to sex on odds of UAVI (OR = 1.40,  $p < .05$ ), such that stimulant use was associated with a 40% increase in the odds of UAVI. We found no effect for club drug use prior to sex on the odds of UAVI (OR = 0.85,  $p = .775$ ). Finally, polysubstance use prior to sex was also associated with increased odds of UAVI (OR = 1.20,  $p < .01$ ), such that the odds of UAVI increased by 20% for each additional substance used (range 0-10).

There were no significant moderators of the relationship between any drug use and odds of UAVI, including participant age (OR = 1.05,  $p = .140$ ), race (Black vs. Other; OR = 0.53,  $p = .252$ ), race (Latino vs. Other; OR = 1.52,  $p = .221$ ), sensation seeking (OR = 1.27,  $p = .561$ ), or sexual enhancement expectancies for substance use (OR = 0.68,  $p = .266$ ). We were not able to evaluate the moderating effects of demographic differences (i.e., age and race), sensation seeking, or sexual enhancement expectancies of drug use on the main effects of stimulant use, club drug use, or polysubstance use due to limited power resulting from low rates of substance use prior to sex in this sample.

#### **D. Model #3: Affective Influences on Sexual Risk**

All analyses were conducted while controlling for several key demographic covariates (age and race/ethnicity), and results for the final trimmed Model 3 are presented in Table 6. In order to examine affective influences on sexual risk, each type of affect was

modeled separately, including the main effects of both trait and state affect as well as the moderating effects of trait affect on the association between state affect and odds of UAVI.

The odds of UAVI decreased by 43% for each one-unit increase in trait positive activation (range 0-4), though this effect did not reach statistical significance (OR = 0.57,  $p = .256$ ). However, state positive activation had the opposite effect (OR = 1.28,  $p < .05$ ), and the odds of UAVI increased by 28% for each unit increase in state positive activation (range 0-4). Trait positive activation was not a significant moderator of the association between state positive affect and odds of UAVI (OR = 1.13,  $p = .372$ ).

Trait sexual activation was a significant predictor of odds of UAVI (OR = 1.56,  $p < .05$ ). Odds of UAVI increased by 56% for each unit increase in trait sexual activation (range 0-4). However, the association between state sexual activation and odds of UAVI was non-significant (OR = 1.06,  $p = .568$ ), and trait sexual activation did not moderate this effect (OR = 1.05,  $p = .575$ ).

No significant effects emerged in the negative activation model. The main effect for trait negative activation (OR = 1.27,  $p = .279$ ) on odds of UAVI was non-significant. Furthermore, there was no association between odds of UAVI and state negative activation (OR = 0.90,  $p = .668$ ). Finally, moderation analyses indicated that the interaction between trait and state negative activation (OR = 0.88,  $p = .471$ ) was non-significant. Also notable was that key demographic variables (i.e., age and race/ethnicity) did not moderate any of the above-mentioned effects in any of the four models of affective influences on UAVI.

#### **E. Model #4: Information, Motivations, Behavioral Skills (IMB) and Sexual Risk**

Two separate analyses were conducted to examine Model 4. First, a model was built to examine the influence of the individual components of the IMB model on the odds of

UAVI during the sexual diary portion of the current study. A second model was built to examine the moderating effects of these IMB variables on the relationship between UAVI and subjective perceptions of riskiness of each sexual encounter. Each final trimmed model controlled for key demographic covariates (age and race/ethnicity).

In order to examine the influence of components of the IMB model on the odds of UAVI, each individual component was entered separately into the model. Motivation to become safer/stay safe during sexual encounters was associated with lower odds of UAVI (OR = 0.63,  $p < .01$ ) or a 37% decrease in the odds of UAVI for each unit increase in motivation (range 0-3). Intentions to use condoms were also associated with lower odds of UAVI (OR = 0.53,  $p < .001$ ), and this was a somewhat larger effect with a 47% decrease in odds of UAVI for each unit increase in intentions (range 0-3). Social norms of condom use were similarly associated with a significant decrease in odds of UAVI (OR = 0.33,  $p < .001$ ), such that the odds of UAVI decreased by 67% for each unit increase in perceived norms (range 0-4). Finally, condom use self-efficacy was significantly associated with odds of UAVI (OR = 0.59,  $p < .001$ ), and the odds of UAVI decreased by 41% for each one-unit increase in self-efficacy (range 0-6). All other components of the IMB model were not significantly associated with UAVI, including HIV knowledge (OR = 0.97,  $p = .351$ ), perceived severity of HIV infection (OR = 0.71,  $p = .318$ ), and baseline perceptions of risk of acquiring HIV (OR = 1.35,  $p = .125$ ).

After entering each component of the IMB model individually to examine the influence on UAVI, we ran a multivariate trimmed model that included all significant bivariate effects and was adjusted for the previously mentioned demographic covariates (see Table 7). Condom use self-efficacy was the only variable that remained significant in the

trimmed and adjusted model (OR = 0.71,  $p < .05$ ). Perceived norms of condom use moved to a statistical trend (OR = 0.58,  $p = .068$ ), and motivation OR = 1.00,  $p = .986$ ) and intentions (OR = 0.91,  $p = .592$ ) became non-significant.

Analysis of influences on subjective perceptions of risk of sexual encounters was conducted with a normal distribution, and effects are therefore presented as beta weights. We first ran an unconditional (null) model of perceptions of risk of sexual encounters with no predictor variables entered at Level 1 or Level 2 in order to evaluate the extent to which variability in perceptions of risk was due to individual/group differences (between-subjects characteristics) or change over time (within-persons factors). The intraclass correlation coefficient (ICC) was 0.58, indicating that 58% of the variance in prospective perceived risk was due to between-subjects influences. UAVI was associated with higher perceived risk of encounters ( $\beta = 0.54$ ,  $p < .001$ ). Several group differences in prospective perceptions of risk emerged as significant (while controlling for actual sexual risk behavior). Participant age was negatively associated with perceptions of risk ( $\beta = -0.02$ ,  $p < .05$ ), such that perceptions of risk decreased with age. Moreover, Black MSM perceived their sexual encounters to be riskier compared to White and Latino MSM ( $\beta = 0.43$ ,  $p < .01$ ).

To evaluate the moderating effects of IMB variables on the association between UAVI and perceived riskiness of these encounters, we first entered each moderating effect into the model separately. Perceived riskiness of sexual behavior at baseline was a significant moderator ( $\beta = 0.41$ ,  $p < .05$ ), such that individuals with a history of perceived sexual risk at baseline attributed higher perceived risk prospectively when engaging in unprotected anal or vaginal sex (Figure 12). HIV knowledge moderated this relationship in a similar manner.

Individuals with more HIV knowledge perceived their episodes of unprotected sex as riskier than those with less HIV knowledge (Figure 13;  $\beta = 0.06, p < .05$ ).

Perceived severity of HIV infection and motivation to become safer/stay safe were also significant moderators of the association between UAVI and perceived riskiness of these sexual encounters. Participants with higher scores on perceived severity of HIV infection attributed less risk to their episodes of UAVI than those with lower perceived severity scores (Figure 14;  $\beta = -0.66, p < .05$ ). Similarly, participants who endorsed more motivation to become safer/stay safe attributed less risk to episodes of UAVI than those with less motivation to be safe (Figure 15;  $\beta = -0.42, p < .01$ ). The following components of IMB model were not significant moderators of the relationship between UAVI and perceived riskiness of these encounters: condom use intentions ( $\beta = -0.21, p = .298$ ), condom use self-efficacy ( $\beta = -0.19, p = .135$ ), and condom use norms ( $\beta = 0.02, p = .946$ ).

We next entered all significant moderating effects simultaneously into the model while controlling for the effects of partner gender and number of previous encounters with the partners, as well as the effect of key demographic variables (Table 8). In this trimmed and adjusted model, two of the previously described moderating effects moved from significance to trends: the moderating effects of baseline perception of risk ( $\beta = 0.22, p = .092$ ) and perceived severity of HIV infection ( $\beta = -0.38, p = .108$ ). Also of note, sexual encounters with female partners were associated with less perceived risk ( $\beta = -0.35, p < .05$ ), and perceived riskiness of sexual encounters declined significantly as the number of previous sexual encounters with the partner increased ( $\beta = -0.004, p < .05$ ).

## IV. DISCUSSION

As a whole, the results of the current study confirm several previous findings from the literature on sexual risk in MSM while providing a more nuanced picture of the variables that confer risk for HIV acquisition and how these risk factors differ between sub-groups of the MSM community. The findings indicate that the majority of variance in odds of UAVI occurs within-persons over time, and in order to fully understand HIV risk in MSM we must consider situational variables, stable group difference characteristics, and the interactions between these two types of variables. With continued advances in HIV treatment approaches and increased societal tolerance and awareness of this chronic illness, behavioral prevention strategies against HIV acquisition will also need to continue to evolve in order to be efficacious. The consideration of these multiple between- and within-persons influences on risk behavior is a critical component of future intervention development.

### **A. Model 1: Sexual Partnership Characteristics and Sexual Risk**

When examining the sample as a whole, few sexual partnership characteristics emerged as significant predictors of sexual risk behavior across all MSM. One consistent predictor of odds of UAVI was sexual partner's gender, and MSM were more than four times more likely to have UAVI with their female partners than with their male partners. This finding is consistent with previous research (Mustanski, et al., 2011) and adds to the burgeoning literature indicating that MSM make choices about condom use based on perceived riskiness of their sexual partners. Given that the prevalence of HIV is substantially lower amongst females (CDC, 2008), it may be that behaviorally-bisexual MSM perceive their female partners to be less likely to have HIV and are therefore less likely to use condoms with these partners. Taken together, these findings point to a potentially major

health concern for women who have sex with behaviorally-bisexual men. Given that condom use with male partners is not consistent amongst MSM and condom use errors are frequent, particularly among young MSM (Du Bois, Emerson, & Mustanski, 2011), these women may be at high risk for acquiring HIV and other STIs.

Moderating analyses revealed several important group differences in the effects of sexual partnership characteristics on the odds of UAVI. For Black MSM, the number of previous sexual encounters with a partner significantly increased the likelihood of sexual risk behavior, and it appeared to do so quadratically. The odds of having UAVI with partners increased rapidly over the initial sexual encounters with a partner and the odds of risk increased more modestly as repeated sexual encounters continued to increase. This quadratic effect indicates that as Black MSM become more familiar with their sexual partners, they perceive these partners to be less risky, and these changes in perceived risk appear to happen more rapidly during the initial sexual encounters with a new partner. Given that Black MSM also had significantly less UAVI overall compared to all other racial groups despite having the highest incidence rates of new HIV infections nationally (CDC, 2010b), it may be that Black MSM have gotten the message that they are at increased risk for acquiring HIV. Because of this, they may be using familiarity with partners as a strategy for determining which partners are “safer” than others to minimize their risk. However, this and other types of serosorting behaviors are not an efficient means of HIV prevention (Eaton, et al., 2009), and the majority of new HIV infections occur in the context of these types of main or serious partners (Sullivan, et al., 2009). As such, this strategy of using familiarity with partners to make decisions about condom use leaves Black MSM at risk for HIV acquisition despite lower rates of unprotected sex overall.

Having older sexual partners also emerged as a significant predictor of increased odds of UAVI amongst young and Black MSM, and this finding is consistent with previous research (Bingham, et al., 2003; Mustanski, et al., 2011). In fact, the MSM in this sample who were both younger *and* Black were the most likely to have UAVI with older partners, and this is the demographic group that is currently experiencing the highest rates of new HIV infections. Considering that Black MSM were approximately 11 times more likely than other racial groups to have other Black partners and appear to use familiarity with partners to determine risk of HIV acquisition, the combined effects of partner age, familiarity with partners, and sexual homophily are likely some of the driving forces behind racial disparities in HIV incidence. It has been proposed that racial disparities in HIV acquisition may be explained by the presence of tight-knit sexual networks of Black MSM that are dominated by older men (Clerkin, et al., 2011; Millett, et al., 2006), and this theory is supported by the findings of the current study. While Black MSM use condoms more frequently than other racial groups overall, the influence of partner age and familiarity within these sexual networks would allow the virus to travel through the network at a more rapid pace compared to the larger and less homophilous sexual networks of White MSM.

Amongst Latino MSM, a more perplexing pattern emerged with regard to sexual partnership characteristics as predictors of sexual risk behavior. Overall, Latino MSM were the racial group most likely to engage in UAVI during the 12-week assessment period. What's more, these men were also more likely to have UAVI with partners they perceived to be HIV+, and they were almost three times more likely than any other racial group to have other Latino sexual partners. Few studies have investigated the prevalence of serosorting behavior in Latino MSM specifically, but some evidence indicates that Latino MSM engage

in serosorting behavior (including having unprotected sex with HIV+ or unknown status partners) more frequently than Black MSM (Marks et al., 2009; 2010). Furthermore, another recent study indicates that some Latino MSM hold the belief that having partners of their same race reduces the risk of HIV transmission, regardless of partner's actual HIV status (Millett et al., 2011). While it remains unclear how these behaviors and beliefs may be influencing the elevated transmission risk behavior in Latino MSM found in the current study, it appears that a number of factors influence decisions about condom use in this population in addition to perceptions of serostatus. This represents a challenging and worrisome patterning of behavior amongst Latino MSM that deserves further attention.

One possibility is that Latino MSM may be more likely to be in serious relationships with HIV+ partners. In the current study, follow-up analysis indicated that participants who had HIV+ partners were significantly more likely to be in a "serious" relationship with these partners, and this effect was particularly strong in Latino MSM. It may be that limited partner availability in this population and/or discrimination in partner selection leads to a higher likelihood of Latino MSM getting into serious relationships with HIV+ partners. Given that unprotected sex is more likely with serious or main partners (Sullivan, et al., 2009), this would help to explain the positive association between having HIV+ partners and UAVI in the current study.

Alternatively, this increased risk behavior amongst Latino MSM may also be influenced by elevated rates of substance use prior to sex. In the current study, Latino MSM had the highest rates of substance use prior to sex, (see below for a discussion of these substance use effects) and previous research has found that HIV+ Latino MSM were more likely than other racial groups to have serodiscordant unprotected sex in part due to elevated

rates of substance use (Bedoya et al., 2011). It is also possible that a variety of other third variables not evaluated in the current study may contribute to risk behavior in Latino MSM (e.g., cultural differences in sex role positioning) or that other cognitive processes might mediate this risk behavior (e.g., internalized shame/stigma about same-sex sexual behavior). Interestingly, across all racial groups participants were more likely to have unprotected sex with Latino partners compared to all other racial groups. It may be that having unprotected sex with Latino partners is eroticized in the MSM population, and subsequently, Latino MSM are more influenced by their partners' desires for condom use or non-condom use compared to other groups. Further research is needed to identify the variables that predict or mediate this increased risk taking behavior amongst Latino MSM.

A variety of sexual partnership characteristics were unrelated to the odds of UAVI in the current sample. Previous research has found that MSM are more likely to use condoms with Black partners (Clerkin, et al., 2011) and has hypothesized that condom use is more likely with Black partners because MSM perceive these partners as more likely to be HIV+. The current analyses did not support these findings, and having Black partners was not associated with likelihood of condom use. Relationship status with partners was also unrelated to the odds UAVI with these partners. Given that this study recruited specifically for single or non-monogamous MSM, there was likely insufficient variability in relationship status to detect effects, and number of previous sexual encounters with partners was a better measure of the effect of "familiarity" on condom use. Finally, partner's perceived HIV status was unrelated to the odds of UAVI. While this finding seems counterintuitive and HIV- MSM would be expected to use condoms more frequently with partners they perceive to be

HIV+, the finding amongst Latino MSM that they were more likely to have UAVI with HIV+ partners likely impacted the ability to detect this effect for the sample as a whole.

### **B. Model #2: Substance Use and Sexual Risk**

The effects of alcohol and substance use on sexual risk in the current study largely replicated previous findings, but the diversity of the sample and comprehensive evaluations of types and amount of substances used provides a more comprehensive and nuanced picture of the influence of these effects than has been reported previously. The relationship between alcohol use and sexual risk in MSM has been equivocal in the literature, but in the current study, alcohol use predicted an increased likelihood of UAVI for the sample as a whole. Many previous studies of this relationship were either cross sectional or evaluated drinking prior to sex with a dichotomous variable, and the question remained as to whether or not the quantity of alcohol consumed prior to sexual encounters would influence condom use. Our analyses, however, accounted for the number of drinks consumed prior to each sexual encounter across the 12-week assessment period, indicating that previous studies may have failed to find statistical significance due to lack of precision in measurement.

The results of the current analyses of alcohol use and sexual risk also support previous work indicating that the effect of drinking on sexual risk is not consistent across all groups of MSM (Newcomb, et al., 2011). More specifically, MSM who were younger, Latino (statistical trend), higher in sensation seeking, and drank less on average all had stronger positive associations between alcohol use and UAVI. The findings for MSM who were higher in sensation seeking and drank less on average are consistent with previous work on young MSM (Newcomb, et al., 2011) and adult MSM (Kalichman, et al., 1998). However, the moderating effect of age on the association between drinking and UAVI

contradicts a previous finding using a similar daily diary methodology. Mustanski's (2008) previous work found the opposite moderating effect: older MSM had a stronger positive association between drinking and sexual risk. However, the current study used a younger sample that contained a much higher proportion of MSM under the age of 21 and therefore may have been more sensitive to developmental influences on the association between drinking and sexual risk.

This moderating effect of age on the association between drinking and UAVI also falls in line with predictions made by alcohol myopia theory (Steele & Josephs, 1990). More specifically, younger MSM are likely more prone to the cognitive impairment in decision-making and risk appraisals that are experienced by individuals while under the influence of alcohol. For younger MSM, particularly those in the adolescent and emerging adult developmental stages, cognitive development in the frontal lobes is ongoing, and subsequently their ability to evaluate the long-term consequences of risk behaviors has not yet fully developed (Steinberg, 2008). Intoxication from alcohol consumption would compromise this ability even more, and could theoretically lead to increased odds of unprotected sex. Further investigation is needed to more clearly understand these divergent findings of age differences in the association between drinking and sexual risk in MSM.

A large body of research has identified substance use as one of the most consistent predictors of sexual risk amongst MSM (Drumright, Patterson, et al., 2006; Mustanski, et al., 2011). The findings from the current study support this previous work and extend previous findings by simultaneously evaluating the influence of multiple substances on sexual risk in the same sample. Overall, stimulants (including cocaine, amphetamines, and methamphetamine) were the drugs that were most strongly associated with UAVI when used

prior to sex. Interestingly, use of club drugs prior to sex was not associated with odds of UAVI in this sample, which contradicts a large body of previous research (Drumright, Patterson, et al., 2006). However, most of these studies have included amphetamines and methamphetamine in the club drug category. These drugs are most accurately described as stimulants, and they have been found to be strongly associated with unprotected sex in MSM. The current analyses indicate that other club drugs, such as ecstasy, MDMA, and ketamine, may have a weaker association with sexual risk.

The current study also evaluated the effect of polysubstance use prior to sex on UAVI, and diary methodology and multilevel analyses allowed for the evaluation of the incremental increase in risk for each additional substance used prior to sex. While different substances likely vary in their relative influence on risk, the current analyses revealed a substantial increase in the odds of UAVI for each additional substance used prior to sex (i.e., 20% increase). It should also be noted that there were no significant group differences in any of these effects, but Latino MSM reported significant higher rates of substance use prior to sex than all other racial groups. Substance use remains a major contributor to sexual risk behavior in MSM, and it appears to affect all MSM regardless of demographic group or personality characteristics.

Finally, sexual enhancement expectancies for alcohol and substance use were not significant predictors of sexual risk, and these variables also did not moderate the associations between alcohol/substance use and odds of UAVI. This contradicts Kalichman's (1998) previous work, and there are several potential explanations for these null findings. One possibility is that sexual enhancement expectancies are better described as mediators through which alcohol and substance use predict sexual risk, and these variables

do not predict group differences in substance use and sexual risk (i.e., moderating effects). However, if these variables are in fact mediators, then we would expect their main effects on sexual risk to be significant in analyses. Alternatively, Kalichman's mediation findings were in a sample of MSM that was significantly older than the current sample, and it is possible that the cognitive mechanisms through which alcohol and substance use exert their effects on sexual risk change across development. A more nuanced moderated mediation analysis would be required to determine whether there are group differences (e.g., by age or race) in this mediation effect.

### **C. Model #3: Affective Influences on Sexual Risk**

Few significant findings emerged from the model investigating affective influences on sexual risk. Overall, sexual activation was the only component of trait affect that was related to odds of UAVI, and odds of unprotected sex were higher in individuals with higher trait sexual activation. Trait positive and negative activation were both unrelated to the odds of UAVI.

Inconsistent with previous research (Mustanski, 2007b), MSM in the current study with higher levels of trait sexual activation were more likely to have UAVI with their partners. Previous research has indicated that MSM with high trait sexual activation do not engage in more sexual risk behavior. However, being sexually activated at the state level predicted increased likelihood of UAVI, a finding that is consistent with Mustanski's previous work. These findings indicate that it is important to consider both trait and state components of this affective dimension in predicting risk behavior, but approaches for addressing these components of affect in behavioral interventions would likely differ. It may be that trait sexual activation behaves more likely a stable personality characteristic, similar

to sexual sensation seeking which has been found to be associated with sexual risk (Kalichman, et al., 1998), and that it differentiates between individuals who are more risk-prone overall. This warrants further investigation to reconcile equivocal findings. On the other hand, high state sexual activation may impede rational decision-making processes and potentiate sexual risk behavior (Mustanski, 2007b). The absence of a significant interaction between trait and state sexual activation in these analyses suggests that the effects of acute sexual activation on likelihood of sexual risk are consistent across all levels of trait sexual activation. As such, all MSM would benefit from monitoring the effects of acute sexual activation on judgment and behavioral risk decisions. Both of these components of sexual activation are important targets for behavioral intervention.

In terms of positive activation, analyses revealed a relatively large effective size for a protective effect against odds of UAVI, but this effect failed to reach statistical significance. However, findings were opposite for state positive activation, and higher levels of state positive activation actually *increased* the odds of engaging in UAVI. This finding contradicts Mustanski's (2007b) previous research, which found a negative association between state positive activation and unprotected sex. While this might appear contradictory, it may be that trait and state positive activation represent two independent constructs. In terms of trait positive activation, it would follow that MSM who are "happier" overall would be more likely to engage in self-care behaviors, such as condom use (Allgower, Wardle, & Steptoe, 2001). However, having increased state positive activation may actually induce overly optimistic beliefs about the consequences of riskiness of behaviors, similar to those experienced by individuals in a hypomanic state. Further investigation of these effects is warranted in order to determine: a) if the protective effect of trait positive activation failed to

reach significant due to analyses being under-powered, and b) to reconcile the contradictory findings for state positive activation between the current study and previous findings.

Negative activation was unrelated to sexual risk in this sample, a finding that is consistent with Mustanski's (2007b) work. Unfortunately, we were unable to evaluate the effects of anxious arousal on sexual risk because the items of this measure loaded more strongly on the negative activation scale. As such, Mustanski's previous finding for a positive association between state anxious arousal and risk could not be replicated in these analyses. Further investigation is necessary to better understand why the factor structure of these affect components differed in the current study from previous work.

It should be noted that the design of the current study likely limited the ability to detect the effects of state affect on risk given the weekly survey methodology that was utilized. Participants' ability to recall these complex components of affective states up to seven days after they occurred was likely prone to memory bias. Moreover, recall of state affect may also have been influenced by a variety of other situational factors surrounding sexual encounters, such as substance use, partnership characteristics, and other events that occurred between the sexual encounter and the completion of the weekly diary. Daily diary methodology or ecological momentary analysis would be more sensitive to the influence of these fleeting affective states on sexual risk.

Also notable in the analyses of affective influences on sexual risk was that there were no group differences in these effects based on participant race or age. Population-based research in the United States has found that prevalence of affective disorders is significantly lower amongst Black and Latino persons (Breslau et al., 2006; Riolo, Nguyen, Greden, & King, 2005) and onset of these disorders is more common amongst adolescents and young

adults (Kessler et al., 2005). However, our analyses indicate that the effects of these affective experiences on behavior do not differ between groups but may occur more frequently in some racial and developmental groups.

**D. Model #4: Information, Motivations, Behavioral Skills (IMB) and Sexual Risk**

Analysis of the influence of the components of the IMB model on sexual risk revealed that multiple cognitive processes have an influence on sexual risk either directly or through appraisals of the riskiness of sexual encounters. Condom use self-efficacy, social norms of condom use, motivation to stay safe, and intentions to use condoms all had significant direct effects on UAVI when analyzed separately, but condom use self-efficacy and social norms of condom use were the two strongest effects when all four components of the IMB model were entered into HLM simultaneously (though the effect for social norms of condom use was a statistical trend). These analyses indicate that while motivation and intentions may contribute to the desire to engage in safer sex, the most robust predictor of actual condom use is likely self-efficacy (i.e., confidence in one's ability to use condoms effectively in sexual situations). This finding is supported by the research literature (Berg, 2008; Chesney, et al., 2003; Diaz, et al., 1996; Dilley, et al., 1998; Kok, et al., 2007; Mao, et al., 2004; Waldo, et al., 2000; Zea, et al., 2005). Furthermore, perceived social norms of condom use (including peer/community, family, and healthcare provider norms) had a strong protective effect against UAVI when analyzed individually, but this effect was dampened somewhat in the full model. While condom use self-efficacy was a stronger predictor of sexual risk in this sample, it seems that sexual risk behavior is likely also influenced by the condom use beliefs of peers and loved ones, and the influence of this effect was stronger than that of the individual's own motivation to use condoms.

In addition to the above-mentioned direct effects, several other cognitive processes were associated with the risk appraisals of sexual encounters. More specifically, HIV knowledge, perceived severity of HIV infection (i.e., consequences of infection), motivation to stay safe, and baseline appraisals of risk moderated the relationship between actual sexual risk behavior (i.e., UAVI) and the risk appraisals of these encounters. MSM with more motivation to stay safe and who scored higher on perceived severity of HIV infection appraised their UAVI as *less* risky than individuals who scored lower on both of these cognitive variables. At first glance this seems counterintuitive: one would expect that individuals who are highly motivated to stay safe and who consider the consequences of HIV infection to be more severe would be more hypervigilant about sexual risk and would therefore evaluate any unprotected sexual encounters as very risky. However, given that the risk appraisals were administered after the unprotected sexual encounter had occurred, the individuals who had a stronger desire to use condoms and stay HIV-negative may have been downplaying the riskiness of their unprotected sexual encounters. Using a cognitive dissonance framework (Festinger, 1957), this process of downplaying risk appraisals to better match their values and minimize distress associated with risk behavior makes sense. Moreover, this process of minimizing risk appraisals following episodes of unprotected sex may potentially promote future episodes of sexual risk behavior and provides an important target for cognitive interventions.

Two other cognitive variables had significant moderating effects on the association between UAVI and risk appraisals of these encounters: HIV knowledge and baseline appraisals of risk. MSM with more HIV knowledge and who evaluated their previous sexual behavior as riskier at baseline evaluated their UAVI encounters as significantly riskier during

the 12-week assessment period compared to individuals who scored lower on both of these cognitive variables. In terms of the moderating effect of HIV knowledge, this finding confirms previous hypotheses that HIV knowledge is a necessary but not sufficient component of reducing sexual risk. While HIV knowledge did not have a direct effect on odds of UAVI, individuals with more knowledge were able to make more accurate appraisals of the risk associated with their unprotected sexual encounters, which is a necessary component of behavior change. Furthermore, MSM who endorsed riskier past sexual behavior at baseline appeared to be more accurate in appraising the risk associated with their UAVI encounters than MSM who rated their previous behavior as less risky. The MSM who are less risky on average, on the other hand, may minimize the risk associated with unprotected sex when it occurs. Alternatively, it is also possible that certain MSM rate all their sexual behavior as “low risk”, regardless of whether or not a condom was used. Regardless, it is clear that risk appraisals are not always accurate, and increasing HIV knowledge and perceived vulnerability to HIV infection may help improve the accuracy of these appraisals and help contribute to long-term behavior change.

Overall, the current analyses indicate that cognitive processes are critical components of sexual risk behavior, but these variables contribute to risk-taking behavior in a variety of ways. While certain cognitive processes and behavioral skills (most notably condom use self-efficacy) have strong direct effects on sexual risk, others have more indirect influences on risk through risk appraisals of sexual encounters. In fact, some MSM appear to make cognitive errors (i.e., misappraisals of riskiness) when evaluating the riskiness of their sexual behavior. As we move forward to further investigate these influences and develop effective risk reduction interventions, we must consider the influence of multiple cognitive processes

and address both direct influences on sexual risk behavior and influences on our risk appraisals. Both of these intervention targets may be necessary for effective long-term behavior change.

### **E. General Conclusions**

As a whole, analysis of the four models of situational influences and group differences in sexual risk in this diverse sample of MSM revealed that there are multiple influences on sexual risk in this population and that MSM are highly variable in their sexual risk behavior over time. In fact, most predictors did not exert their effects in the same manner for all groups of MSM, and few within- and between-persons direct effects emerged as significant in these analyses. Not surprisingly, substance use prior to sex was a significant predictor of UAVI across all MSM, and stimulant and polysubstance use exerted particularly strong effects. Additionally, having female and Latino sexual partners was associated with higher odds of UAVI at the event-level. Finally, having higher levels of condom use self-efficacy and perceived social norms of condom use provided protective effects against sexual risk. Overall, the results point to the importance of considering both situational and group difference variables in predicting which MSM will engage in sexual risk in which contexts.

Several important group differences in sexual risk behavior emerged from these analyses. Some of these findings were consistent with previous research while others represent novel findings. Overall, Black MSM reported significantly less UAVI than other racial groups over the course of the 12-week assessment period, but this group was particularly influenced by partner age and familiarity with partners when making decisions about condom use. Black MSM were also approximately 11 times more likely than other groups to have Black sexual partners. Taken together, these findings help to explain racial

disparities in HIV incidence and lend support to emerging evidence suggesting that sexual network factors underlie the disproportionately high incidence of HIV in Black MSM.

More perplexing, however, were the findings that Latino MSM reported the highest rates of UAVI and were more likely to have unprotected sex with partners they perceived as more likely to be HIV+. Given that many of the other findings from the current analyses were in the expected direction, this increased risk behavior in Latino MSM is likely not a result of measurement error. However, a variety of other variables (e.g., sexual homophily, relationship status, discrimination in partner selection, alcohol and substance use prior to sex) are likely influencing these perplexing effects and may be mediating the association between perceived sero-positivity and sexual risk (e.g., a higher likelihood of being in serious relationships with HIV+ partners). This concerning finding requires further investigation in the literature.

Several stable affective variables and personality characteristics also emerged as important group differences in determining sexual risk patterns of MSM. Trait sexual activation (i.e., average degree of sexual arousability and sexual interest) provided a direct effect in predicting increased odds of UAVI, and trait positive affect appeared to provide a protective effect against UAVI (though this effect did not reach statistical significance). Additionally, sensation seeking helped to delineate for whom alcohol use prior to sex predicted UAVI (high sensation seekers were more likely to have unprotected sex while under the influence of alcohol). Taken together, these findings indicate that stable personality traits and measures of more stable trait-like affective functioning have both direct effects on sexual risk as well as help to predict for which MSM certain situational variables will exert the strongest influence on condom use. The ability to predict these group

differences in risk a priori could have a profound impact on the effectiveness of risk-reduction intervention efforts that often need to be tailored based on these group difference variables.

One of the primary aims of the current study was to determine developmental influences on predictors of sexual risk. Unfortunately, few developmental differences were uncovered, which leaves many questions unanswered as to what factors account for the elevated HIV incidence rates amongst young MSM. However, two important findings emerged from analyses of developmental influences on risk. First, having older sexual partners increased the odds of UAVI for young Black MSM. This is a particularly important finding considering that the group with the highest rates of HIV incidence currently is young Black MSM (ages 13-29). Additionally, younger MSM had a stronger positive association between drinking and UAVI. This finding contradicts some previous research (B. Mustanski, 2008), and represents an area for future investigation and a potentially important target for risk reduction interventions. The lack of additional developmental differences in risk may be related to sampling bias. Although the current study enrolled a relatively young sample ( $M = 27.53$ ,  $SD = 7.33$ ) and had a substantial proportion of MSM under the age of 18 (9.1%), inclusion criteria required that MSM not be in a sexually-monogamous relationship and had oral or anal sex with another man during the six months prior to baseline. Given that young MSM tend to be less sexually active on average and that there is some evidence that these young people tend to define their relationships as “serious” and possibly monogamous much more quickly than older MSM (Sullivan et al., 2009), the sample from the current study may not have been representative. The factors predicting sexual risk amongst these “serially monogamous” young MSM may differ from the effects found in this study.

The current study provides a number of important avenues for future research on sexual risk in MSM, and it is clear that a number of important research questions remain unanswered. First, this study expands on previous research supporting the utility of daily diary methodology in assessing sexual behavior in MSM and confirms that it is feasible to enroll a diverse sample of MSM recruited entirely online into a weekly diary study that spans three months while maintaining high retention rates across the 12 weeks of follow-up. This extension to a three-month follow-up with high retention is an important development to diary methodology as it allows for the observation of a greater number of sexual encounters and increases the likelihood of change in behavior within-persons over time. Given that the weekly diary methodology may suffer from some bias in recall across the one-week assessment period, though, an effective approach for more accurately assessing all situational predictors of risk may be a hybrid approach. Such an approach might first enroll participants into a single month of daily diaries followed by weekly diary follow-ups over the course of the subsequent assessment period. Furthermore, incorporating a period of ecological momentary assessment (EMA) through the use of mobile technology may help to assess certain situational variables in-vivo that are more prone to memory bias (e.g., affective states).

Another important next step for research on situational predictors of sexual risk in MSM using sexual diary methodology is to expand recruitment to MSM who identify as being in sexually monogamous relationships. The majority of new HIV infections in MSM occur in the context of serious relationships (Sullivan et al., 2009), and it is vital that we include this group of MSM in future studies of situational risk factors. This may also help to obtain a more representative sample of young MSM who are more likely to endorse being in

a serious or monogamous relationship for brief periods of time (i.e., serial monogamy) and therefore may not have been effectively recruited into the current study. While this would require a larger sample size in order to have enough power to detect group differences in effects by relationship status, it would provide a more nuanced picture of predictors of risk behavior for the MSM population as a whole.

Finally, the sexual network factors that are likely underlying the disproportionate number of new HIV infections amongst Black MSM are currently not well understood. While this and other studies point to the importance of considering these network factors (e.g., Clerkin, et al., 2011; Millett, Flores, Peterson, & Bakeman, 2007), little is known about the interpersonal dynamics of these networks or the feasibility of group- or structural-level interventions to help mitigate this increased risk. It is clear that researchers need to identify key stakeholders and informants in the Black MSM community in order to evaluate the acceptability and feasibility of intervention strategies with this group. Furthermore, qualitative research may allow the field to better delineate targets for intervention within these networks.

The results of the current study provide a number of important implications for intervention development and implementation. When it comes to HIV prevention and intervention for MSM, it seems that one size does not fit all. Given the many group differences in influences on sexual risk behavior, it is clear that comprehensive assessment of all risk-related domains (e.g., partnership characteristics, alcohol/substance use, affective/mental health functioning, cognitive processes) is necessary in order to tailor intervention content to the individual or group to which the treatment is being delivered. In fact, the methodology used in the current study could be adapted to facilitate uncovering

individual patterns of risk to be targeted in interventions. Technology, including mobile technology, is becoming an increasingly important and viable tool for both assessment and intervention, and the use of technology may help facilitate the tailoring of intervention content more efficiently in order to deliver interventions that are individualized enough to meet the needs of the individual without compromising treatment efficacy.

Given the complexity of the variables that contribute to risk behavior amongst MSM, it is prudent to integrate existing efficacious intervention strategies into a more unified and comprehensive sexual risk reduction intervention protocol that can be adapted based on the unique needs of the individual. More specifically, cognitive intervention strategies may be effective in challenging erroneous beliefs related to risk appraisals of sexual encounters, but it is unlikely that all MSM who are at risk for acquiring HIV have such beliefs. Cognitive-behavioral strategies may also be effective in addressing the links between thoughts, behaviors, and emotions; for example, the presence of high state positive and sexual activation may influence thoughts related to risk appraisals and subsequently influence risk behavior.

Implementation of alcohol and substance use interventions may also be warranted for some at-risk MSM, and the results of this study indicate that addressing stimulant and polysubstance use is a critical component of prevention strategies. Most recently, a number of interventions have been developing for methamphetamine-using MSM (Rajasingham et al., 2012; Shoptaw et al., 2005; Stall, Paul, Barrett, Crosby, & Bein, 1999), and a variety of other prevention interventions have incorporated strategies for preventing HIV acquisition in the context of alcohol and substance use (see Johnson et al., 2008). Again, comprehensive assessment of the individual's risk factors and psychosocial concerns is a critical component

of developing an effective intervention strategy. As such, the content of the risk-reduction intervention delivered to one MSM may diverge significantly from that delivered to another, but a comprehensive intervention protocol would allow for this degree of tailoring without sacrificing efficacy.

Finally, the results of this study echo some recent findings that the development of couples- or dyad-based interventions is a critical next step in preventing HIV acquisition, particularly amongst young and Black MSM (Mustanski, et al., 2011; Sullivan, et al., 2009). Characteristics of sexual partners, as well as the dynamics of the relationships with these partners, seem to play an important role in influencing safer sexual behavior. In some situations, partnership characteristics may influence risk because MSM make decisions about condom use based on certain partner characteristics (e.g., gender, relationship status). In other dyads, however, certain MSM may have less agency in making decisions about condom use with certain types of partners (e.g., age disparities, power dynamics). Couples-based interventions may help MSM to navigate these complex interpersonal issues in order to make more effective decisions about sexual behavior and condom use, though the feasibility and efficacy of these types of interventions have yet to be determined.

#### **F. Study Limitations**

All study results and implications must be considered within the context of several important limitations. First, there are certain limitations inherent in online recruitment, and it is not possible to fully determine whether participants are “faking eligibility” based on perceived eligibility criteria. In order to reduce this possibility, eligibility criteria were not listed in online recruitment advertisements, and multiple questions were administered for a single inclusion criterion in order to measure inconsistencies in responses. Similarly, when

recruiting participants online it is also not possible to know with certainty whether a participant has enrolled in the study more than once. IP addresses were collected for all individuals who completed the screening questionnaire as well as multiple forms of contact information, and these pieces of information were cross-referenced in order to prevent double enrollment. Two research participants were identified as having enrolled in the study twice using the approach described above and were subsequently removed from the study.

Second, all data for this study were collected online. Online data collection has certain advantages because it is efficient and allows participants to complete assessments wherever they feel most comfortable. There is also some evidence that online data collection is just as accurate as in-person data collection, and it may be perceived as more anonymous and may reduce the effect of social desirability (Gosling, Vazire, Srivastava, & John, 2004). However, it is not possible to control the environments in which participants were completing online assessments, and it is not possible to know whether these environments were conducive to accurate data collection.

Third, the weekly diary approach to data collection has some methodological limitations. While administering weekly diaries instead of daily diaries allowed for the extension of this methodology past the typical one month assessment period to three months, weekly diary assessments are likely more prone to bias in recall than daily diaries. This may be less problematic for certain variables assessed in the diaries that are more strongly activated by episodic memories (e.g., certain partnership characteristics, condom use), but other situational variables, such as affective states, may be more difficult to recall with accuracy across the one-week time span.

Fourth, the current study utilized strict inclusion criteria, and we did not include MSM who were in sexually-monogamous relationships, were HIV+, or who had not had oral or anal sex with a man in the six months prior to baseline interview. These criteria were used in order to: a) increase the likelihood that participants would have multiple sexual encounters and/or sexual partners in the three month assessment period, and b) to avoid confounding predictors of risk that are specific to MSM who are HIV+ and/or in sexually monogamous relationships. However, not including these groups may alter the representativeness of the sample, and our results cannot be generalized to the MSM community as a whole. Currently, the majority of new HIV infections occur within the context of serious relationships (Sullivan, et al., 2009), which points to the importance of supplementing sexual diary research with dyad-based research methodology that observes multiple sexual episodes from the perspectives of both members of the dyad.

Fifth, the exclusion of MSM who were in sexually-monogamous relationships and who had not had sex within the six months prior to eligibility screening may have compromised the representativeness of the young MSM in this study, and it may have impacted our ability to detect developmental differences in predictors of sexual risk. Young MSM, particularly those who are under age 18 or who are still living at home, may have less access to sexual partners and may therefore not have met inclusion criteria. There is also some indication that young MSM are more likely to endorse having serious or monogamous relationships for brief periods of time (i.e., serial monogamy). Our inclusion criteria may have made it difficult for these young MSM to be enrolled in the study, and these MSM may be particularly vulnerable to the sexual partnership characteristics that influence unprotected sex.

Finally, due to limitations in the scope of the current project, it was not possible to assess all baseline psychosocial variables that may either contribute directly to sexual risk behavior or help delineate groups of MSM that are more vulnerable to certain situational predictors of risk. A broader evaluation of mental health functioning, victimization experiences, and coping strategies (to name a few) may have provided a more comprehensive evaluation of risk behavior amongst MSM and allowed more nuanced analyses.

### **G. Concluding Statement**

These limitations notwithstanding, the current study marks an important contribution to the literature on sexual risk behavior in MSM as well as an advance in sexual risk assessment procedures and methodology. Sexual risk behavior shows wide variability both between- and within-persons over time, and with few exceptions, predictors of sexual risk do not do so consistently for all groups of MSM. As the HIV/AIDS epidemic continues to evolve and predictors of sexual risk behavior continue to shift in their predictive ability, it is critical that we develop novel risk assessment tools and intervention strategies to address the individual needs of members of this population. The results of this study confirm that several key variables consistently predict sexual risk behavior in MSM (e.g., substance use) and point to novel targets for further research and intervention development (e.g., sexual network factors, cognitive processes). If we ever hope to come to a more complete understanding of sexual risk behavior in MSM, we must evaluate multiple domains of behavior that influence sexual risk, including both situational factors as well as group differences in risk. In order for intervention strategies to be efficacious, we cannot fail to account for these critical factors.

TABLE 1

**PARTICIPANT DEMOGRAPHICS: MEN WHO HAVE  
SEX WITH MEN RECRUITED ONLINE, 2011**

Variable	% of Full Sample <i>N</i> (%)	% of Analytic Sample <i>N</i> (%)
<b>Age</b>		
16-24	59 (41.3)	57 (41.6)
25-30	36 (25.2)	33 (24.1)
31-40	48 (33.5)	47 (34.3)
Mean ( <i>SD</i> )	27.53 (7.33)	27.54 (7.40)
<b>Race/Ethnicity</b>		
White/Caucasian	53 (37.1)	50 (36.5)
Black/African American	32 (22.4)	31 (22.6)
Hispanic/Latino	39 (27.3)	37 (27.0)
Asian/Pacific Islander	6 (4.2)	6 (4.4)
Other or Multi-Racial	13 (9.1)	13 (9.5)
<b>Sexual Orientation</b>		
Gay	111 (77.6)	106 (77.4)
Bisexual	29 (20.3)	28 (20.4)
Heterosexual (same-sex attracted)	3 (2.1)	3 (2.2)
<b>Geographic Region</b>		
Northeast	37 (25.9)	36 (26.3)
Midwest	40 (28.0)	37 (27.0)
West Coast	42 (29.4)	40 (29.2)
South/Southeast	24 (16.8)	24 (17.5)

TABLE II

## FACTOR LOADINGS FROM FACTOR ANALYSIS OF TRAIT AFFECT ITEMS

Affect Component	Negative Activation (NA)	Sexual Activation (SA)	Positive Activation (PA)
Alert	-.027	.204	.343
Afraid	.710 <sup>a</sup>	-.176	-.119
Discouraged	.694 <sup>a</sup>	-.020	-.108
Guilty	.637 <sup>a</sup>	-.163	-.110
Inspired	.153	.337	.573 <sup>a</sup>
Anxious	.607 <sup>a</sup>	.098	-.559
Upset	.603 <sup>a</sup>	-.279	-.048
Excited	.239	.517	.389
Nervous	.604 <sup>a</sup>	-.043	-.095
Keyed Up	.461	-.150	.041
Enthusiastic	.345	.332	.461 <sup>a</sup>
Scared	.640 <sup>a</sup>	-.140	-.053
Sexually Aroused	.148	.781 <sup>a</sup>	-.470
Determined	.285	.372	.552 <sup>a</sup>
Distressed	.707 <sup>a</sup>	-.022	-.092
Relaxed	.206	.272	.518 <sup>a</sup>
Ashamed	.617 <sup>a</sup>	.083	-.059
Jittery	.436	-.100	.152
Sluggish	.576 <sup>a</sup>	-.302	.059
Horny	.129	.739 <sup>a</sup>	-.484
Depressed	.599 <sup>a</sup>	-.065	-.068
Sexually Interested	.205	.772 <sup>a</sup>	-.305
Stressed	.490	-.119	.142

NOTE: Loadings were computed using principal components analysis with varimax rotation.

<sup>a</sup>Item was included in the scale.

TABLE III

## SEXUAL PARTNERSHIP CHARACTERISTICS AND SEXUAL RISK

Fixed Effect	Odds Ratio	Confidence Interval	Coefficient Value	Standard Error	<i>t</i> Ratio	<i>df</i>	<i>p</i> value
Intercept	0.23	0.13 – 0.41	-1.473	0.292	-5.032	123	*<.001
Age	1.00	0.96 – 1.04	-0.001	0.022	-0.057	123	.995
Race (Black v. Other)	0.32	0.15 – 0.68	-1.154	0.388	-2.975	123	*.004
Race (Latino v. Other)	0.93	0.45 – 1.94	-0.070	0.369	-0.190	123	.849
Partner Gender	4.40	2.06 – 9.40	1.482	0.387	3.828	5005	*<.001
Partner Race (Black v. Other)	1.03	0.67 – 1.61	0.033	0.225	0.148	5005	.883
Partner Race (Latino v. Other)	1.57	1.08 – 2.28	0.449	0.192	2.338	5005	*.019
Partner Age	1.01	0.86 – 1.18	0.008	0.079	0.098	5005	.922
Age	0.99	0.97 – 1.01	-0.012	0.008	-1.299	5005	.194
Race (Black v. Other)	1.34	1.03 – 1.73	0.289	0.132	2.187	5005	*.029
Race (Latino v. Other)	0.82	0.60 – 1.13	-0.200	0.163	-1.222	5005	.222
Num. Previous Encounters	1.00	0.98 – 1.01	-0.005	0.007	-0.629	5005	.529
Age	1.00	1.00 – 1.00	0.001	0.001	0.296	5005	.767
Race (Black v. Other)	1.04	1.01 – 1.07	0.038	0.013	3.008	5005	*.003
Race (Latino v. Other)	1.01	1.00 – 1.00	0.005	0.014	0.344	5005	.731
Perceived HIV Status	1.12	0.83 – 1.15	0.109	0.154	0.709	5005	.479
Relationship with Partner	1.08	0.90 – 1.28	0.073	0.089	0.817	5005	.414
Online v. Offline	0.84	0.51 – 1.39	-0.172	0.257	-0.669	5005	.504

NOTE: Results presented are from the full trimmed model. Asterisks denote statistical significance at  $p < .05$ .

TABLE IV

## ALCOHOL USE AND SEXUAL RISK

Fixed Effect	Odds Ratio	Confidence Interval	Coefficient Value	Standard Error	<i>t</i> Ratio	<i>df</i>	<i>p</i> value
Intercept	0.25	0.15 – 0.42	-1.402	0.268	-5.222	122	*<.001
Age	1.02	0.98 – 1.07	0.021	0.023	0.941	122	.348
Race (Black vs. Other)	0.49	0.24 – 0.98	-0.716	0.352	-2.036	122	*.044
Race (Latino vs. Other)	1.31	0.69 – 2.47	0.267	0.323	0.827	122	.410
Sensation Seeking	1.58	0.79 – 3.16	0.458	0.349	1.315	122	.191
Baseline Alcohol QF	1.01	0.99 – 1.02	0.007	0.005	1.375	122	.172
Drinking Prior to Sex	1.15	1.04 – 1.28	0.143	0.052	2.749	1035	*.006
Age	0.99	0.98 – 0.99	-0.011	0.005	-2.160	1035	*.031
Race (Black vs. Other)	1.03	0.92 – 1.15	0.027	0.056	0.479	1035	.632
Race (Latino vs. Other)	1.11	1.00 – 1.24	0.105	0.056	1.886	1035	.060
Sensation Seeking	1.16	1.05 – 1.28	0.148	0.050	2.938	1035	*.003
Baseline Alcohol QF	0.99	0.99 – 0.99	-0.006	0.001	-6.176	1035	*<.001
Alc. Expectancies	1.08	0.98 – 1.19	0.078	0.049	1.589	1035	.112
Partner Gender	4.92	2.14 – 11.32	1.592	0.425	3.748	1035	*<.001
Num. Previous Encounters	1.00	0.99 – 1.01	0.004	0.003	1.349	1035	.178

NOTE: Results presented are from the full trimmed model. Asterisks denote statistical significance at  $p < .05$ .

TABLE V

## SUBSTANCE USE AND SEXUAL RISK

Fixed Effect	Odds Ratio	Confidence Interval	Coefficient Value	Standard Error	<i>t</i> Ratio	<i>df</i>	<i>p</i> value
Any Drug Use	1.24	1.04 – 1.49	0.218	0.093	2.349	1042	*.019
Stimulant Use	1.40	1.05 – 1.88	0.339	0.148	2.295	1042	*.022
Club Drug Use	0.85	0.28 – 2.62	-0.164	0.575	-0.286	1042	.775
Polysubstance Use (ERR)	1.20	1.06 – 1.36	0.183	0.065	2.823	1042	*.005

NOTE: All effects were entered separated into HLM to avoid issues of collinearity. The Event Rate Ratio (ERR) was used as the effect size statistical for polysubstance use as this was a count variable. Asterisks denote statistical significance at  $p < .05$ .

TABLE VI

## AFFECTIVE INFLUENCES ON SEXUAL RISK

Fixed Effect	Odds Ratio	Confidence Interval	Coefficient Value	Standard Error	<i>t</i> Ratio	<i>df</i>	<i>p</i> value
Trait PA	0.57	0.08 – 4.27	-0.571	0.501	-1.140	124	.256
Trait NA	1.27	0.82 - 1.97	0.241	0.222	1.087	124	.279
Trait SA	1.53	1.13 – 2.07	0.425	0.153	2.783	124	*.006
State PA	1.28	1.01 – 1.62	0.245	0.120	2.028	5014	*.043
State X Trait PA	1.13	0.86 – 1.50	0.126	0.141	0.892	5014	.372
State NA	0.90	0.56 – 1.46	-0.105	0.245	-0.429	5014	.733
State X Trait NA	0.88	0.61 – 1.26	-0.132	0.184	-0.720	5014	.471
State SA	1.21	1.03 – 1.42	0.189	0.080	2.376	5014	*.019
State X Trait SA	1.06	0.91 – 1.24	0.061	0.078	0.786	5014	.433

NOTE: All effects were entered separated into HLM to avoid issues of collinearity. Asterisks denote statistical significance at  $p < .05$ .

TABLE VII

INFORMATION, MOTIVATION, BEHAVIORAL SKILLS (IMB) AND SEXUAL RISK							
Fixed Effect	Odds Ratio	Confidence Interval	Coefficient Value	Standard Error	<i>t</i> Ratio	<i>df</i>	<i>p</i> value
Motivation for Safer Sex	1.00	0.71 – 1.31	-0.003	0.169	-0.017	124	.986
Intentions for Condom Use	0.91	0.64 – 1.29	-0.096	0.178	-0.537	124	.592
Social Norms of Condom Use	0.58	0.33 – 1.04	-0.539	0.293	-1.841	124	.068
Condom Use Self-Efficacy	0.71	0.51 – 0.99	-0.337	0.170	-1.982	124	*.049

NOTE: Asterisks denote statistical significance at  $p < .05$ .

TABLE VIII

MODERATING EFFECTS OF IMB VARIABLES ON THE ASSOCIATION BETWEEN  
SEXUAL RISK BEHAVIOR AND RISK APPRAISALS

Fixed Effect	Coefficient Value ( $\beta$ )	Standard Error	<i>t</i> Ratio	<i>df</i>	<i>p</i> value
Sexual Risk Behavior	1.053	1.002	1.051	124	.294
Perceived Risk at Baseline	0.220	0.131	1.686	124	.092
HIV Knowledge	0.068	0.025	2.768	124	*.006
Perceived Severity of Infection	-0.375	0.233	-1.610	124	.108
Motivation for Safer Sex	-0.366	0.111	-3.303	124	*<.001
Partner Gender	-0.353	0.168	-2.102	124	*.036
Num. Previous Encounters	-0.004	0.002	-2.280	124	*.023

NOTE: Asterisks denote statistical significance at  $p < .05$ .

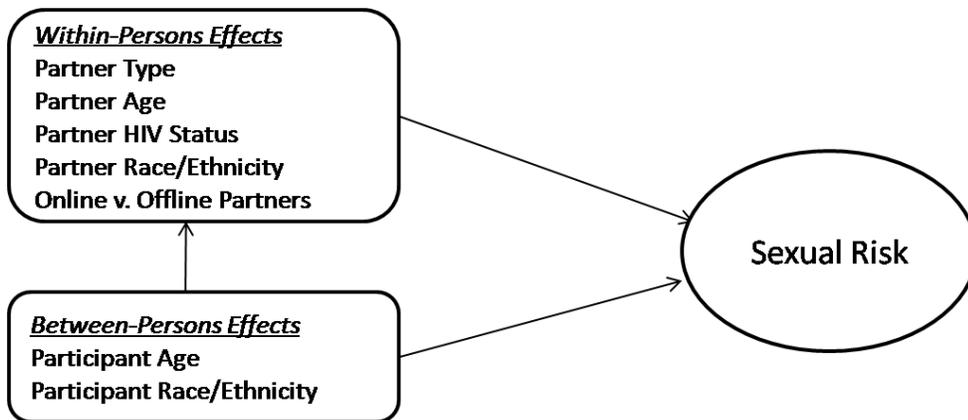


Figure 1. Model 1: Sexual Partnership Characteristics and Sexual Risk

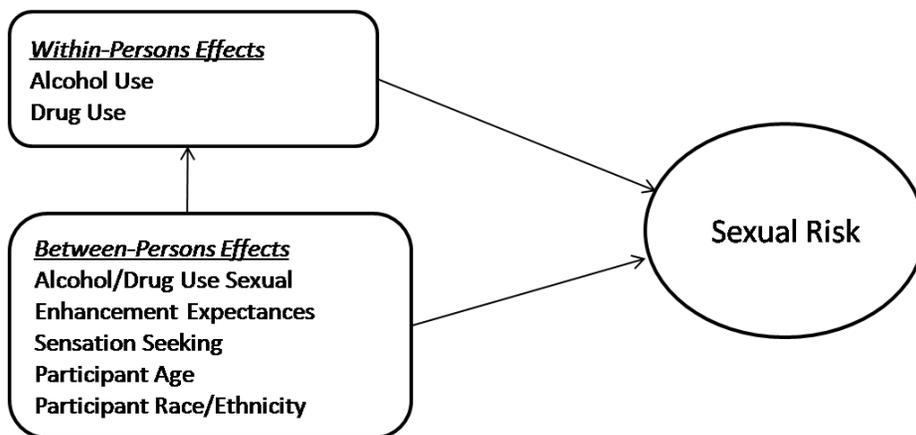


Figure 2. Model 2: Substance Use and Sexual Risk

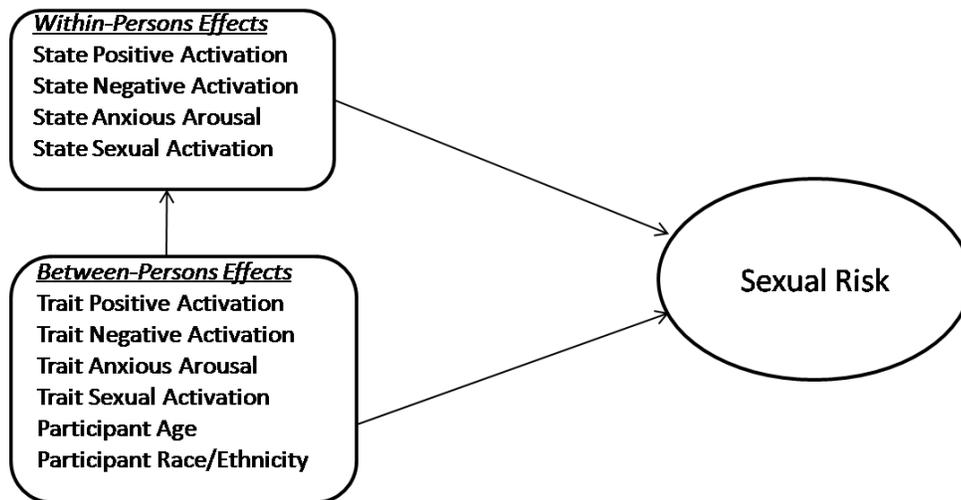


Figure 3. Model 3: Affective Influences and Sexual Risk

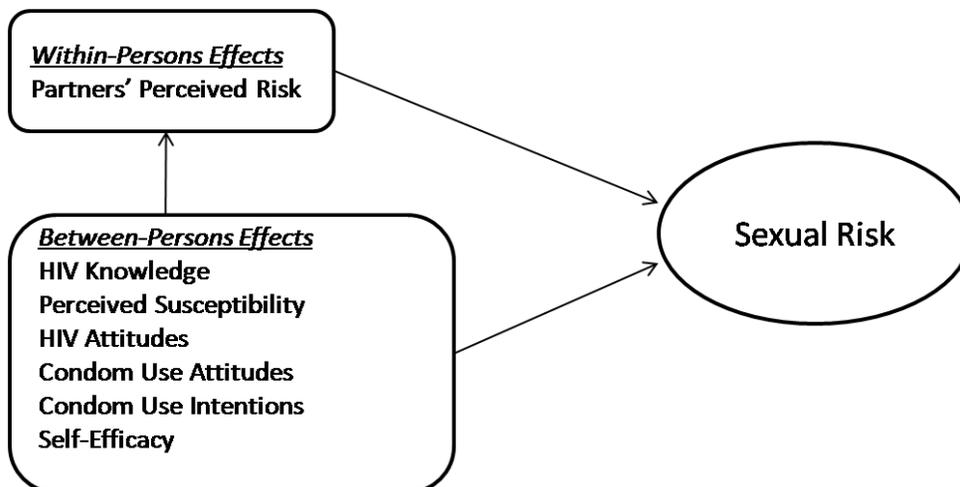
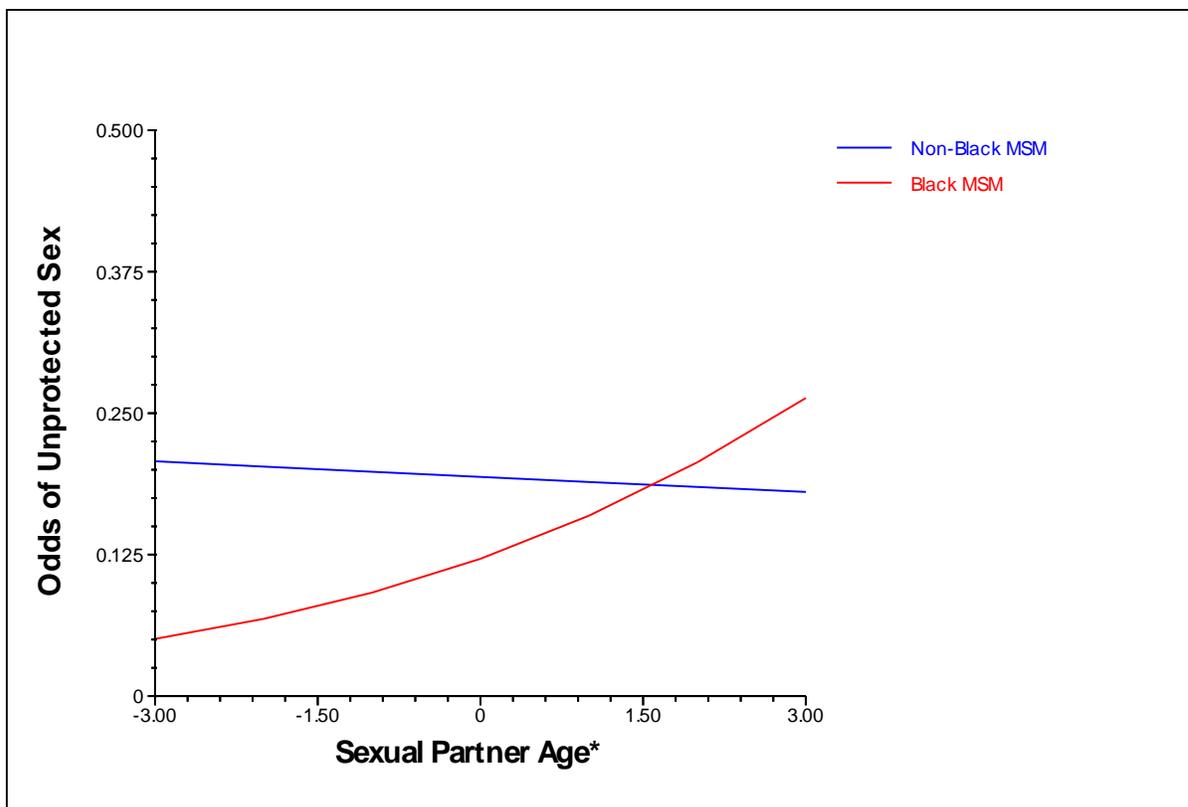
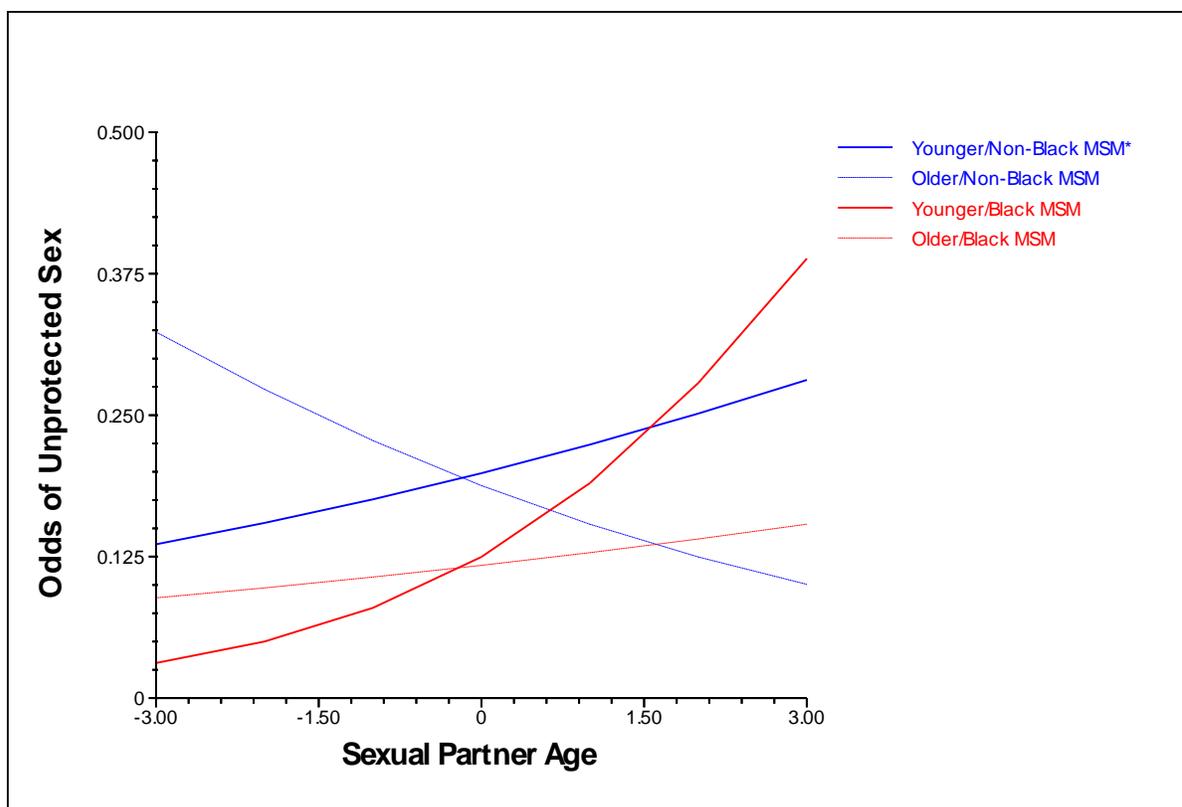


Figure 4. Model 4: Information, Motivation, Behavioral Skills (IMB) and Sexual Risk



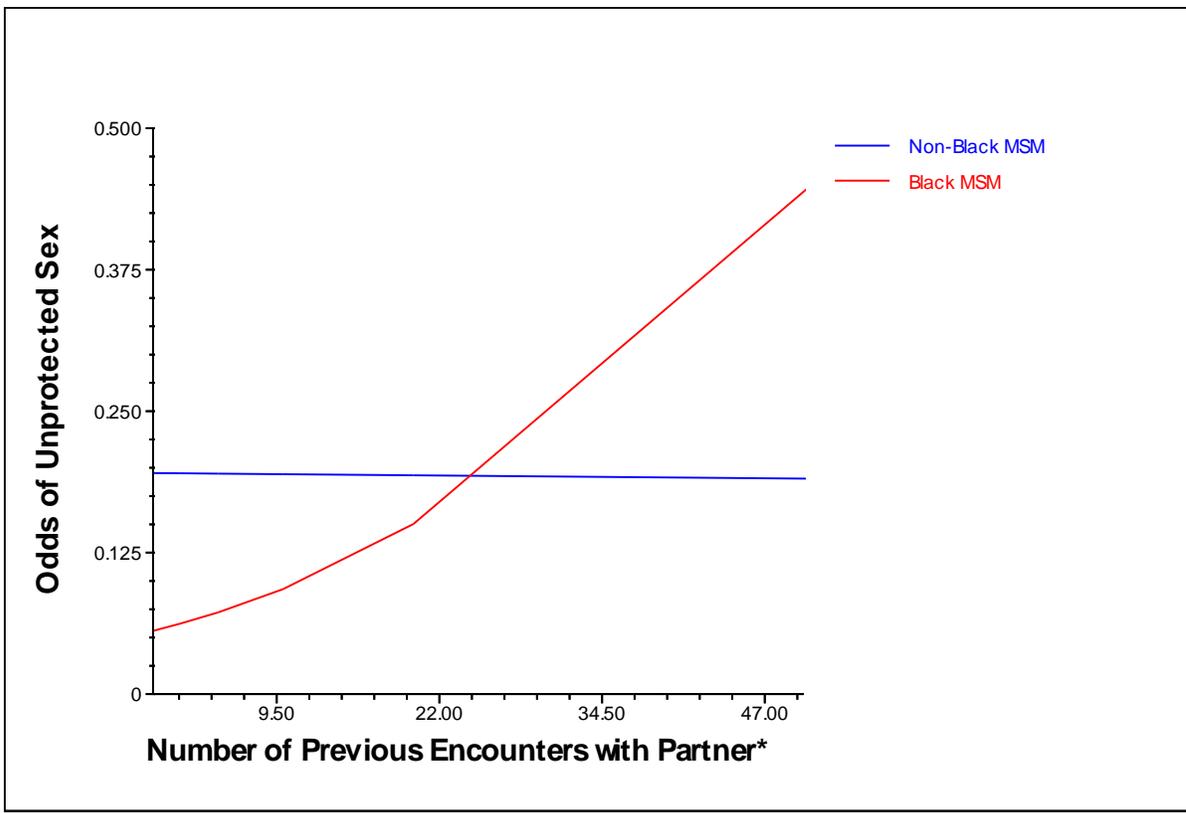
\*NOTE: Sexual partner age values were -3 = 10+ years younger, -2 = 5-10 years younger, -1 = 1-4 years younger, 0 = about same age as participant, 1 = 1-4 years older, 2 = 5-10 years older, and 3 = 10+ years older.

Figure 5. Moderating Effect of Participant Race on the Association between Sexual Partner Age and Odds of Unprotected Anal or Vaginal Intercourse



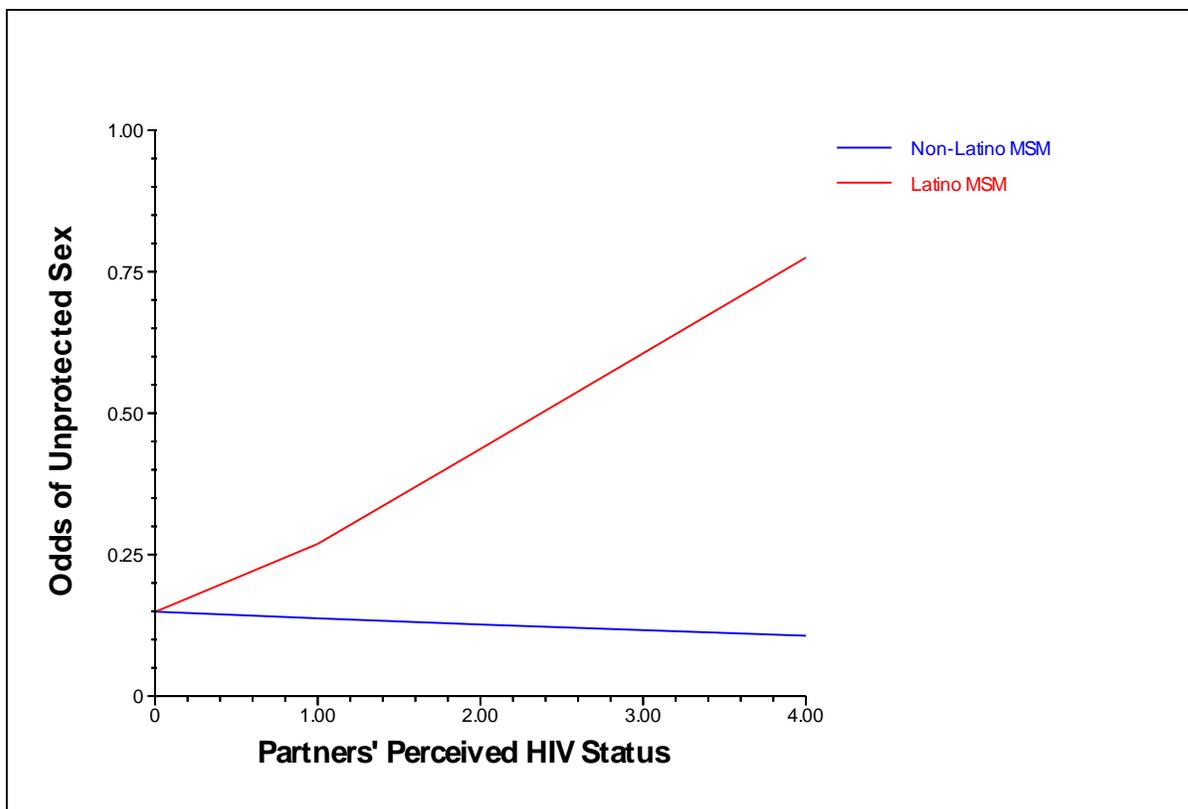
\*NOTE: Age x Race x Partner Age interaction is illustrated by splitting participants into four groups. “Younger” and “older” age groups were created by averaging the lower and upper quartiles of participant age. This is done solely for illustrative purposes. Sexual partner age values were -3 = 10+ years younger, -2 = 5-10 years younger, -1 = 1-4 years younger, 0 = about same age as participant, 1 = 1-4 years older, 2 = 5-10 years older, and 3 = 10+ years older.

Figure 6. Three-Way Interaction Between Participant Race, Participant Age, and Sexual Partner Age in Predicting Odds of Unprotected Anal or Vaginal Intercourse



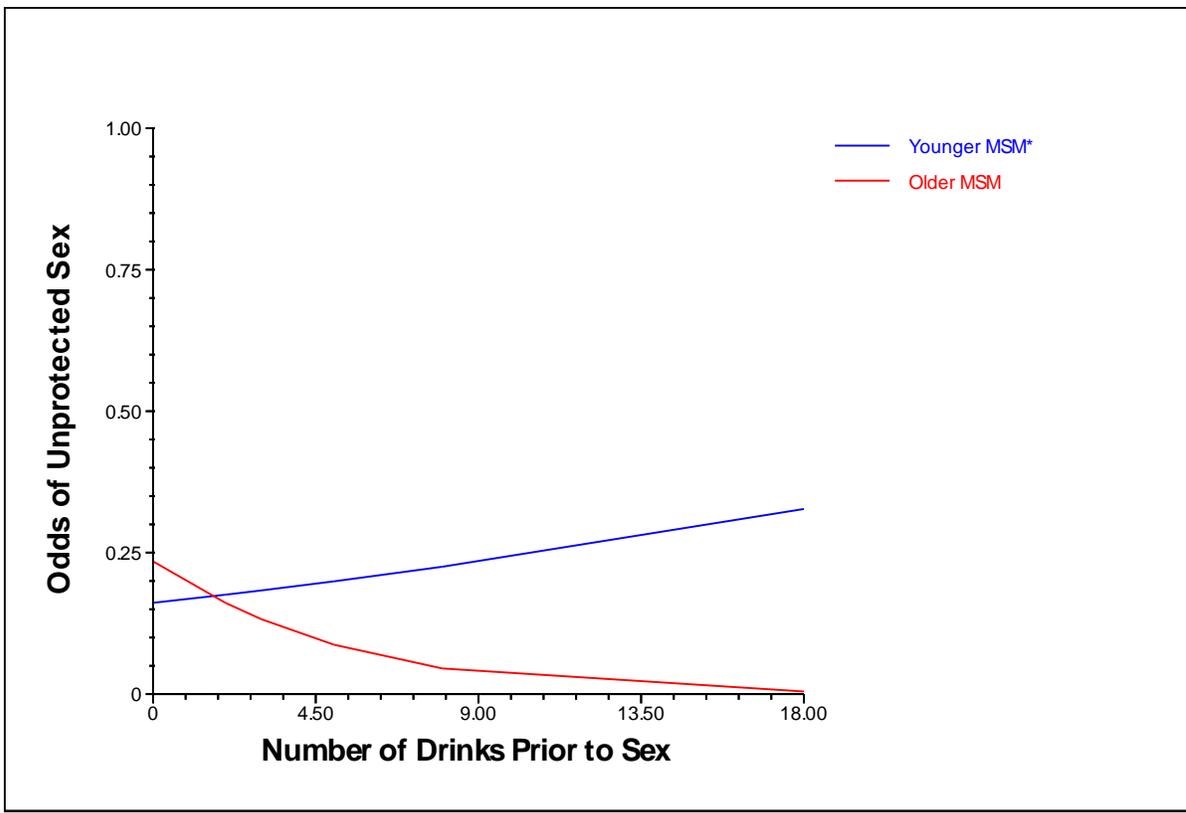
\*NOTE: Number of previous encounters with partner was winsorized at three standard deviations from the mean to reduce the influence of outliers.

Figure 7. Moderating Effect of Participant Race on the Association Between the Number of Previous Sexual Encounters with a Partner and Odds of Unprotected Anal or Vaginal Intercourse



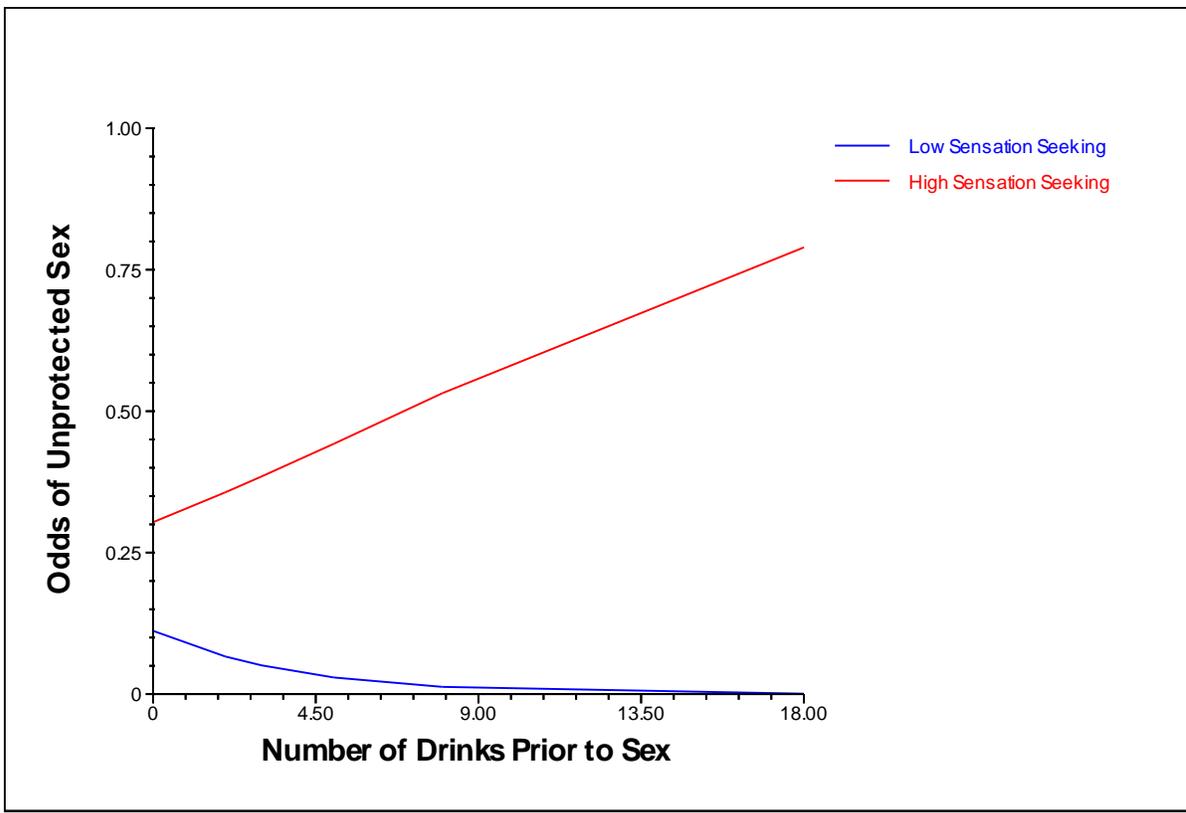
NOTE: Higher values on the x-axis indicate higher perceived likelihood that a partner was HIV+.

Figure 8. Moderating Effect of Participant Race on the Association Between Sexual Partner's Perceived HIV Status and Odds of Unprotected Anal or Vaginal Intercourse



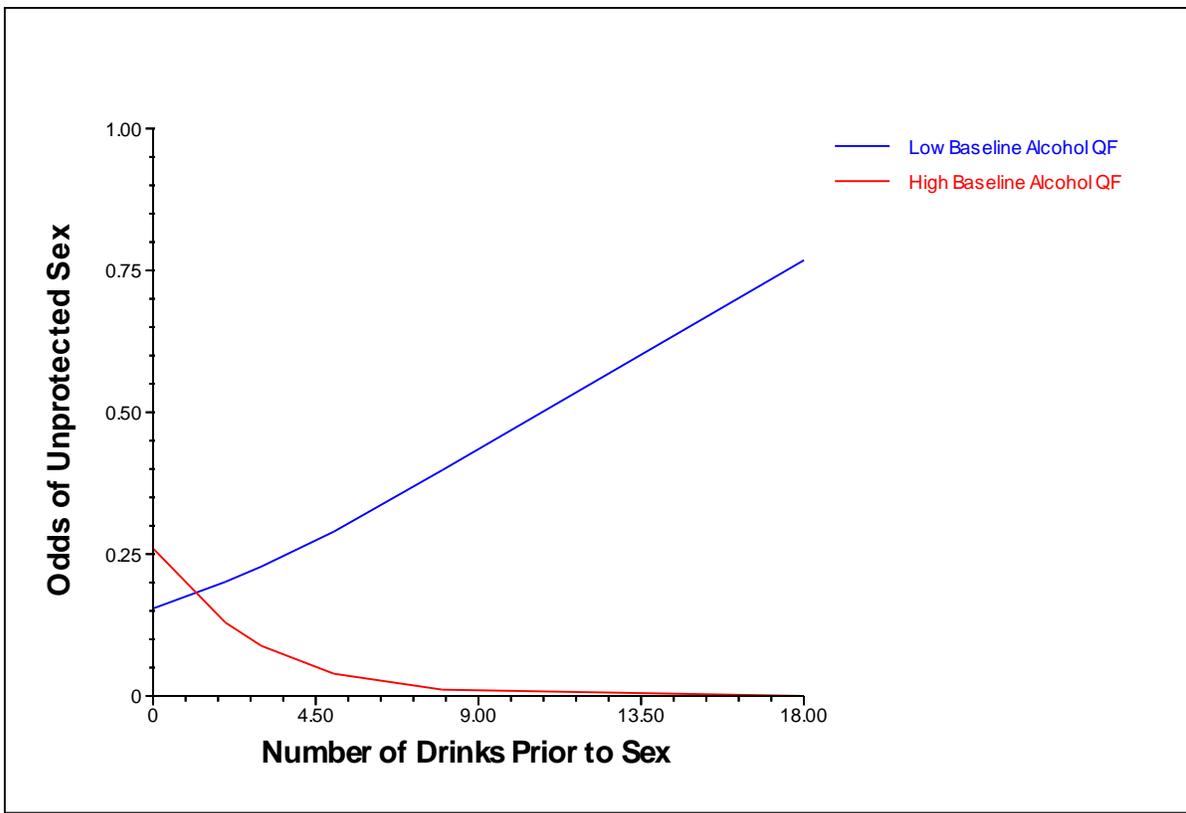
\*NOTE: Participant age was measured as a continuous variable. This figure groups MSM into younger and older groups by averaging the lower and upper quartiles of participant age. This is done solely for illustrative purposes.

Figure 9. Moderating Effect of Participant Age on the Association Between Drinking Prior to Sex and Odds of Unprotected Anal or Vaginal Intercourse



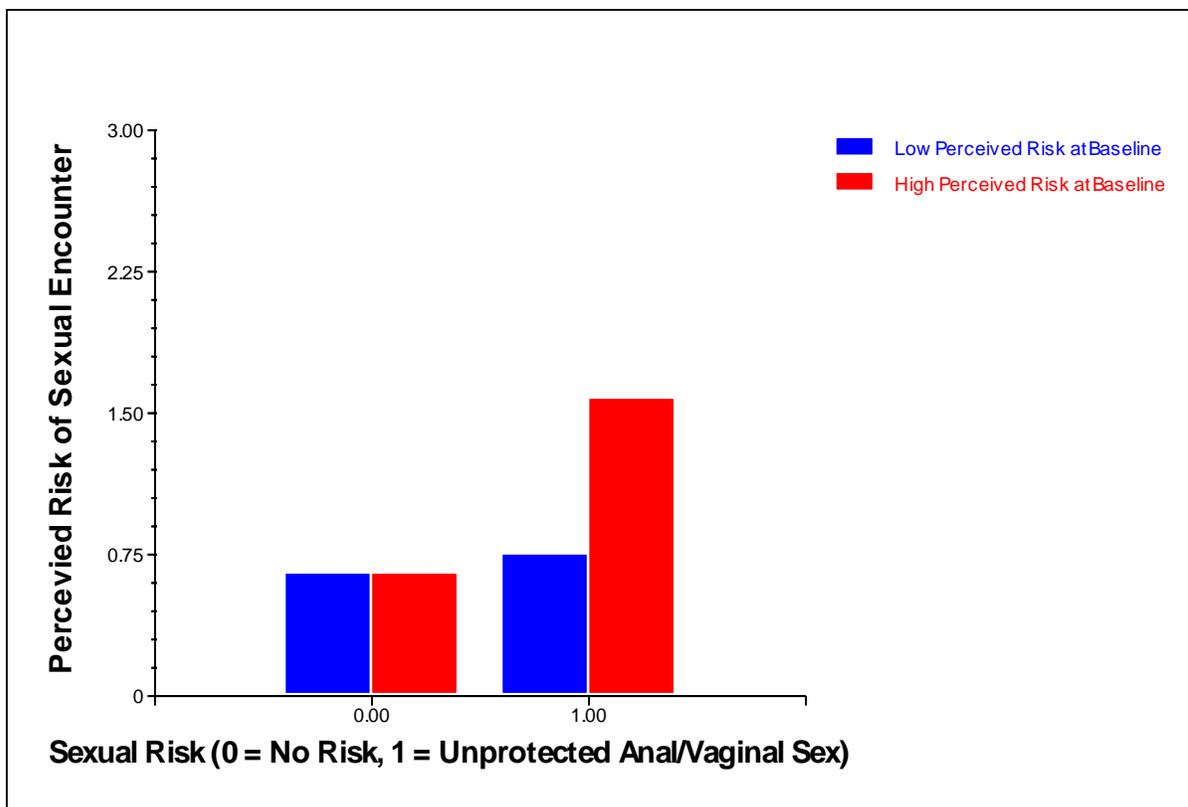
\*NOTE: Sensation seeking was measured as a continuous variable. This figure groups MSM into low-sensation seeking and high-sensation seeking groups by averaging the lower and upper quartiles of this variable. This is done solely for illustrative purposes.

Figure 10. Moderating Effect of Sensation Seeking on the Association Between Drinking Prior to Sex and Odds of Unprotected Anal or Vaginal Intercourse



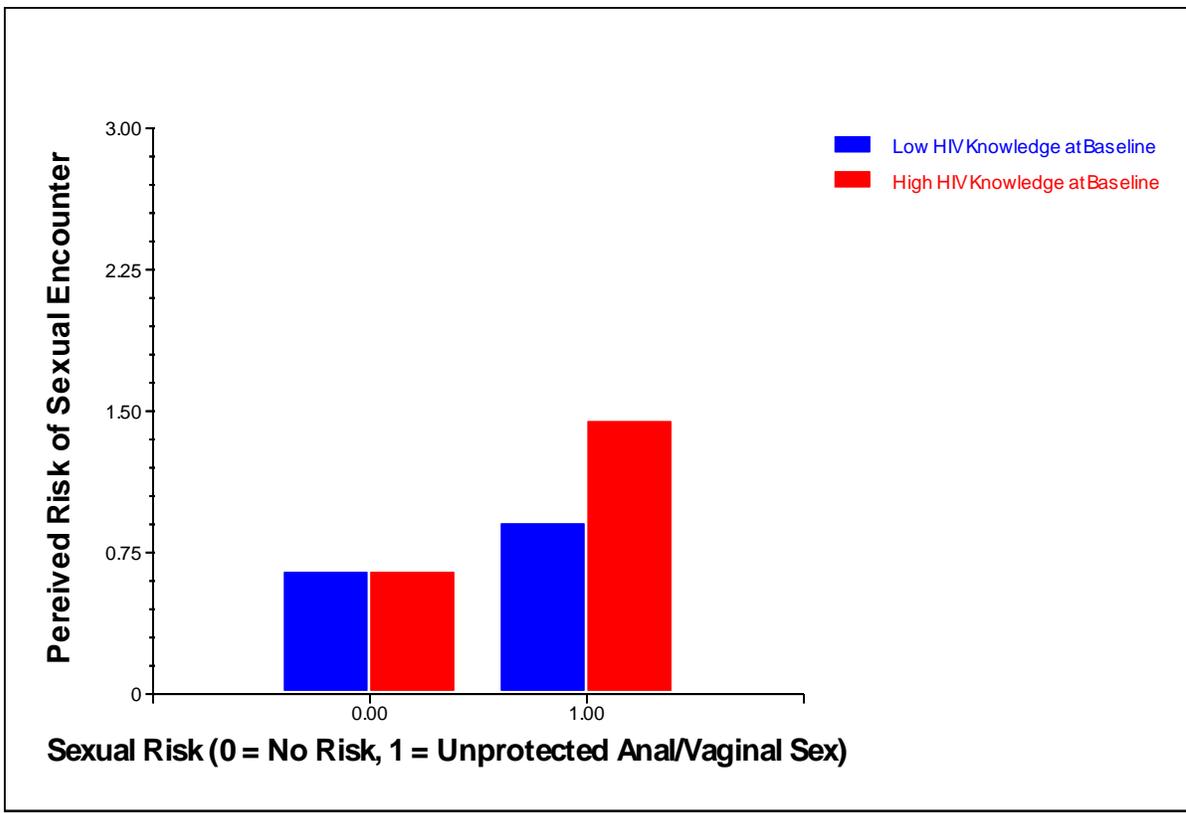
\*NOTE: Baseline alcohol QF was measured as a continuous variable. This figure groups MSM into low-alcohol QF and high-alcohol QF groups by averaging the lower and upper quartiles of this variable. This is done solely for illustrative purposes.

Figure 11. Moderating Effect of Baseline Quantity-Frequency of Alcohol Use on the Association Between Drinking Prior to Sex and Odds of Unprotected Anal or Vaginal Intercourse



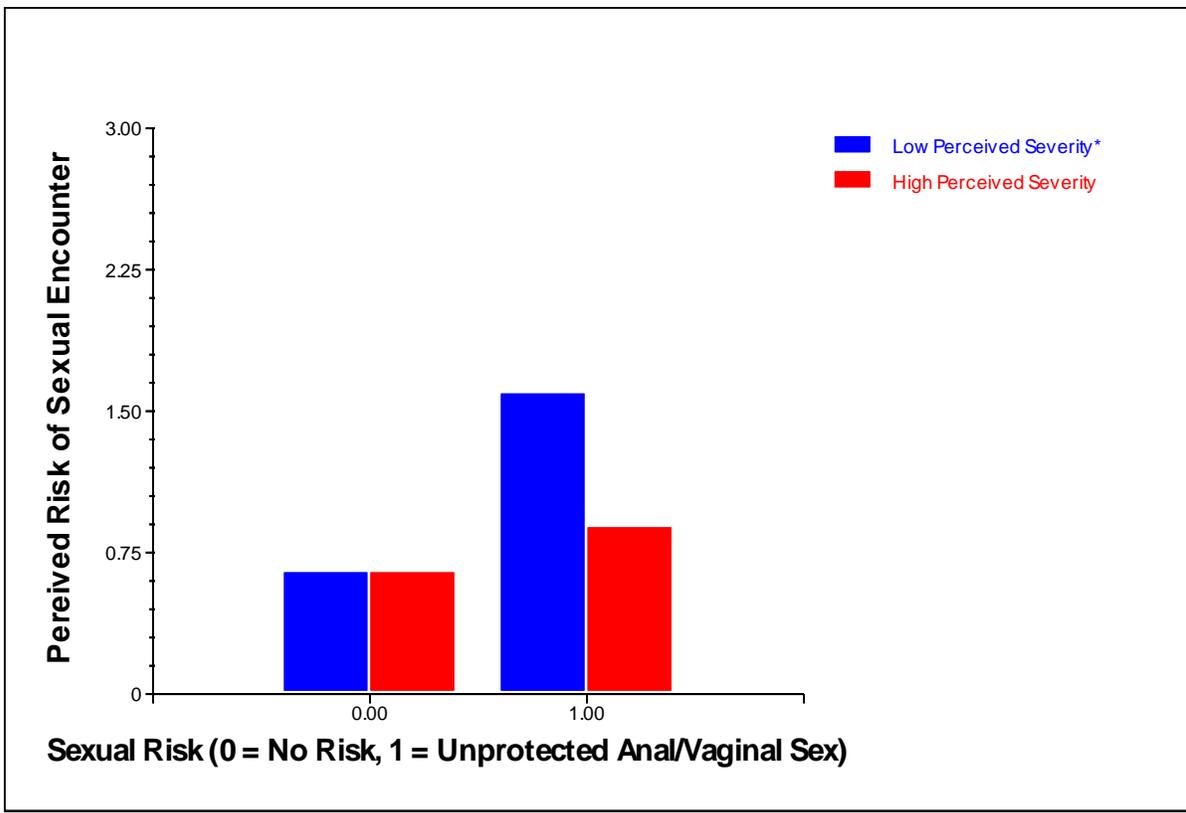
\*NOTE: Perceived risk at baseline was measured as a continuous variable. This figure groups MSM into low-perceived risk and high-perceived risk groups by averaging the lower and upper quartiles of this variable. This is done solely for illustrative purposes.

Figure 12. Moderating Effect of Perceived Risk at Baseline on the Association Between Odds of Unprotected Anal or Vaginal Intercourse and Perceived Risk of the Sexual Encounter



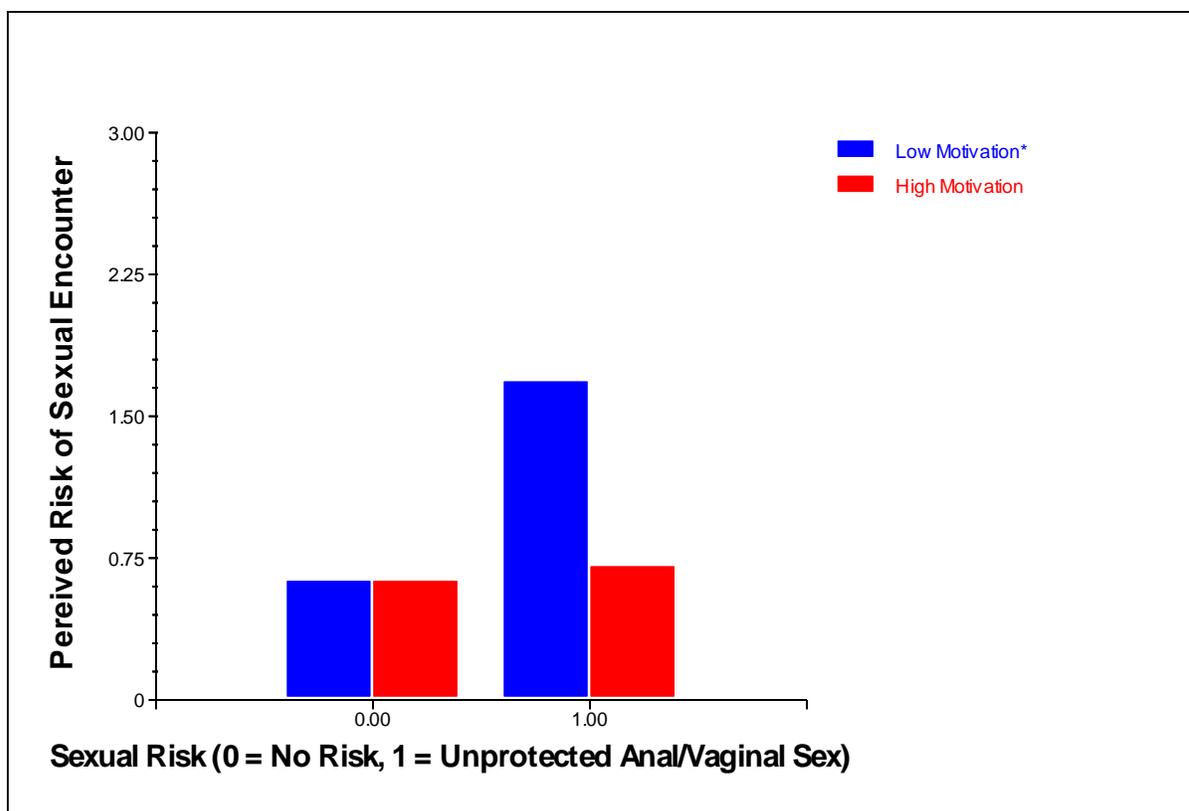
\*NOTE: HIV knowledge was measured as a continuous variable. This figure groups MSM into low-HIV knowledge and high-HIV knowledge groups by averaging the lower and upper quartiles of this variable. This is done solely for illustrative purposes.

Figure 13. Moderating Effect of HIV Knowledge on the Association Between Odds of Unprotected Anal or Vaginal Intercourse and Perceived Risk of the Sexual Encounter



\*NOTE: Perceived severity of HIV infection was measured as a continuous variable. This figure groups MSM into low-perceived severity and high-perceived severity groups by averaging the lower and upper quartiles of this variable. This is done solely for illustrative purposes.

Figure 14. Moderating Effect of Perceived Severity of HIV Infection on the Association Between Odds of Unprotected Anal or Vaginal Intercourse and Perceived Risk of the Sexual Encounter



\*NOTE: Motivation to become safer/stay safe was measured as a continuous variable. This figure groups MSM into low motivation and high motivation groups by averaging the lower and upper quartiles of this variable. This is done solely for illustrative purposes.

Figure 15. Moderating Effect of Motivation for Safer Sex on the Association Between Odds of Unprotected Anal or Vaginal Intercourse and Perceived Risk of the Sexual Encounter

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**VI. APPENDIX A: MEASURES**

## Demographic Questionnaire

1. What is your birthday? (dd/mm/yyyy)
2. What is your zip code?
3. What is your birth gender or biological sex?
  - 1 = male
  - 2 = female
  - 777 = don't know
4. How do you self-identify?
  - 1 = male
  - 2 = female
  - 3 = transgender male-to-female (MTF)
  - 4 = transgender female-to-male (FTM)
  - 777 = don't know
5. Which of the following best describes your sexual orientation?
  - 1 = gay
  - 2 = lesbian
  - 3 = bisexual
  - 4 = heterosexual
  - 5 = questioning/unsure
  - 777 = don't know
6. The individuals to whom you are physically attracted are:
  - 1 = males only
  - 2 = mostly males, but some females
  - 3 = both males and females equally
  - 4 = mostly females, but some males
  - 5 = females only
7. How do you describe your race or ethnic background?
  1. White (not Hispanic or Latino/a)
  2. Black/African American
  3. Hispanic or Latino/a
  4. Asian/Pacific Islander
  5. Native American
  6. Other (please specify: \_\_\_\_\_)
  7. Multi-racial (please specify: \_\_\_\_\_)
8. What is your HIV status?

- 1 = HIV positive
- 2 = HIV negative
- 3 = I don't know my HIV status

9. Are you currently in a sexually monogamous relationship? In other words, are you having sex with only one person?

- 1 = yes
- 2 = no

10. Have you had either oral sex or anal sex with another man in the last 6 months?

- 1 = yes
- 2 = no

11. Who are you currently having sex with, and who do you expect to have sex with over the next several months?

- 1 = men only
- 2 = mostly men, but some women
- 3 = both men and women equally
- 4 = mostly women, but some men
- 5 = women only

## Brief Sensation Seeking Scale (BSSS; Donohew et al., 199)

Please indicate how much you agree with the following statements.

1) I would like to explore strange places.

- 1 = strongly disagree
- 2 = disagree
- 3 = neither disagree nor agree
- 4 = agree
- 5 = strongly agree

2) I get restless when I spend too much time at home.

- 1 = strongly disagree
- 2 = disagree
- 3 = neither disagree nor agree
- 4 = agree
- 5 = strongly agree

3) I like to do frightening things.

- 1 = strongly disagree
- 2 = disagree
- 3 = neither disagree nor agree
- 4 = agree
- 5 = strongly agree

4) I like wild parties.

- 1 = strongly disagree
- 2 = disagree
- 3 = neither disagree nor agree
- 4 = agree
- 5 = strongly agree

5) I would like to take off on a trip with no pre-planned routes or timetables.

- 1 = strongly disagree
- 2 = disagree
- 3 = neither disagree nor agree
- 4 = agree
- 5 = strongly agree

6) I prefer friends who are excitingly unpredictable.

- 1 = strongly disagree
- 2 = disagree
- 3 = neither disagree nor agree
- 4 = agree
- 5 = strongly agree

7) I would like to try bungee jumping.

1 = strongly disagree

2 = disagree

3 = neither disagree nor agree

4 = agree

5 = strongly agree

8) I would love to have no and exciting experiences, even if they are illegal.

1 = strongly disagree

2 = disagree

3 = neither disagree nor agree

4 = agree

5 = strongly agree

## Sexual Enhancement Expectancies for Alcohol and Drug Use (Kalichman et al., 2002)

Please indicate how much you agree with the following statements.

- 1) Drinking/Using drugs helps me relax about having sex.
  - 1 = strongly agree
  - 2 = agree
  - 3 = disagree
  - 4 = strongly disagree
  
- 2) I want to have sex after drinking/using drugs.
  - 1 = strongly agree
  - 2 = agree
  - 3 = disagree
  - 4 = strongly disagree
  
- 3) It is easier to satisfy my sex partner if they have been drinking/using drugs.
  - 1 = strongly agree
  - 2 = agree
  - 3 = disagree
  - 4 = strongly disagree
  
- 4) I am a better lover after I have been drinking/using drugs.
  - 1 = strongly agree
  - 2 = agree
  - 3 = disagree
  - 4 = strongly disagree
  
- 5) For me, drinking/using drugs and having sex are connected.
  - 1 = strongly agree
  - 2 = agree
  - 3 = disagree
  - 4 = strongly disagree
  
- 6) I feel horny or sexual after I've been drinking/using drugs.
  - 1 = strongly agree
  - 2 = agree
  - 3 = disagree
  - 4 = strongly disagree
  
- 7) It is easier to get turned on sexually after drinking/using drugs.
  - 1 = strongly agree
  - 2 = agree
  - 3 = disagree
  - 4 = strongly disagree

8) Sex is better after I have been drinking/using drugs.

1 = strongly agree

2 = agree

3 = disagree

4 = strongly disagree

9) Safer sex is harder after I have been drinking/using drugs.

1 = strongly agree

2 = agree

3 = disagree

4 = strongly disagree

10) It is difficult to use condoms after drinking/using drugs.

1 = strongly agree

2 = agree

3 = disagree

4 = strongly disagree

Weekly Diary of Sexual Behavior, Substance Use and Other Situational Factors

1) How many times did you have sex (oral, vaginal or anal sex) during the last week?

Most recent sexual encounter:

1) In terms of risk for HIV, how risky do you think this sexual encounter was?

1 = very risky

2 = risky

3 = somewhat risky

4 = not risky

2) During this sexual encounter, did you have oral sex?

1 = yes

If yes, did you use a condom?:

1 = yes

2 = no

2 = no

3) During this sexual encounter, did you have vaginal sex?

1 = yes

If yes, did you use a condom?:

1 = yes

2 = no

2 = no

4) During this sexual encounter, did you have anal sex?

1 = yes

If yes, did you use a condom?:

1 = yes

2 = no

Were you the receptive or insertive partner (“bottom” or “top”?)

1 = receptive/bottom

2 = insertive/top

3 = both receptive and insertive

2 = no

5) Have you had sex (oral, vaginal or anal sex) with this person before?

1 = yes

If yes, how many times?: \_\_\_\_\_

2 = no

6) How would you describe your relationship with this partner?

1 = I am in a serious relationship with this partner.

2 = I am dating this partner, but it is not serious or is not yet serious.

3 = I am friends with this partner, but we are not dating.

- 4 = This is a casual partner (we have sex occasionally, but we are not really friends).  
 5 = This is an anonymous partner (I did not know this person well at all).
- 7) How old was this person? If you don't know exactly, how old do you think this person was?
- 1 = 10+ years younger than I am
  - 2 = 5-10 years younger than I am
  - 3 = 1-4 years younger than I am
  - 4 = about my age
  - 5 = 1-4 years older than I am
  - 6 = 5-10 years older than I am
  - 7 = 10+ years older than I am
- 8) What was this person's HIV status?
- 1 = I know this person is HIV positive
  - 2 = I think this person is HIV positive
  - 3 = I don't know this person's HIV status
  - 4 = I think this person is HIV negative
  - 5 = I know this person is HIV negative
- 9) What was this person's race or ethnic background?
- 1 = White (not Hispanic or Latino/a)
  - 2 = Black/African American
  - 3 = Hispanic or Latino/a
  - 4 = Asian/Pacific Islander
  - 5 = Native American
  - 6 = Other (please specify: \_\_\_\_\_)
  - 7 = Multi-racial (please specify: \_\_\_\_\_)
- 10) How did you meet this person?
- 1 = Through friends
  - 2 = At a party
  - 3 = In a public location (e.g., gym, store, work)
  - 4 = At a bar/club
  - 5 = At a bathhouse/public sex venue
  - 6 = Community organization
  - 7 = Online (specify website: \_\_\_\_\_)
  - 8 = Other (please specify: \_\_\_\_\_)
- 11) Had you consumed alcohol prior to this sexual encounter?
- 1 = yes  
 If yes, approximately how many drinks did you have?: \_\_\_\_\_
  - 2 = no
- 12) Did you use any drugs prior to or during this sexual encounter?
- 1 = yes

If yes, which drugs did you use? Choose all that apply:

- 1 = Marijuana (reefer, weed, bud, etc.)
- 2 = Crack
- 3 = Cocaine
- 4 = Heroin
- 5 = Methamphetamines (crystal meth, tina, speed)
- 6 = Opiates (opium, morphine, codeine, Demerol, etc.)
- 7 = Depressants/downers (Valium, Xanax, Halcion, etc.)
- 8 = Stimulants/uppers (Ritalin, Dexedrine, etc.)
- 9 = Psychedelics (PCP, LSD, mescaline, mushrooms)
- 10 = Club drugs (Ecstasy, MDMA, Liquid G, Special K, etc.)
- 11 = Poppers
- 12 = Other inhalants (glues, nail polish remover, lighter fluid, etc.)
- 13 = Other (please specify: \_\_\_\_\_)

2 = no

State Affect questions will be asked for each sexual encounter and are parallel to the trait affect questions listed below.

Repeat for sexual encounters 2 and 3 (i.e., the next 2 most recent sexual encounters from the previous week)

## Trait and State Affect (Mustanski, 2007)

Instructions for trait affect:

This scale consists of a number of words that describe different feelings and emotions. Mark the answer that best describes the extent to which you generally feel this way, that is, how you feel on the average.

Instructions for state affect:

Before answering the next items, take a moment to recall what you were doing before this sexual encounter and how you were feeling at that time. This scale consists of a number of words that describe feelings and emotions. Read each item and the mark the appropriate answer. Indicate to what extent you were feeling that way before this sexual encounter.

Alert

- 1 = very slightly
- 2 = a little
- 3 = moderately
- 4 = quite a bit
- 5 = extremely
- 6 = not at all

Afraid

- 1 = very slightly
- 2 = a little
- 3 = moderately
- 4 = quite a bit
- 5 = extremely
- 6 = not at all

Discouraged

- 1 = very slightly
- 2 = a little
- 3 = moderately
- 4 = quite a bit
- 5 = extremely
- 6 = not at all

Guilty

- 1 = very slightly
- 2 = a little
- 3 = moderately
- 4 = quite a bit
- 5 = extremely
- 6 = not at all

## Inspired

- 1 = very slightly
- 2 = a little
- 3 = moderately
- 4 = quite a bit
- 5 = extremely
- 6 = not at all

## Anxious

- 1 = very slightly
- 2 = a little
- 3 = moderately
- 4 = quite a bit
- 5 = extremely
- 6 = not at all

## Upset

- 1 = very slightly
- 2 = a little
- 3 = moderately
- 4 = quite a bit
- 5 = extremely
- 6 = not at all

## Excited

- 1 = very slightly
- 2 = a little
- 3 = moderately
- 4 = quite a bit
- 5 = extremely
- 6 = not at all

## Nervous

- 1 = very slightly
- 2 = a little
- 3 = moderately
- 4 = quite a bit
- 5 = extremely
- 6 = not at all

## Keyed Up

- 1 = very slightly
- 2 = a little
- 3 = moderately
- 4 = quite a bit

5 = extremely  
6 = not at all

#### Enthusiastic

1 = very slightly  
2 = a little  
3 = moderately  
4 = quite a bit  
5 = extremely  
6 = not at all

#### Scared

1 = very slightly  
2 = a little  
3 = moderately  
4 = quite a bit  
5 = extremely  
6 = not at all

#### Sexually Aroused

1 = very slightly  
2 = a little  
3 = moderately  
4 = quite a bit  
5 = extremely  
6 = not at all

#### Determined

1 = very slightly  
2 = a little  
3 = moderately  
4 = quite a bit  
5 = extremely  
6 = not at all

#### Distressed

1 = very slightly  
2 = a little  
3 = moderately  
4 = quite a bit  
5 = extremely  
6 = not at all

#### Relaxed

1 = very slightly  
2 = a little

- 3 = moderately
- 4 = quite a bit
- 5 = extremely
- 6 = not at all

#### Ashamed

- 1 = very slightly
- 2 = a little
- 3 = moderately
- 4 = quite a bit
- 5 = extremely
- 6 = not at all

#### Jittery

- 1 = very slightly
- 2 = a little
- 3 = moderately
- 4 = quite a bit
- 5 = extremely
- 6 = not at all

#### Sluggish

- 1 = very slightly
- 2 = a little
- 3 = moderately
- 4 = quite a bit
- 5 = extremely
- 6 = not at all

#### Horny

- 1 = very slightly
- 2 = a little
- 3 = moderately
- 4 = quite a bit
- 5 = extremely
- 6 = not at all

#### Depressed

- 1 = very slightly
- 2 = a little
- 3 = moderately
- 4 = quite a bit
- 5 = extremely
- 6 = not at all

#### Sexually interested

- 1 = very slightly
- 2 = a little
- 3 = moderately
- 4 = quite a bit
- 5 = extremely
- 6 = not at all

**Stressed**

- 1 = very slightly
- 2 = a little
- 3 = moderately
- 4 = quite a bit
- 5 = extremely
- 6 = not at all

## HIV Knowledge (HIV-KQ-18) (Carey and Schroder, 2002)

For each of the following states, please answer “true”, “false”, or “don’t know.” If you do not know please do not guess; instead please answer “don’t know.”

1) Coughing and sneezing DO NOT spread HIV. (T)

1 = True

2 = False

3 = Don’t know

2) A person can get HIV by sharing a glass of water with someone who has HIV. (F)

1 = True

2 = False

3 = Don’t know

3) Pulling out the penis before a man climaxes/cums keeps a person from getting HIV during sex. (F)

1 = True

2 = False

3 = Don’t know

4) A person can get HIV from having anal sex. (T)

1 = True

2 = False

3 = Don’t know

5) Showering, or washing one’s genitals/private parts after sex keeps a person from getting HIV. (F)

1 = True

2 = False

3 = Don’t know

6) All pregnant women infected with HIV will have babies born with HIV. (F)

1 = True

2 = False

3 = Don’t know

7) People who have been infected with HIV quickly show serious signs of being infected. (F)

1 = True

2 = False

3 = Don’t know

8) There is a vaccine that can stop people from getting HIV. (F)

1 = True

2 = False

3 = Don’t know

9) People are likely to get HIV by deep kissing, putting their tongue in a partner's mouth, if their partner has HIV and cuts in their mouth. (F)

1 = True

2 = False

3 = Don't know

10) It is possible to get HIV when a person gets a tattoo if the equipment is not properly cleaned. (T)

1 = True

2 = False

3 = Don't know

11) Using a latex condom or rubber can lower a person's chance of getting HIV. (T)

1 = True

2 = False

3 = Don't know

12) A natural skin condom works better against HIV than does a latex condom. (F)

1 = True

2 = False

3 = Don't know

13) A person will NOT get HIV if she or he is taking antibiotics. (F)

1 = True

2 = False

3 = Don't know

14) Having sex with more than one partner can increase a person's chance of being infected with HIV. (T)

1 = True

2 = False

3 = Don't know

15) Taking a test for HIV one week after having sex will tell a person if she or he has HIV. (F)

1 = True

2 = False

3 = Don't know

16) A person can get HIV by sitting in a hot tub or a swimming pool with a person who have HIV. (F)

1 = True

2 = False

3 = Don't know

17) A person can get HIV from oral sex. (T)

1 = True

2 = False

3 = Don't know

18) Using Vaseline or baby oil with condoms lowers the change of getting HIV. (F)

1 = True

2 = False

3 = Don't know

Additions to HIV-KQ-18 to assess MSM-specific HIV knowledge:

19) A person cannot get HIV from having sex with someone who is HIV+ but has an undetectable viral load. (F)

1 = True

2 = False

3 = Don't know

20) When using condoms during sex it is safer to use water-based lubricants than oil-based lubricants. (T)

1 = True

2 = False

3 = Don't know

21) A person cannot get HIV from being the "top" or insertive partner during anal sex. (F)

1 = True

2 = False

3 = Don't know

22) A person is more likely to get HIV by having unprotected anal sex than by having unprotected oral sex. (T)

1 = True

2 = False

3 = Don't know

HIV/AIDS Motivation and Behavioral Skills (AIDS-A; Kalichman et al., 2008)

For each statement below, tell us how likely it is that you will do each of these things in the next three months.

IMB01 How likely is it that you will keep condoms nearby?

- 1 Very Unlikely
- 2 Unlikely
- 3 Likely
- 4 Very Likely

IMB02 How likely is it that you will tell your partner that you need to use a condom?

- 1 Very Unlikely
- 2 Unlikely
- 3 Likely
- 4 Very Likely

IMB03 How likely is it that you will use a condom?

- 1 Very Unlikely
- 2 Unlikely
- 3 Likely
- 4 Very Likely

IMB04 How likely is it that you will use a condom even if your partner does not want to?

- 1 Very Unlikely
- 2 Unlikely
- 3 Likely
- 4 Very Likely

These questions ask about the opinions of people who are important to you. In particular, we want to know whether these people think you should use condoms during anal sex. You may not have talked with these people about using condoms during anal sex, but click on the answer that is closest to what you think about using condoms during anal sex.

IMB05 my primary male partner thinks that we ...

- 1 Definitely should NOT use condoms during anal sex
- 2 Probably Should NOT use condoms during anal sex
- 3 Neutral
- 4 Probably SHOULD use condoms during anal sex
- 5 Definitely SHOULD use condoms during anal sex

IMB06 most of my close friends think that I ...

- 1 Definitely should NOT use condoms during anal sex
- 2 Probably Should NOT use condoms during anal sex
- 3 Neutral
- 4 Probably SHOULD use condoms during anal sex
- 5 Definitely SHOULD use condoms during anal sex

IMB07 my doctor or health care provider thinks that I ...

- 1 Definitely should NOT use condoms during anal sex
- 2 Probably Should NOT use condoms during anal sex
- 3 Neutral
- 4 Probably SHOULD use condoms during anal sex
- 5 Definitely SHOULD use condoms during anal sex

IMB08 most of my family members think that I ...

- 1 Definitely should NOT use condoms during anal sex
- 2 Probably Should NOT use condoms during anal sex
- 3 Neutral
- 4 Probably SHOULD use condoms during anal sex
- 5 Definitely SHOULD use condoms during anal sex

IMB09 people whose opinion I respect think that I ...

- 1 Definitely should NOT use condoms during anal sex
- 2 Probably Should NOT use condoms during anal sex
- 3 Neutral
- 4 Probably SHOULD use condoms during anal sex
- 5 Definitely SHOULD use condoms during anal sex

IMB10 a new sex partner thinks that we ...

- 1 Definitely should NOT use condoms during anal sex
- 2 Probably Should NOT use condoms during anal sex
- 3 Neutral
- 4 Probably SHOULD use condoms during anal sex
- 5 Definitely SHOULD use condoms during anal sex

IMB11 Based on your sexual behavior over the past three months, how much do you think you have been at risk for being infected with HIV or other STDs?

1 = No Risk at All, 2 = A Little Risk, 3 = Some Risk, 4 = Great Deal at Risk

IMB12 How would you describe your motivation to become safer/stay safe?

1 = Not at All Strong, 2 = Somewhat Strong, 3 = Strong, 4 = Extremely Strong

I'd like you to think about the situations in which you have sex. Please read the statement below and tell us how confident you are that you would be able to do each of these things in order to avoid unsafe sex.

In a situation in which you typically have sex, how confident are you that you would be able to...

Extremely Confident								Not at all Confident
	7	6	5	4	3	2	1	

IMB13 be sure you and your partner had agreed to safer sex before sex began?

IMB14 be sure you had condoms with you?

IMB15 get your partner to use a condom during anal sex?

IMB16 use a condom yourself during anal sex?

IMB17 refuse to have anal sex without a condom

Additions to questionnaire measuring Perceived Severity of HIV Infection

How concerned would you be about your future if you became HIV positive?

1 = very concerned

2 = somewhat concerned

3 = a little concerned

4 = not at all concerned

How bad would it be for your physical health if you became HIV positive?

1 = very bad

2 = bad

3 = not too bad

4 = not bad at all

How upset would you be if you became HIV positive?

1 = very upset

2 = upset

3 = not too upset

4 = not at all upset

UNIVERSITY OF ILLINOIS  
AT CHICAGO

Office for the Protection of Research Subjects (OPRS)  
Office of the Vice Chancellor for Research (MC 672)  
203 Administrative Office Building  
1737 West Polk Street  
Chicago, Illinois 60612-7227

**Approval Notice  
Initial Review (Response To Modifications)**

November 23, 2010

Michael E. Newcomb, MA  
Psychology  
1007 W. Harrison St., Suite 1009  
M/C 285  
Chicago, IL 60607

**RE: Protocol # 2010-0750  
"An Investigation of a Situational Model of Risk in MSM"**

Dear Mr. Newcomb:

Your Initial Review (Response To Modifications) was reviewed and approved by the Expedited review process on November 1, 2010. You may now begin your research.

Please note the following information about your approved research protocol:

**Protocol Approval Period:** November 1, 2010 – October 31, 2011  
**Approved Subject Enrollment #:** 140  
**Additional Determinations for Research Involving Minors:** The Board has determined that this research satisfies 45CFR46.404, research not involving greater than minimal risk.  
**Performance Site:** UIC  
**Sponsor:** NIMH-National Institute of Mental Health  
**PAF#:** 2009-05595  
**Grant/Contract No:** F31MH088942  
**Grant/Contract Title:** An Investigation of a Situational Model of Risk in MSM

**Research Protocol(s):**

- a) Research Protocol, Project: An Investigation of a Situational Model of Risk in MSM; Version 2; 10/27/2010

**Recruitment Materials:**

- a) Eligibility Screener; Version 1; 8/03/2010
- b) Recruitment Ad; Version 2; 10/27/2010

c) Information Sheet; Version 2; 10/27/2010

**Informed Consent(s):**

a) Informed Consent/Assent; Version 2; 10/27/2010

b) Waiver of Signed Consent Document granted under 45 CFR 46.117 for this research

Your research meets criteria for expedited review as defined in 45 CFR 46/11 O(b)(1) under the following specific category:

(7) Research on individual or group characteristics or behavior (including but not limited to research on perception, cognition, motivation, identity, language, communication, cultural beliefs, or practices and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

**Please note the Review History of this submission:**

Receipt Date	Submission Type	Review Process	Review Date	Review Action
09/03/201	Initial Review	Expedited	10/05/2010	Modifications Required
10/29/2010	Response To Modifications	Expedited	11/01/2010	Approved

Please remember to:

→ Use your **research protocol number** (2010-0750) on any documents or correspondence with the IRB concerning your research protocol.

→ Review and comply with all requirements on the enclosure,  
**"UIC Investigator Responsibilities, Protection of Human Research Subjects"**

**Please note that the UIC IRB has the prerogative and authority to ask further questions, seek additional information, require further modifications, or monitor the conduct of your research and the consent process.**

**Please be aware that if the scope of work in the grant/project changes, the protocol must be amended and approved by the UIC IRB before the initiation of the change.**

We wish you the best as you conduct your research. If you have any questions or need further help, please contact OPRS at (312) 996-1711 or me at (312) 996-2014. Please send any correspondence about this protocol to OPRS at 203 AOB, M/C 672.

Sincerely,

Marissa Benni-Weis, M.S.  
IRB Coordinator, IRB # 2

Office for the Protection of Research Subjects

Enclosures:

- 1. UIC Investigator Responsibilities, Protection of Human Research Subjects**
- 2. Informed Consent Document(s):**
  - a) Informed Consent/Assent; Version 2; 10/27/2010
- 3. Recruiting Material(s):**
  - a) Eligibility Screener; Version 1; 08/03/2010
  - b) Recruitment Ad; Version 2; 10/27/2010
  - c) Information Sheet; Version 2; 10/27/2010
- 4. Optional Form 310 – Protected of Human Subjects; Assurance Identification/Certification Declaration**

cc: Gary E. Raney, Psychology, M/C 285  
Jon D. Kassel, Psychology, M/C 747  
OVCR Administration, M/C 672

## CURRICULUM VITAE

### Michael E. Newcomb, M.A.

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#### EDUCATION

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- 2007-present      **Doctor of Philosophy in Clinical Psychology, University of Illinois Chicago, Chicago, IL**  
*Chicago, IL*  
 APA Accredited Doctoral Program in Clinical Psychology  
Advisor: Brian Mustanski, Ph.D.
- 2011-2012      **Pre-Doctoral Internship in Clinical Psychology, Massachusetts General Hospital/Harvard Medical School (Behavioral Medicine Track), Boston, MA**  
*Boston, MA*  
 APA Accredited Pre-Doctoral Internship in Clinical Psychology  
Primary Supervisors: Steven A. Safren, Ph.D.; Conall O'Cleirigh, Ph.D.
- 2009      **Master of Arts in Clinical Psychology, University of Illinois at Chicago, Chicago, IL**  
*Chicago, IL*  
 APA Accredited Program in Clinical Psychology  
Advisor: Brian Mustanski, Ph.D.
- 2004      **Bachelor of Arts, Northwestern University, Evanston, IL**  
*Evanston, IL*  
 Major: Psychology  
 Minor: Spanish

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#### GRANTS/HONORS/AWARDS

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- 2012      **Emerson Award for Outstanding Research Paper by a Clinical Fellow in Psychology, Department of Psychiatry, Massachusetts General Hospital/Harvard Medical School**
- 2010-2011      **Ruth Kirschstein National Research Service Award (NRSA), National Institutes of Mental Health, Award Amount: \$102,404**  
Project Title: "An Investigation of a Situational Model of Risk in MSM"  
Sponsor: Brian Mustanski, Ph.D.
- 2011      **Supplementary Dissertation Grant, Chicago Developmental Foundation for AIDS Research (D-CFAR), \$1500**
- 2011      **Best Student Poster in the LGBT Special Interest Group, annual meeting of the Association of Behavioral and Cognitive Therapies**
- 2011      **Best Senior Investigator Poster (second author), annual meeting of the International Academy of Sex Researchers**
- 2010      **Travel Grant, Chicago Foundation for AIDS Research (CFAR), \$900**
- 2010      **Passed Preliminary Examination with Distinction, Department of Psychology, University of Illinois at Chicago**
- 2008      **McWhirter and Mattison Outstanding Student Paper Award, annual meeting of the Society for the Scientific Study of Sexuality**
- 2004      **Graduated cum laude from the Weinberg College of Arts and Sciences, Northwestern University**
- 2004      **Graduated with departmental honors from the Department of Psychology, Northwestern University**

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**PROFESSIONAL AFFILIATIONS**


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Association of Behavioral and Cognitive Therapies (ABCT)  
 Society of Clinical Psychology (APA Division 12)  
 Society for the Psychological Study of Lesbian, Gay, and Bisexual Issues (APA Division 44)  
 Society for the Scientific Study of Sexuality (SSSS)  
 Society for the Teaching of Psychology (APA Division 2)

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**RESEARCH EXPERIENCE**


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2009-2012      **Dissertation Project**  
 Developmental and Racial Differences in a Situational Model of Sexual Risk  
 in Men Who Have Sex with Men  
Dissertation Chair: Brian Mustanski, Ph.D.  
Committee: Christian Grov, Ph.D.; Jon Kassel, Ph.D.; Robin Mermelstein,  
 Ph.D.; Stewart Shankman, Ph.D.

2009-2010      **Preliminary Examination**  
 Situational Predictors of Risky Sex in an Ethnically-Diverse Sample of  
 Young Men Who Have Sex with Men: An Event-History Analysis  
Supervisor: Brian Mustanski, Ph.D.

2009            **Project Director for IMPACT Program**  
**Department of Psychiatry, University of Illinois at Chicago, Chicago, IL**  
Supervisors: Brian Mustanski, Ph.D., & Erin Emerson, M.A.

2007-2009      **Masters Project**  
 Psychological and Behavior Correlates of Internalized Homophobia: A Meta-  
 Analysis of 20 Years of Research  
Advisor: Brian Mustanski, Ph.D.

2006-2009      **Project Coordinator/Graduate Research Assistant**  
**Department of Psychiatry, University of Illinois at Chicago, Chicago, IL**  
Supervisor: Brian Mustanski, Ph.D.

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**SUPPLEMENTAL TRAINING**


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2011            Cognitive Processing Therapy for Posttraumatic Stress Disorder. Boston,  
 MA  
*Faculty: Patricia Resick, Ph.D.*

2011            Cognitive Behavioral Therapy for Mood Disorders and Chronic  
Illness. Boston, MA  
*Faculty: Steven A. Safren, Ph.D.; Conall O'Cleirigh, Ph.D.*

2009-2011      Advanced Applications of Hierarchical Linear Modeling and Growth  
Mixture Modeling for Longitudinal Data Analysis  
*Faculty: Brian Mustanski, Ph.D.*

2010            Basics of Motivational Interviewing and Applications for Respondent-Driven  
Sampling. Chicago, IL  
*Faculty: Jeffrey Parsons, Ph.D.*

2010            Dialectical Behavior Therapy (DBT) Skills Training. Chicago, IL  
*Faculty: Eunice Chen, Ph.D.; Kay Havenhill, M.A.; Sarah Altman, M.A.*

2010            Growth Modeling with Latent Variables Using Mplus: Advanced Growth  
Models, Survival Analysis, and Missing Data. Baltimore, MD

- 2010 Faculty: Linda K. Muthen, Ph.D.; BengtMuthen, Ph.D.  
Growth Modeling with Latent Variables Using Mplus: Introductory and Intermediate Growth Models. Baltimore, MD
- 2009 Faculty: Linda K. Muthen, Ph.D.; BengtMuthen, Ph.D.  
Qualitative Data Analysis Using EthnoNotes. Chicago, IL  
 Faculty: Eli Lieber, Ph.D.

## **ACADEMIC PUBLICATIONS**

### **Peer Reviewed Journal Articles**

- Newcomb, M. E.,** Heinz, A. J., &Mustanski, B. (in press). Examining risk and protective factors of alcohol use inlesbian, gay, bisexual and transgender youth: A longitudinal multilevel analysis.*Journal of Studies on Alcohol and Drugs.*
- Beidas, R. S., Birkett, M., **Newcomb, M. E.,**&Mustanski, B. (in press)Does psychological distress moderate the relationship between psychopathology and sexual risk taking behaviors in young men who have sex with men? *AIDS Patient Care and STDs.*
- Newcomb, M. E.,**&Mustanski, B. (2011). Moderators of the relationship between internalized homophobia and risky sexual behavior: A meta-analytic approach. *Archives of Sexual Behavior, 40,* 189-199.
- Newcomb, M. E.,**Clerkin, E. M., &Mustanski, B. (2011). Sensation seeking moderates the effects of alcohol and substance use prior to sex on sexual risk in young men who have sex with men. *AIDS and Behavior, 15,* 565-575.
- Mustanski, B., **Newcomb, M. E.,** DuBois, S., & Garcia, S. C., &Grov, C. (2011). HIV in young men who have sex with men: A review of epidemiology, risk and protective factors, and interventions. *Journal of Sex Research, 48,* 218-253.
- Mustanski, B., &**Newcomb, M. E.,** Clerkin, E. M.(2011).Longitudinal effects of partner and relationship characteristics on sexual risk taking in ethnically-diverse young men who have sex with men. *Health Psychology, 30,* 597-605.
- Clerkin, E. M., **Newcomb, M. E.,**&Mustanski, B. (2011). Unpacking the racial disparity in HIV rates: The effect of race on risky sexual behavior. *Journal of Behavioral Medicine, 34,* 237-243.
- Mustanski, B., **Newcomb, M. E.,** Garofalo, R. (2011). Mental health of lesbian, gay, and bisexual youth: A developmental resiliency perspective. *Journal of Gay & Lesbian Social Services, 23,* 204-225.
- Newcomb, M. E.,** &Mustanski, B. (2010). The relationship between internalizedhomophobia and internalizing mental health problems: A meta-analytic review.*Clinical Psychology Review, 30,* 1019-1029.

### **Published Reviews, Letters, and Editorials**

- Newcomb, M. E.,** &Mustanski, B. (2010). “The importance of measuring internalized homophobia/

Homonegativity": Response to Ross, Rosser, and Smolenski (2010a). *Archives of Sexual Behavior*, 39, 1209-1211.

### Manuscript Currently Under Review or In Preparation

- Newcomb, M. E., & Mustanski, B.** Racial differences in the effects of sexual partnership characteristics on HIV risk in MSM: A prospective sexual diary study. *Manuscript under review.*
- Birkett, M., **Newcomb, M. E., & Mustanski, B.** Does it get better? A longitudinal analysis of psychological distress and victimization in LGBTQ youth. *Manuscript under review.*
- O'Cleirigh, C., **Newcomb, M. E., Skeer, M., Mayer, K., Safren, S. A., & EPPEC Preventive for Positives Team.** Moderate levels of depression in MSM predict poorer response to a sexual risk reduction intervention for HIV+ individuals: An analysis of data from six sites. *Manuscript under review.*
- Newcomb, M. E., Birkett, M., Corliss, H., & Mustanski, B.** Substance use disparities in lesbian, gay, and bisexual youth: Examining intersections between sexual orientation, gender, and race in a nationally-representative sample of U.S. high school students.

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### ACADEMIC TALKS

- Newcomb, M.E.** (2012, June). Risk and protective factors for alcohol use in lesbian, gay, bisexual and transgender youth: Clinical and research implications. Invited presentation at Department of Psychiatry Grand Rounds, Massachusetts General Hospital, Boston, MA.
- Newcomb, M. E., & Mustanski, B.** (2012, February). What's driving racial disparities in HIV incidence? The role of sexual partnership characteristics in predicting sexual risk in Black MSM. Paper presented at the international invited meeting Gay Men's Sexual Health: A Focus on Couples, San Juan, PR.
- Newcomb, M. E., & Mustanski, B.** (2011, November). Modeling variability in perceptions of sexual risk over time in a sexual diary study of men who have sex with men. Paper presented at the annual conference of the Society for the Scientific Study of Sexuality, Houston, TX.
- Newcomb, M. E., Heinz, A. J., Mustanski, B.** (2011, November). Alcohol use trajectories in a longitudinal sample of LGBT youth: An analysis of risk and protective factors. Paper presented at the annual conference of the Society for the Scientific Study of Sexuality, Houston, TX.
- Newcomb, M. E., Clerkin, E. M., Garofalo, R., & Mustanski, B.** (2010, November). Sensation seeking moderates the effects of alcohol and substance use on sexual risk in young men who have sex with men. Paper presented at the annual conference of the Society for the Scientific Study of Sexuality, Las Vegas, NV.
- Mustanski, B., & **Newcomb, M. E.** (2010, November). Relationships and risk: Longitudinal analysis of relationship status and unprotected sex in young gay and bisexual men. Paper presented at the annual conference of the Society for the Scientific Study of Sexuality, Las Vegas, NV.
- Mustanski, B., & **Newcomb, M. E.** (2010, October). What mental health professionals need to know

about HIV prevention in youth. Paper presented at the Centennial Conference of the Institute for Juvenile Research, Chicago, IL.

- Newcomb, M. E.**, Mustanski, B., &Garofalo, R. (2009, November). Situational predictors of risky sex in an ethnically-diverse sample of YMSM: An event-level analysis. Paper presented at the annual conference of the Society for the Scientific Study of Sexuality, Puerto Vallarta, MEX.
- Garofalo, R., **Newcomb, M. E.**,Kuhns, L., &Mustanski, B. (2009, November). The presence and availability of role models among LGBT youth. Paper presented at the annual conference of the Society for the Scientific Study of Sexuality, Puerto Vallarta, MEX.
- Newcomb, M. E.**,&Mustanski, B. (2008, November). A meta-analysis of the relationshipbetween internalized homophobia and risky sexual behavior. Paper presented at the annual conference of the Society for the Scientific Study of Sexuality, San Juan, PR.
- Newcomb, M. E.**,&Mustanski, B. (2008, March). Defining LGBT youth for research recruitment. Symposium presented at the annual meeting of the Society for Research on Adolescence, Chicago, IL.
- Newcomb, M. E.**,&Mustanski, B. S. (2008, January). Using the Internet to Promote Safer Sex Behavior in HIV- YMSM. Paper presented at the first annual STD/HIV prevention conference focusing on youth and technology, San Francisco, CA.

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#### **ACADEMIC POSTER PRESENTATIONS**

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- O’Cleirigh, C., Taylor, S. W., **Newcomb, M. E.**, Mayer, K. H., &Safren, S. A. (2012, July). HIV-infected men who have sex with men (MSM) who report very high rates of HIV sexual transmission risk behavior: Developing a context for novel HIV prevention interventions. Poster presented at the annual meeting of the International AIDS Society, Washington, DC.
- Newcomb, M. E.**, O’Cleirigh, C., Skeer, M., Mayer, K., Safren, S. A., & EPPEC Prevention for Positives Team (2011, November). Moderate levels of depression predict poorer response to a sexual risk reduction intervention for HIV+ individuals: An analysis of data from six sites. Poster presented at the annual meeting of the Association of Behavioral and Cognitive Therapies, Toronto, CAN.
- Mustanski, B., **Newcomb, M. E.**, Heinz, A. J., Birkett, M., &Ashbeck, A. (2011, July). Sex differences in developmental trajectories of sexual attractions among LGBT youth. Poster presented at the annual meeting of the International Academy of Sex Researchers, Los Angeles, CA.
- Newcomb, M. E.**, Mustanski, B., &Clerkin, E. M. (2010, September). Partner age predicts sexual risk in ethnically-diverse young men who have sex with men. Poster presented at the University of Illinois at Chicago Department of Psychiatry Research Forum, Chicago, IL.
- Newcomb, M. E.**, Mustanski, B., &Clerkin, E. M. (2010, May). Partner age predicts sexual risk in ethnically-diverse young men who have sex with men. Poster presented at the annual conference of the Association for Psychological Science, Boston, MA.

**Newcomb, M. E.,** Mustanski, B., Emerson, E., & Samuels, K. (2009, November). Clustering of HIV risk behaviors in African American adolescents and the protective role of family factors against risk. Poster presented at the annual conference of the Society for the Scientific Study of Sexuality, Puerto Vallarta, MEX.

**Newcomb, M. E.** (2004, July). The effects of gender atypical behavior on perceived attractiveness in heterosexual and homosexual populations. Poster presented at the annual meeting of the Human Behavior and Evolution Society, Berlin, GER.

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### **EDITORIAL SERVICE**

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Ad Hoc Reviewer, *AIDS and Behavior* (April 2011, August 2011, June 2012, July 2012)

Ad Hoc Reviewer, *American Journal of Men's Health* (May 2012, July 2012)

Ad Hoc Reviewer, *Archives of Sexual Behavior* (August 2009, April 2010, November 2010, May 2011, April 2012)

Ad Hoc Reviewer, *Journal of Acquired Immune Deficiency Syndromes* (October 2011)

Ad Hoc Reviewer, *Journal of Homosexuality* (March 2011, January 2012)

Ad Hoc Reviewer, *Sexuality Research and Social Policy* (March 2012)

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### **CLINICAL EXPERIENCE AND TRAINING**

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2011-present

**Pre-doctoral Internship in Clinical Psychology**

**Massachusetts General Hospital/Harvard Medical School (Behavioral Medicine Track), Boston, MA**

Supervisors: Michelle Jacobo, Ph.D.; Joseph Greer, Ph.D.; Robert Knauz, Ph.D.; Conall O' Cleirigh, Ph.D.; Stephanie Sogg, Ph.D.

- Individual outpatient CBT for patients with Axis I conditions and comorbid chronic medical problems
- Group DBT for patients with Borderline Personality Disorder
- Evaluation and brief CBT treatment for weight loss and binge eating
- Individual outpatient CBT for depression and treatment adherence in HIV+ individuals as part of a NIMH-funded randomized control trial

2010-2011

**Practicum in Dialectical Behavior Therapy (DBT)**

**Department of Psychiatry, Adult Eating and Weight Disorders Program  
University of Chicago, Chicago, IL**

Supervisor: Eunice Chen, Ph.D.

- Individual outpatient DBT for patients with Bulimia Nervosa, Binge-Eating Disorder, Anorexia Nervosa, and Borderline Personality Disorder as part of a NIMH-funded randomized-control trial
- DBT skills group therapy for patients with Eating Disorders
- Research team meetings to review research protocols and development of manualized treatment

2009-2010

**Practicum in Health Psychology**

**Department of Psychiatry, University of Illinois Medical Center Chicago  
University of Illinois at Chicago, Chicago, IL**

Supervisors: Susan Labott, Ph.D., ABPP, & Eric Prenskey, Ph.D.

- Consultation liaison service for English and Spanish-speaking medical inpatients
- Outpatient psychotherapy for comorbid psychiatric and medical conditions

- Preoperative evaluation for patients seeking bariatric surgery
- 2008-2010      **Clinician on Call for Clinical Emergencies**  
**IMPACT Program, Department of Psychiatry**  
**University of Illinois at Chicago, Chicago, IL**  
Supervisor: Brian Mustanski, Ph.D.
- Serve as primary on-call consultant for clinical emergencies related to suicidality and domestic violence, as flagged during structured diagnostic interviews
  - Supervise graduate and undergraduate students in navigating clinical emergency situations in a research protocol
- 2008-2010      **Diagnostic Interviewing/Suicide Assessment Training Coordinator**  
**IMPACT Program, Department of Psychiatry**  
**University of Illinois at Chicago, Chicago, IL**  
Supervisor: Brian Mustanski, Ph.D.
- Train graduate and undergraduate students to administer structured diagnostic interviews and assess for suicidality for three research protocols with LGBT youth, men who have sex with men, and African American youth living in housing projects
- 2007-present      **Practicum in Psychotherapy**  
**Office of Applied Psychological Services (OAPS)**  
**University of Illinois at Chicago, Chicago, IL**  
Supervisors: Stewart Shankman, Ph.D., Nancy Dasso, Ph.D., Sheela Raja, Ph.D., Gloria Balague, Ph.D., & Jon Kassel, Ph.D.
- Conduct individual cognitive behavioral therapy for adult clients with Major Depressive Disorder, Bipolar Disorder, Panic Disorder, and Generalized Anxiety Disorder
  - Conduct individual mindfulness-based cognitive therapy for an adult client with childhood and adult trauma
  - Conduct cognitive-based couples therapy
- 2008-2009      **Practicum in Psychological Assessment**  
**Office of Applied Psychological Services (OAPS)**  
**University of Illinois at Chicago, Chicago, IL**  
Supervisors: Audrey Ruderman, Ph.D., & Gloria Balague, Ph.D.
- Administer assessment tools for intelligence, achievement, and diagnostic testing to child and adult clients with learning disabilities
  - Assess for Attention-Deficit Hyperactivity Disorder in child and adult clients
  - Conduct assessment for adult clients seeking Supplemental Security Income (SSI) due to psychiatric conditions
- 2005-2006      **Practicum in Assessment for Preschool Children**  
**Rosalind Franklin University of Medicine and Science, North Chicago, IL**  
Supervisor: Chinni Chilamkurti, Ph.D.
- Administer screening tools for academic achievement in English and Spanish to preschool children enrolled in Head Start programs

- Conduct functional behavioral assessments on preschool children with disruptive behaviors
- Lead family conferences for implementing behavioral management strategies for disruptive behaviors

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### **TEACHING EXPERIENCE**

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2010-2010	<u>Associate Instructor</u> , Graduate Clinical Interviewing (PSCH 481), University of Illinois at Chicago, Department of Psychology (Fall 2010)
2007-present	<u>Research Training (PSCH 396)</u> , University of Illinois at Chicago, Department of Psychology (Fall 2007; Spring 2008; Fall 2008; Spring 2009; Fall 2009, Spring 2010; Spring 2011)
2007-2009	<u>Research Training, Summer Research Opportunities Program (SROP)</u> , an NSF funded program to give ethnic minority undergraduate students an intensive mentored research experience (Summer 2007; Summer 2008; Summer 2009).
2009-2009	<u>Instructor</u> , Abnormal Psychology (PSCH 275), University of Illinois at Chicago, Department of Psychology (Spring 2009)
2009-2009	<u>Head Teaching Assistant</u> , Introduction to Psychology (PSCH 100), University of Illinois at Chicago, Department of Psychology (Spring 2009)
2007-2009	<u>Teaching Assistant</u> , University of Illinois at Chicago, Department of Psychology Introduction to Psychology (Fall 2007; Spring 2008; Fall 2008; Spring 2009; Fall 2009)
<u>Guest Lectures</u>	<i>Topic: course name (number of occasions)</i>
2008-2011	<u>University of Illinois at Chicago</u> <i>Symptoms and Treatment of Panic Disorder: Abnormal Psychology (1x)</i> <i>Disorders of Gender and Sexuality: Abnormal Psychology (1x)</i> <i>Clinical Interviewing for Couples: Psychology of Interviewing (1x)</i> <i>Clinical Assessment for Supplemental Security Income: Practicum in Clinical Assessment (1x)</i>
2011-2012	Suffolk University <i>Symptoms and Treatment of Panic Disorder and Obsessive Compulsive Disorder: Abnormal Psychology (1x)</i> <i>Child and Adolescent Sexuality: Human Sexuality (1x)</i>