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Relationship characteristics and sexual risk-taking in young men who have sex with men

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Abstract

Objective—Young MSM (men who have sex with men), particularly young men of color, are experiencing the largest increase in HIV incidence of any risk group in the U.S. Epidemiological research suggests that the majority of transmissions among MSM are occurring in the context of primary partnerships, but little research has been done on the processes within these dyads that increase HIV risk behaviors. The aim of this study was to use longitudinal partnership-level data to explore the effects of partner and relationship characteristics on the frequency of unprotected sex within young MSM relationships.

Methods—One hundred twenty-two young MSM (age 16-20 at baseline) were assessed at three time-points six months apart, with 91% retention at the 12-month follow-up wave. Over 80% were racial/ethnic minorities. At each wave, participants reported on characteristics of the relationship and partner for up to three sexual partners. Hierarchical linear modeling was used for analyses.

Results—The largest effect was for considering the relationship to be serious, which was associated with nearly an eight-fold increase in the rate of unprotected sex. Other factors that increased risk behaviors included: older partners, drug use prior to sex, physical violence, forced sex, and partnership lasting more than 6 months. Partners met online were not associated with significantly more sexual risk.

Conclusions—These data provide insight into the relationship processes that should be addressed in prevention programs targeted at young MSM. Relationships may serve as a promising unit for HIV prevention interventions, although more formative research will be required to address potential logistical obstacles to implementing such interventions. The partner-by-partner analytic approach (i.e., evaluating situational variables associated with several partners for a given participant) holds promise for future HIV behavioral research.

Keywords

Relationships and HIV risk; youth; Internet; couples; prevention

The vast majority of HIV transmissions occur in the context of a sexual dyad (CDC, 2010b), but most research is focused on individuals as the unit of analysis (Karney, et al., 2010; Zea, Reisen, Poppen, & Bianchi, 2009). Recent research has highlighted the value of considering

relationship factors as predictors of HIV transmission and as the unit for intervention. Sullivan and colleagues (2009) reported that among men who have sex with men (MSM) 68% of HIV transmissions were in the context of a main sex partnership, which is defined by the National HIV Behavioral Surveillance System as “someone who you feel committed to above all others” (p. 1155). This was contrasted with only 32% of HIV transmissions in the context of casual sex partnerships, which contradicted traditional thinking that casual relationships should be the unit for interventions among MSM. Disparities in HIV prevalence between Black and White MSM have also been poorly explained by individual behavior (Millett, Flores, Peterson, & Bakeman, 2007), and one study of young MSM aged 23-29 found that partner characteristics partially accounted for the race difference (Bingham et al., 2003). In particular, this research indicated that having had an older, Black male partner helped to explain the racial disparity in HIV rates. Taken together, these studies illustrate the value of research on characteristics of relationships and partners that may be related to HIV risk.

The current study explored the effects of relationship and partner characteristics on the frequency of unprotected sex among young MSM, who account for nearly 70% of all new HIV/AIDS diagnoses among all adolescents and young adults in the U.S. (CDC, 2010a). The CDC has estimated that HIV diagnosis rates among MSM are 60 times the rate in other men and 54 times the rate in women (Purcell et al., 2010). Furthermore, young MSM (ages 13 to 24) showed the highest increase in new infections between 2001 and 2006 (CDC, 2008), with a 93% increase among young Black MSM.

Our approach in the current study builds on prior work showing that HIV risk behaviors differ not only between individuals, but also across relationships and occasions of sex (e.g., Cooper, 2010; Mustanski, 2007; Zea et al., 2009). These studies have demonstrated that the majority of variability in condom use is within individuals, who may have protected sex with one partner but engage in unprotected sex with a different partner or in a different context. Here we focused on the sexual partnership as the unit of analyses; our approach extends the methodology used in past cross-sectional studies of adult MSM by using a longitudinal design that allowed for the inclusion of more partnerships over a longer timeframe (e.g., Zea et al., 2009). Past studies have also generally focused on one relationship factor at a time (Gorbach & Holmes, 2003), and we extended that work by simultaneously considering multiple relationship and partner characteristics, thereby estimating the relative importance of each factor when considered in conjunction with other factors.

Characteristics of the sexual partner and sexual relationship

Meeting online or offline

The earliest MSM-focused research on the effects of meeting partners online painted the Internet as a sexual “risk environment” that potentiated unprotected sex (e.g., Benotsch, Kalichman, & Cage, 2002). These studies found that men who met partners online were also more likely to report more unprotected sex or sexually transmitted infections (STIs). Later research that compared the same person’s behavior across occasions of meeting partners online versus offline found the opposite pattern—significantly less unprotected sex with partners met online (Mustanski, 2007). Other studies using event-based approaches have found no differences between partners met online or offline (e.g., Bolding, Davis, Hart, Sherr, & Elford, 2005; Chiasson et al., 2007). These inconsistent findings could reflect the fact that between- and within-person methods can produce different results. Between-person approaches that compare groups of people by their history of meeting partners online are inherently confounded by other individual differences that may explain the association (e.g., sensation seeking). Within-person approaches that examine the same individual across

multiple contexts do not have this same confound, and therefore offer a cleaner estimate of contextual effects on behavior (Affleck, Zautra, Tennen, & Armeli, 1999).

Relationship Type

Perhaps the most well-studied relationship characteristic related to HIV risk behaviors among MSM is relationship type. Studies of young MSM have consistently found more unprotected sex in committed, serious, or closer relationships compared to those that are less so (e.g., Bingham et al., 2003; Choi, Han, Hudes, & Kegeles, 2002; Hart, Peterson, & CITY Study Team, 2004; Stueve, O'Donnell, Duran, San Doval, & Geier, 2002). Although there has been much less research on the mechanisms that link relationship type to the rate of unprotected sex, the pattern has been suggested to be due to greater trust and familiarity of serious partners, the perception that condoms interfere with intimacy, and the negotiation of agreements about acceptable sexual behaviors for the partners as a strategy to increase safety (Davidovich, de Wit, & Stroebe, 2004; Hays et al., 1997; Theodore, Duran, Antoni, & Fernandez, 2004).

Notably, the effects of relationship type seem to change across development. Crepaz and colleagues (2000) found in a survey of MSM that unprotected anal intercourse (UAI) with primary partners was substantially more prevalent among men younger than 25 years of age. Sullivan and colleagues (2009) found that the proportion of HIV infections within primary relationships decreased with age, from 79% in 18-24 year-olds to 40% in >40 year-olds. They suggest this was driven by a higher proportion of undiagnosed HIV infections in young MSM and a difference in how younger MSM define main partners or the duration of those partnerships.

Emotional Aspects of Relationship, Power, and Concurrency

Feelings of intimacy, trust, and closeness that often occur in serious relationships have been suggested to explain the higher rates of unprotected sex among adult MSM in these types of relationships (Davidovich et al., 2004; Theodore et al., 2004; Zea et al., 2009). Such positive emotions in a relationship have been suggested to be an important component in wanting a relationship to last (Fletcher & Simpson, 2000). Another emotional aspect is the feeling of being trapped in a particular relationship because of perceived inability to acquire another more desirable partner. (i.e., perceived lack of partner availability; Wingood, Camp, Dunkle, Cooper, & DiClemente, 2009).

Relatively few studies have looked directly at the interpersonal issues faced by male couples in their relationships, particularly among MSM of color (Mays, Cochran, & Zamudio, 2004). Some have suggested this may be due to the assumption that it is women and not men who are vulnerable to relationship power differentials (Gorbach & Holmes, 2003). However, many of the underlying mechanisms merit investigation among young male couples, including physical and sexual partner abuse, older partners, and economic dependence. These factors can decrease an individual's ability to adopt or advocate for adoption of behaviors that reduce risk of HIV transmission. For example, asserting condom use may jeopardize financial support by the partners of economically vulnerable young MSM, and therefore their immediate needs may outweigh the later health risks of HIV infection. Similarly, past relationship violence may dissuade self-assertion and forced sex may be unprotected.

To our knowledge only two studies have investigated the association between a history of partner abuse and unprotected sex among young MSM, and both reported a significant effect (Koblin et al., 2006; Mustanski, Garofalo, Herrick, & Donenberg, 2007). Similarly, limited research has been conducted on the association between sexual partner age and HIV risk in

young MSM, but it consistently points to a positive association (Bingham et al., 2003; Morris, Zavisca, & Dean, 1995). Finally, there has been very limited research on economic dependencies and HIV risk within young male partnerships, but a large survey of young MSM found that an alarming proportion (11%) reported having exchanged sex in the last six months for “things you or they needed” (Harawa et al., 2004). However, that same study found no significant relationship between exchange sex and HIV seropositivity, possibly because of higher rates of condom use with exchange partners.

Believing that your current partner is having sex with others is likely to increase perceived vulnerability to HIV transmission, thereby increasing desire to reduce risk behaviors. Extensive research has found that concurrent partnerships clearly potentiate the epidemic spread of STIs (Gorbach & Holmes, 2003). One study of young adults found that having concurrent partnerships nearly quadrupled the odds of having a sexually transmitted infection (STI) (Gorbach, Drumright, & Holmes, 2005).

Gender of Partner

While there has been significant interest in behaviorally bisexual men as a bridge for HIV transmission (Malebranche, Arriola, Jenkins, Dauria, & Patel, 2010), there has been little research that has compared rates of unprotected sex between male and female partners. One qualitative study of Black men who had sex with men and women found that many reported not using condoms with female partners because they perceived females to be “safer” (Dodge, Jeffries, & Sandfort, 2008). However, another nationally representative study of adult behaviorally bisexual men found higher condom use at last sex with female (64%) than male (41%) partners (Jeffries & Dodge, 2007), indicating that more research is needed to understand these contradicting effects.

Drug Use Prior to Sex

Drug use is one of the most widely studied risk factors for UAI among young MSM (Mustanski et al., In Press). In a large study of nearly 3,500 young MSM, 66% reported illicit drugs use in the six months prior to the interview, 29% used drugs on a regular basis, and 28% reported polydrug use (Thiede et al., 2003). Few studies of MSM have explicitly examined within-persons variability in drug use across multiple sexual encounters or partnerships. There is some evidence that drug use prior to sex decreases the likelihood of condom use, and importantly that drug use prior to sex may vary across partnerships (Celentano et al., 2006; Drumright et al., 2006a; Newcomb, Clerkin, & Mustanski, in press; Stueve et al., 2002). That drug use is such a widely studied risk factor for UAI means that it can serve an important role in multivariate research; its inclusion in a multivariate model can establish the relative value of less studied variables, thereby helping to establish their incremental predictive validity.

The Current Study

In the current study we used data from a unique longitudinal study of LGBT youth that provided data on up to 9 partnerships over an 18-month reporting window. Our approach in the current study of treating the sexual partnership as the unit of analysis was analogous to the within-person approaches described above, and therefore we hypothesized either no effect or a protective effect of meeting partners online. We further hypothesized that being in a serious relationship, wanting it to last, and feeling stuck in the relationship would be related to higher levels of unprotected sex. In regards to relationship power, we hypothesized that less power due to economic dependence, violence, forced sex, and older partners would be associated with a higher rate of unprotected sex. Given the risks involved in having concurrent partnerships, we hypothesized that less unprotected sex would occur in

partnerships where participants believe their partner is having sex with others. Also consistent with previous research (e.g., Drumright, Patterson, Strathdee, 2006b; Newcomb et al., in press; Stueve et al., 2002), drug use in the context of a given sexual relationship was expected to increase rates of unprotected sex. Finally, we did not have specific hypotheses about the relative strength of the effect sizes of predictors of unprotected sex as the goal of this study was to estimate the relative strength of the effect sizes in a multivariate model.

Methods

Participants

Participants were a subset of young MSM from Project Q2, a longitudinal study of LGBT youth (for more information see Mustanski, Garofalo, & Emerson, 2010). Project Q2 was focused on the sexual and mental health of LGBT youth. Only male participants who reported that they had sex with males were included in the current analyses ($N = 122$). The largest percentage of young MSM identified as African American (48.4%), followed by White (18.9%), Latino/Hispanic (12.3%), Multi-racial (11.5%), Asian/Pacific Islander (2.5%), and Other (6.5%). In terms of self-reported sexual orientation, 65.6% were gay, 23.0% bisexual, and 11.4% others (e.g., queer, questioning, etc.). Mean age of the sample at baseline was 18.53 (range = 16-20; $SD = 1.21$) and 23.0% were under age 18. Seven participants (6%) reported having a known HIV positive serostatus; at baseline 81.5% of the sample reported that they had ever been tested for HIV and 60.5% in the previous 6 months. Participants reported their socioeconomic status as 10.9% “upper,” 71.4% “middle,” and 17.6% “lower.”

Recruitment and Eligibility

LGBT youth were recruited through a combination of outreach (38%) and incentivized snowball sampling (62%) in a large Midwestern city. Specifically, participants were given cards with contact information for the study, and were compensated \$10 for every eligible person they recruited into the study. Eligibility screening included a question asking, “Project Q2 is a study for lesbian, gay, bisexual, transgender and other youths who do not use these terms but have same-sex attractions. Does this include you?” Participants were *not* specifically selected for having engaged in high-risk sexual activity.

Procedure and Design

Data for this analysis were taken from three waves of data collection with 87% and 91% retention at 6- and 12-month follow-up, respectively. Participants completed measures using audio computer-assisted self-interview (ACASI) technology that collected information on characteristics of and behaviors with three sexual partners during the 6 months prior to each data collection wave. Measures were completed either in a private room at a youth center affiliated with a large LGBT community-based health center, or in a private room at a university. Analyses were conducted on characteristics associated with all sexual partners across all participants spanning the 18 months covered by questionnaires (i.e., 6 months prior to baseline interview through to the 12-month follow-up). To minimize recall bias in this retrospective approach, the self-administered questionnaire required participants to create a timeline of the previous six months by indicating unique events throughout this period. These specific events were then referenced in questions related to their sexual partnerships to help participants remember specific events surrounding their sexual experiences (Glasner & van der Vaart, 2009).

The baseline and 12-month interviews lasted approximately two hours and participants were paid \$40 for each interview. The 6-month interview lasted approximately one hour, and participants were paid \$25 dollars for their participation. The protocol was approved by the

Institutional Review Boards (IRB) with a waiver of parental permission under 45 CFR 46.408(c) (for more information on relevant IRB issues in this study see Mustanski, in press). Participants provided written informed consent/assent, and mechanisms to protect participant confidentiality were utilized (i.e., a federal certificate of confidentiality).

Measures

General Demographics—The demographics questionnaire was administered at baseline and assessed a variety of participant characteristics (e.g., age, self-reported sexual orientation).

Sexual Risk Behaviors—The AIDS-Risk Behavior Assessment (ARBA; Donenberg, Emerson, Bryant, Wilson, & Weber-Shiffrin, 2001) is a computerized self-administered interview designed to assess self-reported sexual and drug behaviors associated with HIV infection among youth. The use of ACASI technology prevents the need for interviewers to ask sensitive questions. The sexual risk outcome variable used for analyses was a count of the total number of unprotected anal or vaginal sex acts within each sexual partnership.

Partner and relationship characteristics—The ARBA was also adapted for this study to embed characteristics of the partner and relationship. Relevant partner characteristics include sex (female = 1) and age difference when sex was initiated (He/She was... -1 = younger than you; 0 = the same age; 1 = 1-2 years older than you; 2 = 3-4 years older than you; 3 = 5 or more years older than you) and if the partner was known to be HIV positive. Relevant relationship characteristics included the venue where the partner was met (0 = offline; 1 = online) and if the partner was considered “casual” (0) or “serious” (1). Serious partners were defined as “someone with whom you’ve had an ongoing relationship with, like a lover, boyfriend or girlfriend, or someone you dated for a while and feel very close to.”

Drug Use—Participants were asked: “How frequently did you use drugs before having vaginal, anal, or oral sex with partner [initials]?” with a 5-point Likert scale (0 = “never” to 4 = “always”). This variable did not assess alcohol use. For discussion of the effects of alcohol use on unprotected sex in this sample, see Newcomb et al. (in press).

Violence and Forced Sex—Violence in the relationship was assessed by asking if the partner ever “hit, slapped, punched, or hurt you?” Forced sex was assessed by asking, “Did this partner ever force you to have vaginal, anal, or oral sex when you didn’t want to?” with “force” defined as, “physical and non-physical pressure, such as pushing you, arguing with you or threatening you in order to have sex.”

Relationship Status—If the relationship was categorized as serious, then participants were asked five questions about power, emotional dynamics, and concurrency. Items were adapted from the Sexual Relationship Power Scale (Pulerwitz, Gortmaker, & DeJong, 2000) based on prior literature on HIV risk behaviors in young MSM. Items included: 1) I really wanted my relationship with this person to last; 2) I felt trapped or stuck in my relationship with this person; 3) My partner was having sex with someone else; 4) My partner paid for things I really wanted or needed; 5) When my partner and I disagreed, my partner got his/her way most of the time. The response option ranged from 0 (strongly disagree) to 3 (strongly agree).

Initials were provided for each partner at each wave of data collection. If initials matched those of a partner at a previous wave, we further investigated if demographic characteristics of the partner also matched. In those cases where there was a match in initials and

demographic characteristics of partners across waves, we coded the partner as a repeat partner (1).

Analyses

Analyses were conducted using Hierarchical Linear Modeling (HLM) statistical software and procedures outlined by Raudenbush and Bryk (2002). HLM is well suited to this design because it can account for dependency in observations in data that contains a nested or multilevel structure. In this case, characteristics of sexual partnerships (Level 1) are nested within participants (Level 2). Maximum likelihood estimation was used to model frequency of unprotected sex as the dependent variable. A Poisson distribution was used in estimating the count of unprotected sex acts and the model also accounted for over-dispersion in the outcome variable. Estimates were made from the population-average model using robust standard errors.

Results

Three participants were removed because of missing data from their baseline interview, and five participants were dropped from analysis because they had not engaged in any sex in the six months prior to each of the three waves of data collection. The remaining 117 participants reported a total of 416 sexual partnerships across all three waves of data collection. Data for the dependent variable was missing on three of these partnerships, so our analytic sample includes 413 partnerships. Participants had a median of one sexual partner per 6-month wave, and 6% of participants reported having more than three sexual partners at any wave. Detailed relationship data was collected on three partners per wave, meaning that this dyad-level analysis included the vast majority (94%) of our participants' sexual partnerships during the 18-month window.

Table 1 shows the characteristics of partners and relationship factors across all sexual partnerships. On average, participants had 5.74 episodes of unprotected sex in each partnership; the intraclass correlation (ICC) indicated 29% of the variance was across participants and 71% across partnerships. Very few partners (2%) were reported to be known to the participant as HIV positive, and therefore this variable was deemed too infrequent to include as a predictor in the HLM models. On average, sexual partners were described as 1-2 years older than the participant ($M = 1.13$), with the majority of the variance in partner ages across partnerships ($ICC = .31$). Drug use prior to sex was infrequent on average; we previously reported the most common drug used by this sample was marijuana ($M = 48$ days in prior 6 months), then stimulants/uppers ($M = 9$ days), and then cocaine ($M = 7$ days) and that the majority of variance was due to between-subject factors (Newcomb et al., in press). Approximately half of relationships were considered serious, with participants reporting a mean of 1.75 ($SD = 1.23$) serious relationships within the 18-month window (20% had zero, 23% one, 27% two, 23% three, 6% four, and 1% five). Within these serious relationships, participants most strongly agreed with the feeling that they wanted their relationship to last and most strongly disagreed with the statement that their partner was having sex with someone else. Most of the variability in serious relationship factors was across partnerships, rather than being stable within participants (average $ICC = .17$).

Table 2a shows the results of the multivariate HLM model predicting the rate of unprotected sex in a given sexual partnership. By far the largest effect was for identifying the relationship as "serious" (vs. "casual"), with these types of partnerships having nearly eight times the rate of unprotected sex relative to casual relationships. Continuing a partnership across the 6-month window between assessments showed an independent effect of 1.62 times the rate of unprotected sex. The next largest effect was for being forced to have sex,

event rate ratio (ERR) = 5.46, although its rarity (2% of partnerships) led to a wide confidence interval for this effect. Similarly, physical aggression in a relationship increased the rate of unprotected sex reported (ERR = 1.88). Older partners also significantly increased the rate of unprotected sex by 20% at each step of moving from a younger partner, to a same age partner, to partners 1-2, 3-4, or 5 or more years older. Female partners and having met a partner online did not significantly alter the rate of unprotected sex. Finally, consistent with findings from Newcomb et al. (in press), drug use prior to sex significantly increased the rate of unprotected sex (ERR = 1.45), although in this multivariate model the effect was more modest than other partner and relationship characteristics.

Table 2b reports results of HLM models of items only asked in serious partnerships ($N = 205$). Due to less available data, the effects are reported from bivariate analyses. Of the five variables tested, three significantly predicted the rate of unprotected sex across serious relationships. Wanting the relationship to last was associated with a significant doubling of the rate of unprotected sex, whereas the more participants believed their partner was having sex with someone else, the less frequently they had unprotected sex (ERR = 0.68). The more that participants felt that their partner had the power to make decisions when there was a disagreement, the more often unprotected sex occurred (ERR = 1.32). Neither the extent to which a participant felt trapped in a relationship nor the extent to which they believed their partner paid for things was significantly related to the rate of unprotected sex.

Several supplemental analyses were conducted to test for the robustness of the results of our multilevel models. To test the effects of dependency of repeated partnership across waves, we re-estimated our models after deleting repeat partners from the dataset. Deleting these 8% of cases made little difference to the magnitude or significance of the effects already described, with the exception on being physical abused by the partner becoming nonsignificant (ERR = 1.24, $p = 0.61$) and partner making the decision when there was a disagreement also becoming nonsignificant (ERR = .95, $p = .63$). We further tested for robustness of effects by winsorising the outcome variable (i.e., frequency of unprotected sex) at three standard deviations from the mean to reduce possible effects of outliers (range 0 to 99). The pattern of results remained unaltered. We tested the effects of only including the 88% of sexual partnerships that were with another male. The results remained largely unchanged, although there was an increase in the effect of the partnership being considered serious (ERR = 10.08, $p < .001$) and a decrease in the effect of forced sex (ERR = 2.47, $p < .001$).

Discussion

This is the first study to our knowledge to use longitudinal data to explore the effects of multiple relationship factors within young MSM across numerous sexual partnerships. In this context, the most important predictor of unprotected sex was classifying the relationship as serious. In fact there was almost no unprotected sex occurring in relationships classified as casual. This effect is important because across an 18-month window, 80% of young MSM had at least one serious relationship and nearly one-third had three or more serious relationships. Seriousness of the relationship had an independent effect when simultaneously evaluating the effect of a partnership lasting across the six months between assessments. Because only 8% of relationships were repeated across waves we can assume that the majority of serious relationships were classified as such before the dyad achieved a 6-month history of sexual contact. Taken together, our findings suggest young MSM are likely to classify a relationship as serious in less than six months of sexual contact, have multiple serious relationships within 18 months, and that such relationships are characterized by substantially higher rates of unprotected sex. These findings are consistent with prior cross-sectional studies of young MSM (Choi et al., 2002; Hart et al., 2004; Hays et al., 1997) and

evidence that nearly 80% of HIV transmissions among 18 – 24 year old MSM are from main partners (Sullivan et al., 2009).

We also conducted novel analyses on processes within serious relationships that may explain increased rates of unprotected sex. Consistent with our hypotheses, greater desire for the relationship to last and feeling less power to make decisions both significantly increased the rate of unprotected sex. Wanting a relationship to last implies greater feelings of intimacy and closeness, as well as the hope that this may be a sustained, long-term relationship. Such emotional factors have been suggested to underlie the effects of relationship type on unprotected sex among adult MSM (Davidovich et al., 2004; Theodore et al., 2004; Zea et al., 2009) and may therefore have similar effects in young MSM. Feeling less power to make decisions in a relationship has been implicated in lack of condom use in adult women (Pulerwitz et al., 2002) and appears to have similar effects among young MSM. Lack of power can reduce the agency of a young man to assert condom use or avoid unprotected anal sex.

Individuals within sexual networks in which there is greater partner concurrency are at greater risk for contracting STIs (Gorbach & Holmes, 2003). From the perspective of preventing transmissions, it was encouraging to find that believing a partner was having sex with others decreased the rate of unprotected sex. This suggests that young MSM use their beliefs about sexual fidelity to make decisions about the need for condom use within the relationship. On the other hand, it is not possible to be certain that a partner is not having sex with others. In such cases, untrue beliefs that a relationship is sexually monogamous could lead to HIV/STI infection.

Based on research with Black heterosexual women that suggested a relationship between concerns about availability of male partners and HIV risk behaviors (Wingood et al., 2009), we hypothesized that if participants believed they had few options for other relationships, and therefore felt trapped in their current one, they may have been more likely to acquiesce to unprotected sex. Contrary to our hypothesis, there was no significant bivariate relationship in our sample of mostly racial-minority young MSM. Similarly, we hypothesized that having a partner who provided financial support could decrease condom use, but there was no significant relationship. The lack of such effects may reflect the fact that there was low endorsement of feeling trapped or having partners who paid for things.

Across all relationship types, the second most important predictor was being forced to have sex. Such relationships had more than five times the rate of unprotected sex, although it is important to acknowledge that these relationships were rare (2%). It is also important to consider the item wording, because it could present a range of situations from physically forced to verbally pressured. In 11% of relationships the young men reported being the recipient of physical violence and aggression, and this also was associated with a significantly higher rate of unprotected sex. Few studies have explored the effects of sexual partner violence on HIV risk behaviors in men, although at least three studies have reported cross-sectional associations consistent with our results (Braitstein et al., 2006; Koblin et al., 2006; Mustanski et al., 2007).

When including all relationship types, our model predicted a significant increase of six times the rate of unprotected sex from younger partners to those that were five or more years older. Epidemiological studies have found that sex with older partners is associated with acquiring HIV infections among MSM (Hurt et al., 2010) and prior cross-sectional studies have reported an increase in unprotected sex (Bingham et al., 2003). We extended these findings by testing the effect within-persons across multiple relationships, thereby addressing the potential confounding effects of individual differences that may make a

young man both more likely to have sex with an older partner and to have unprotected sex. Combined with the epidemiological data on HIV transmissions, our findings suggest that these partnerships may be a particular risk factor for HIV infection in young MSM, in that older partners are more likely to be HIV positive and unprotected sex occurs more frequently. It will be valuable for future research to focus on the factors that help to explain why having an older partner may place one at an elevated risk for engaging in unprotected sex (e.g., economic disparity, education differences, etc.).

We explored the effects of drug use prior to sex for two reasons. First, drug use has been one of the most consistent predictors of HIV risk behaviors among young MSM (Mustanski et al., In Press), and therefore it helps to contextualize the effect sizes found for our relationship factors in terms of their incremental predictive validity. Second, most prior research on drug use and HIV risk in young MSM has been cross-sectional; therefore our findings extend this literature by using a longitudinal approach. In this sample, greater frequency of drug use prior to sex significantly predicted a greater rate of unprotected sex with a given partner, but the effect was not as large as other relationship dimensions such as relationship type. This may have been related to the relatively infrequent levels of drug use in the current sample.

Meeting a partner online did not significantly change the rate of unprotected sex with that partner, compared to partners met through other means. Past research has produced inconsistent results for this association, with diary and event level studies producing different results than cross-sectional and retrospective studies (Mustanski, 2007). Our results are consistent with the conclusion of Mustanski (2007) that while *individuals* who seek partners online may tend to have more episodes of sex and more partners, *partners* met online are not associated with greater risk taking. In fact, qualitative research with young MSM reported greater mistrust and resulting desire to use condoms with partners met online (Mustanski, Lyons, & Garcia, In Press).

Approximately 12% of partners reported in this longitudinal study were female, but the sex of partner was not significantly related to the rate of unprotected sex after controlling for the effects of other partner and relationship characteristics. To our knowledge, this is the first study to use a longitudinal within-person approach to compare the rate of unprotected sex between male and female partners among MSM who also have sex with women. More research is needed to understand the interpersonal dynamics that drive decision making about condom use with partners of both sexes in order to develop interventions for behaviorally bisexual men that can prevent transmission to and from male and female partners.

There has been a call for greater attention to the use of couples as the unit of HIV prevention (Karney et al., in press). Our findings suggest that serious relationships are the context in which most unprotected sex is occurring in our sample of urban, primarily racial-minority, young MSM. This, coupled with evidence that 80% of transmissions occur in these types of relationships (Sullivan et al., 2009), points to serious relationships as being a potentially powerful context for prevention. Before such interventions can be developed, however, more formative research will be required to understand how to address the relatively frequent turnover in serious relationships at this age. If the dyad is the unit in an intensive intervention, how do you structure a program to account for one or both members of the dyad potentially being in a relationship with another partner after several months? Our results also point to several important topics that should be addressed in interventions for young MSM, including having older partners, using drugs prior to sex, physically abusive partners, sexual coercion, partner concurrency, and relationship power.

While our results show that HIV risk is associated with serious relationships, this detrimental effect must be interpreted in the context of the other emotional and health benefits that can come with being in a close and positive romantic relationship. Prior research has shown that being in intimate relationships may buffer against stressful life experiences that contribute to physical and mental health problems (see Misovich, Fisher, & Fisher, 1997 for discussion). In addition to emotional intimacy and support, the sexual satisfaction that can come with being in a romantic relationship motivates coupling and may have positive effects on wellbeing.

Our approach in this study also offers insight into methodology for HIV behavioral research. The intraclass correlations for the relationship and partner characteristics included in this study suggest that the majority of the variability was across partnerships rather than within individuals. This finding highlights the value of using our relatively novel partner-by-partner analytic approach, as opposed to the more traditional approach of collapsing risk behaviors and predictors across multiple partners. Our findings suggest collapsing across partners will tend to obscure the majority of variability. Our approach took advantage of partner-by-partner data collected at multiple waves in a longitudinal study, but longitudinal data are not a requirement to implement this approach. For example, similar analyses have been conducted with partner-level data in a cross-sectional study (Zea et al., 2009). We recommend greater use of the current partner-level analyses in future HIV behavioral research.

There are several limitations of the current study that must be acknowledged. First, our non-random sample was predominantly racial and ethnic minorities and was collected in a large Midwestern city. As such, our findings may not be representative of all young MSM. Second, we relied on the use of a single member of the dyad to report on the relationship characteristics and the frequency of unprotected sex within the dyad. While there would be some serious logistical issues in attempting to enroll both members of the dyad in the study, we plan to explore the feasibility and value-added of doing so in future research. Third, there were insufficient HIV positive participants and partners to model effect of serostatus as a within- or between-person effect. Finally, we were unable to test differences in our models as a function of the *participants'* developmental stage (i.e., younger vs. older adolescents) due to the limited range in age and less power to detect between-person effects.

Despite these limitations, this study advances understanding of the important role of relationship and partner characteristics in HIV risk behaviors among the understudied and high risk group of young MSM. It provides novel information about the relative importance of these factors for the design of future dyad-level interventions or individual-level interventions that attend to relationship factors. It also illustrates a relatively novel and promising methodological approach to studying partner and relationship characteristics in HIV behavioral research.

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Table 1

Partners and relationship factors across all sexual partnerships

	<i>Mean</i>	<i>SD</i>	<i>%</i>
<u>Variables asked of all partnerships (<i>N</i> = 413)</u>			
Frequency of unprotected vaginal or anal sex (count)	5.74	32.56	
Partner met online (dichotomous)			25%
Serious relationship (dichotomous)			49%
Female partner (dichotomous)			12%
Partner age difference (ordinal)	1.13	1.32	
Drug use prior to sex with partner (ordinal)	0.64	1.16	
Hit, slapped, punched, or hurt by partner (dichotomous)			11%
Forced to have sex when didn't want to (dichotomous)			2%
Partner repeated from prior 6-month wave (dichotomous)			8%
<u>Variables asked of serious partnerships (<i>N</i> = 205)</u>			
Wanted relationship with partner to last (ordinal)	2.42	0.92	
Felt trapped or stuck in relationship (ordinal)	0.81	0.94	
Partner was having sex with someone else (ordinal)	0.79	0.95	
Partner paid of things wanted or needed (ordinal)	1.52	1.04	
When disagreed, partner got his/her way (ordinal)	1.32	0.87	

HLM models of the effects of partner and relationship characteristics on rate of unprotected sex 2a. Multivariate HLM model of the effects of partner and relationship characteristics on rate of unprotected sex in a given sexual partnership ($N = 413$ partnerships)

Table 2a

Fixed Effect	Event RateRatio	95% Confidence Interval	Coefficient Value	Standard Error	p value
Intercept (rate of unprotected vaginal or anal sex)	0.57	0.38 – 0.87	-0.56	0.21	< .01
Serious relationship	7.82	5.60 – 10.92	2.06	0.17	< .001
Female partner	2.93	0.47 – 18.30	1.08	0.93	.25
Partner age difference	1.20	1.02 – 1.40	0.18	0.08	< .05
Drug use prior to sex with partner	1.45	1.15 – 1.84	0.37	0.12	< .01
Hit, slapped, punched, or hurt by partner	1.88	1.13 – 3.13	0.63	0.26	< .05
Forced to have sex when didn't want to	5.46	1.64 – 18.25	1.70	0.61	< .01
Partner repeated from prior 6 month wave	1.62	1.17 – 2.24	0.48	0.17	< .01
Partner met online	0.81	0.48 – 1.35	-0.21	0.26	.41

HLM models of the effects of partner and relationship characteristics on rate of unprotected sex 2b. Bivariate HLM models of the effects of relationship power on rate of unprotected sex in a serious partnership (*N* =205 partnerships)

Wanted relationship with partner to last	2.01	1.46 – 2.76	0.70	0.16	< .001
Felt trapped or stuck in relationship	1.04	0.81 – 1.33	0.04	0.13	.78
Partner was having sex with someone else	0.68	0.49 – 0.93	–0.39	0.16	< .05
Partner paid of things wanted or needed	0.87	0.70 – 1.08	–0.14	0.11	.20
When disagreed, partner got his/her way	1.32	1.01 – 1.75	0.28	0.14	.05