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Early male partnership patterns, social support, and sexual risk behavior among young men who have sex with men

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Abstract

Few data exist on the early sexual behavior patterns of contemporary young men who have sex with men (YMSM), the social context of these patterns, and which of these factors influence risk for HIV and other sexually transmitted infections (STI). We enrolled 94 YMSM (age 16–30) into a one-year cohort study with serial online retrospective surveys and HIV/STI testing. The first 3 partnerships of YMSM were characterized by relatively high rates of unprotected anal sex and a rapidly expanding sexual repertoire, but also increasing rates of HIV status disclosure. During follow-up, 17% of YMSM reported any nonconcordant unprotected anal intercourse (NCUAI) and 15% were newly diagnosed with HIV/STI. Sex education in high school and current maternal support were protective against HIV/STI, while isolation from family and friends was associated with recent NCUAI. Social support – including from parents, peers, and school-based sex education – may help mitigate HIV/STI risk in this population.

Keywords

young men who have sex with men; sexual behavior; sexually transmitted infections; HIV; cohort

Introduction

Adolescence and the transition into early adulthood are likely to be a vastly different experiences for contemporary young men who have sex with men (YMSM) as compared with earlier generations. YMSM who came of age in the past decade did so in the context of expanding civil rights for sexual minorities and an overall improvement in attitudes toward homosexuality (1). For most YMSM, adolescence and early adulthood overlap with the “coming out” process (disclosure of sexual identity). Sexual partnership patterns that develop during this critical period, and the social context in which they form, are important to understand with respect to HIV/STI risk. Data collected in the mid-1990s found that many YMSM engage in high-risk sexual behaviors soon after sexual debut (2) and that early age at coming out was associated with prevalent HIV infection (3). More recently, Mustanski *et al.*

followed a cohort of YMSM and associated unprotected anal sex with several relationship factors, including having an older partner, drug use prior to sex, physical abuse, and forced sex (4). A growing body of literature suggests that family and peer support may promote safer sexual behaviors among YMSM (5–8). Given the recent data suggesting that HIV diagnoses among YMSM may be increasing (9), it is important to describe early partnership patterns, social support factors, and their potential associations with sexual risk behaviors among YMSM today.

Similar questions have been investigated among heterosexual youth using the National Longitudinal Study of Adolescent Health (Add Health) study (10), a population-based prospective study of young Americans. However, no similar data exist for MSM. Such data would ideally be collected through a cohort study enrolling YMSM soon after the initiation of sexual activity. Although a handful of prospective cohort studies have enrolled YMSM (4,11–17), to our knowledge, none has specifically enrolled MSM near the time of sexual debut.

We conducted a one-year cohort study of YMSM enrolled near the time of their same-sex sexual debut. Our specific objectives were to: 1) describe the characteristics of a contemporary cohort of YMSM, 2) describe MSM early partnership patterns, how they change across partnerships, and what predicts the highest risk patterns, 3) explore if patterns of early risk are associated with later sexual risk behavior as well as with new diagnoses HIV or other sexually transmitted infections (STI), and 4) assess the role of adolescent and current social support in HIV/STI risk.

Methods

Study Population, Recruitment, and Screening

Development And Sexual Health (DASH) study participants were eligible if they: were males aged 16–30 years, spoke English, intended to remain in the Seattle area for one year, had ever had sex with another male (defined as mutual masturbation or oral or anal sex), and either reported 10 lifetime male partners or were within 5 years of their same-sex sexual debut. The plurality (37%) of eligible participants heard about the study through Facebook advertisements; 21% were referred by another participant, 14% from community- or college-organizations, 10% through the PHSKC STD Clinic, and 18% through other means.

Study Procedures

The study consisted of HIV/STI testing at the PHSKC STD Clinic at baseline, 6-, and 12-months; web-based retrospective surveys at baseline and every 3 months; and web-based diaries. (Results from the study's diary component are reported elsewhere (18).) At the baseline visit, participants provided written informed consent and detailed contact information. Baseline and follow-up surveys were accessible through a password-protected online survey account using Illume software (DatStat, Inc., Seattle, WA). The Human Subjects Division at the University of Washington approved all study procedures, including a waiver of parental consent for participants age 16–17.

Measures

The baseline and 3-month follow-up surveys included questions about demographics, sexual history, and contextual factors that we identified *a priori* as potentially influencing sexual risk behaviors among YMSM. Specifically, we asked about current maternal and paternal support related to the participant's sexuality and, if applicable, support when he first disclosed his sexual identity. (Throughout the paper we refer to this as "coming out" or when the participant "came out".) Gay-related harassment questions were based on those in the Urban Men's Health Study and asked about being called names, having rumors spread, being excluded, or being threatened prior to age 16 (3). We asked about attendance in sex education courses in middle and high school and participation in a high school LGBT (lesbian, gay, bisexual, and transgender) group. We used two 3-item questionnaires from the Lubben Social Network Scale to measure current social isolation from family and friends (19). This tool quantified the number of family and friends (separately) with whom a participant was in communication, could call for help, or could share private information; reporting 5 across all 3 domains was classified as "isolation". Current depression symptoms were evaluated using the 10-item Center for Epidemiologic Studies Short Depression Scale (20). We classified participants as current alcohol abusers if they answered "yes" to 2 of the items on the 4-item CAGE (cut-down, annoyed, guilty, eye-opener) questionnaire (21). We also asked about any marijuana, poppers, powder cocaine, or methamphetamine use in the past 6 months.

To describe early sexual partnership patterns, we used partner-specific responses from each participant's first 3 sexual partners. These modules asked about both male and female partners, but due to a small number of reported female partners (n=36) we restricted our primary analyses to only male partners. Therefore, not all participants have data for 3 male partners. For each partner, we asked: participant and partner's age at the start of the partnership, how he met the partner (through friends, family, school, Internet, or another means), how long he knew the partner before they first had sex, partnership duration, if he ever felt forced into sex, anal sex repertoire (insertive and/or receptive), condom use (always or not), and if he and/or his partner ever disclosed their HIV status to one another. We also asked about partnership type (main, regular, friend, acquaintance, one-time, unknown, trade, or other) (22). For this analysis, partners were categorized by whether or not they were a main partner, defined as "your boyfriend, your only sex partner, or the partner you consider to be the most important if you have more than one partner".

Additional sexual behavior data collected at baseline and during follow-up visits were not partner-specific. Instead, each survey included identical questions about aggregate sexual behavior during the prior 3 months. To describe current sexual risk behavior, we calculated if in the past 3 months a participant had engaged in unprotected anal intercourse with a partner whose reported HIV status was unknown or different from the participant's HIV status (i.e., "non-concordant unprotected anal intercourse" (NCUAI)). Using similar questions in a clinical context, our group has previously associated NCUAI with the risk of testing HIV-positive (23). To measure NCUAI, participants were asked in separate questions if they had engaged in insertive and/or receptive anal sex with partners whose HIV status was positive, negative, or unknown during the prior 3 months. For each of these

combinations, we asked if condom use was “always, usually, sometimes, or never”. If a participant indicated anal sex with a partner of discordant or unknown HIV status, and did not always use a condom, we classified that as having engaged in NCUAI in the past 3 months. (For the 2 participants who were newly diagnosed with HIV infection during the study, we assumed that they did not learn about their own status until the study visit when they were diagnosed.) We created a cumulative estimate of NCUAI over the 3 months prior to the baseline survey plus the 12 months of follow-up.

Laboratory Methods and HIV/STI Diagnosis

All participants were offered testing for HIV infection, *Chlamydia trachomatis*, *Neisseria gonorrhea*, and syphilis at baseline, 6- and 12-months. HIV tests were performed using enzyme immunoassays (Vironostika HIV-1 Microelisa System, bioMerieux, Durham, NC) or rapid tests (Oraquick) with confirmatory Western blots (Bio-Rad, Redmond, WA). Per clinic routine, participants also received pooled HIV RNA testing (Procleix HIV-1 Discriminatory Assay, Gen-Probe Inc., San Diego, CA) (24). Men testing positive by HIV RNA alone underwent subsequent confirmatory testing. We used culture to test for rectal gonorrhea, pharyngeal gonorrhea, and rectal chlamydial infection, and Aptima Combo2 (Gen-Probe Inc., San Diego, CA) to test for urethral gonorrhea and chlamydial infection. We tested for syphilis using RPR with confirmatory TPPA. Our composite endpoint of any HIV/STI included a new diagnosis of HIV, syphilis, or chlamydia or gonorrhea at any anatomical site.

Statistical Analysis

In our partner-level analysis, we focused on the participant’s first 3 male partners, including partner-specific and cumulative frequencies. To test for a linear trend across partners (i.e., did the reported behavior increase or decrease with subsequent partners), we used generalized estimating equations (GEE). Because each participant could provide data for up to 3 partners, GEE accounts for correlation across partners. We calculated odds ratios (OR) adjusted for race and participant age and calendar year at the start of the partnership. We also estimated the partner-level association between early partnership characteristics and current risk, defined as any NCUAI or any HIV/STI diagnosis during the present study, using GEE. Finally, we evaluated the association between partnership characteristics, contextual factors during adolescence and the present, and two outcomes measured during the study – NCUAI in the past 3 months and a new HIV/STI diagnosis. NCUAI was measured at baseline and in every 3-month follow-up survey, so GEE incorporates repeated measurements of both the sexual risk outcomes and contextual exposures. New HIV/STI was only measured at baseline and every 6 months, so these models only included the follow-up surveys associated with these visits. For all analyses that used GEE, we used an independent correlation structure with robust standard errors to calculate p-values and confidence intervals (CI). Given the relatively small cell sizes for the models with NCUAI and HIV/STI outcomes, we were unable to construct multivariate models. Of note, there were no significant associations between race and the prevalence of NCUAI or HIV/STI.

Because some YMSM answered questions about more early male partners than others, there is the potential for bias if participants with data for 1–2 early partners were systematically

different from those with data for 3 partners. We conducted a sensitivity analysis by restricting the GEE models to the 63 participants with data for 3 early male partners. The point estimates and p-values were nearly identical so we presented estimates from the full cohort.

All analyses were conducted using StataSE 13 (StataCorp, College Station, Texas, USA).

Results

Recruitment and Retention

From January-December 2009, we screened 177 individuals by telephone; 103 (58%) were eligible, and 95 (92%) enrolled in the study. Of those who were eligible, 58.3% reported 10 male lifetime partners (median=7, range=1–200) and were within 5 years of their same-sex sexual debut (median=3 years, range=0–16), while 20.4% and 21.4% met only the first or second criteria, respectively. Between 81–95% of participants completed each 3-month follow-up survey, and 85–91% attended each HIV/STI testing exam. One enrolled participant was later found to be ineligible and excluded from subsequent analysis.

Cohort Characteristics, Recent Risk Behaviors, and New HIV/STI Diagnoses

The mean age of the 94 participants was 21 years, with 49% aged 20 years (Table 1). Forty percent of participants were Latino and/or non-white, and 84% identified as gay.

The vast majority (98%) of YMSM had ever come out to someone, and nearly one-third did so before age 16. Among the 81% who had come out to at least one parent (or parental figure), >75% of mothers and fathers were at least somewhat supportive of their son's sexuality when he first came out. This support had increased at the time of the baseline survey, particularly among mothers. Despite this, 30% of participants were classified as being isolated from family, although current isolation from friends was rare (5%). Gay-related harassment prior to age 16 was common.

At baseline, 20% of YMSM reported any NCUAI during the previous 3 months. In each of the 4 follow-up surveys, between 4–11% reported NC UAI in the prior 3 months, and across the 12 months covered by these surveys, 17% reported any NC UAI.

Across the 3 HIV/STI testing exams, we identified 7 cases of chlamydial infection, 6 cases of gonorrhea, 1 case of early syphilis, and 3 newly diagnosed HIV infections. Taking into account co-infections, 15% of YMSM were newly diagnosed with HIV/STI during the study. One participant knew he was HIV-infected prior to enrollment.

Characteristics of Early Partners

The majority (85%) of YMSM reported that their first sexual partner was male, and 96% had 1 male among their first 3 partners. Accounting for the duration of the reported male partnerships, these data span an average of 2.2 years (median=1, range=1–11) of same-sex sexual activity.

Nearly one-third (31%) of YMSM first had sex with a male before age 16 (mean=16.8 years) (Table 2). Ten percent reported that their first male partner was 10 years older, and 20% indicated this for 1 of their first 3 male partners. There were no notable differences in the ages at the start of partnerships between YMSM whose partners were 10 years older and those with partners closer in age. Across subsequent partnerships, the proportion of partners found online significantly increased, while the proportion of partners met at school significantly decreased. Knowing partners for 1 day before having sex was common and the frequency increased among later partnerships.

Considering participants' cumulative sexual experience with their first 3 male partners, 53% engaged in both insertive and receptive anal sex, 17% in receptive anal sex only, and 9% in insertive anal sex only. Overall, 40% engaged in both unprotected insertive and receptive anal sex, 7.5% in unprotected receptive anal sex only, and 7.5% in unprotected insertive sex only. Forty-two percent reported telling their first male partner their HIV status, and 48% of first male partners reported their own HIV status. The frequency of both participant and partner HIV status disclosure increased significantly across subsequent partners.

Although early female partners were not included in the partner-level analyses, 23 (24%) YMSM described 36 female partners. Among these YMSM, 17 (74%) had vaginal sex, 14 (61%) performed oral sex, 21 (91%) received oral sex, and 1 (4%) had anal sex with these partners; 76% of YMSM who had vaginal sex reported having sex at least once without a condom. YMSM with an early female partner were older at enrollment (22.3 vs. 20.7 years, $t=-2.02$, $p=0.047$) and had a slightly younger age at (any) sexual debut (15.4 vs. 16.8 years, $t=1.78$, $p=0.080$) than YMSM with only male partners. However, age at same-sex sexual debut was similar between these two groups (16.9 vs. 16.8 years, $t=-0.194$, $p=0.846$).

Patterns and Predictors of Non-concordant Unprotected Anal Intercourse among Early Partners

Twenty-seven (29%) YMSM reported NCUAI with 1 early male partner in their survey (Table 2). Four of these YMSM reported unprotected anal sex with a partner whose HIV status was disclosed but unknown ($n=3$) or positive ($n=1$), while the remaining cases of NCUAI were due to lack of disclosure.

Coming out before age 16 (OR=2.8, 95% CI: 1.1–7.3, $p=0.030$) and first having sex with another man before age 16 (OR=3.4, 95% CI: 1.3–9.0, $p=0.011$) were associated with having NCUAI with 1 of a participant's first 3 partners. Having attended a sex education course in middle school was significantly associated with lower risk for NCUAI (OR=0.3, 95% CI: 0.1–0.98, $p=0.045$).

Predictors of NCUAI and Testing Positive for HIV/STI During Study Follow-up

Ever having NCUAI with an early male partner was positively associated with NCUAI during the year-long study (OR=4.1, 95% CI: 1.7–9.9, $p=0.001$), while ever having unprotected receptive anal sex was significantly associated with HIV/STI diagnosis (OR=2.2, 95% CI: 1.2–4.0, $p=0.013$).

Among contextual factors during adolescence, only sex education attendance during middle and high school were significantly associated with lower rates of NCUAI and HIV/STI, respectively (Table 3). YMSM who came out to their fathers were more likely to report recent NCUAI, and there was a similar trend among YMSM who came out to their mothers. However, among YMSM who came out to their parents, those who reported mothers that were currently extremely supportive of their sexuality were significantly less likely to test positive for HIV/STI, and there was a similar, but non-significant, trend observed for current paternal support. NCUAI in the past 3 months was also significantly associated with social isolation among both family and friends, recent gay-related threats, alcohol abuse, and use of poppers and cocaine in the past 3 months.

Discussion

In this prospective study of YMSM enrolled relatively early in their sexual life course, we found that early male partnerships were characterized by a rapidly evolving and increasingly risky sexual repertoire. Moreover, during the one-year study, one in seven participants was newly diagnosed with HIV/STI. At the same time, YMSM adopted increasing levels of some protective behaviors, with the frequency of HIV status disclosure rising across consecutive partnerships. We were encouraged to find that parental support related to the participants' sexuality was relatively high and that current maternal support was significantly associated with lower risk for HIV/STI. Furthermore, sex education during middle school was protective against early and recent NCUAI, while high school-based sex education was protective against recent HIV/STI. Overall, while a high proportion of YMSM engaged in risky sexual behaviors at or soon after their sexual debut, there is evidence that positive social support may mitigate some of this early HIV/STI risk.

We framed our study design and analysis using a life course perspective, which posits that exposures during critical periods influence subsequent disease risk (25). As has been demonstrated in a large cohort of heterosexual youth (26), and a limited number of studies among MSM (3,27), these early partnership patterns may be predictive of subsequent patterns. In the present study, we found a significant association between having NCUAI with an early partner and current NCUAI, as well as between early unprotected receptive anal sex and newly diagnosed HIV/STI. This suggests that HIV/STI prevention interventions targeted early in the life course of MSM may have both immediate and long-term benefits.

One potential mechanism for early intervention is school-based sex education. We observed strong protective effects associated with both middle and high school sex education. While our finding requires further confirmation, it adds to the evidence supporting school-based sex education as a potentially important opportunity for HIV/STI prevention in YMSM. There have been numerous studies – including two systematic reviews (28,29) and a recent evaluation of National Survey of Family Growth data (30) – demonstrating the benefits of comprehensive sex education among youth. More specific to YMSM, a 2001 study using the Massachusetts Youth Risk Behavior Survey found that lesbian, gay, and bisexual youth who had gay-sensitive HIV education reported fewer sexual partners, less recent sex, and less substance use before last sex than other students (31). Future research should seek not just to

confirm these findings among contemporary sexuality minority youth, but also evaluate the effect of gay-sensitive sex education on attitudes and behaviors toward sexual minority youth among *heterosexual* youth. In settings where gay-inclusive sex education is not feasible to implement, an alternate approach may be to utilize web-based, individually-tailored HIV/STI prevention tools, similar to those recently evaluated by Mustanski *et al* (32).

Gay-related harassment and abuse were alarmingly common among men in our cohort. The prevalence of harassment for being gay was similar to that reported by YMSM using identical questions in the Urban Men's Health Study, which was conducted over a decade earlier (3). Although harassment prior to age 16 was not significantly associated with sexual risk, we did observe a significant association between current threats and NCUAI. This finding is discouraging and highlights the need for additional efforts to assure the safety of YMSM.

Isolation from family and friends was associated with increased sexual risk behavior. Although this small study was unable to explore the mechanisms for this, other research has investigated the role of social isolation on health outcomes among sexual minority youth. For example, Hatzenbuehler *et al.* found an association between social isolation and depression among YMSM and hypothesized that the impact of social networks may be greater among YMSM than other youth subpopulations, perhaps explaining this group's higher rates of depression (33). Similar analyses using sexual health outcomes are needed.

Unexpectedly, we found that participants who came out about their sexuality to their parents, particularly to fathers, were more likely to report recent NCUAI. We explored potential confounding factors – including age, age at sexual debut, lifetime number of partners, and parental response to coming out – but none of these mediated the observed association. Coming out to parents was a normative behavior in this population, but clearly the relationship between parents, the coming out process, and sexual risk among YMSM is complicated. A mixed-methods study by Savin-Williams and Ream found that YMSM anticipated a more negative reaction from coming out to their fathers as compared to their mothers, but there were no meaningful differences in their actual reactions after coming out (34). Our findings suggest that YMSM with unsupportive parents may realize some benefits from not coming out to them, but further research – including qualitative research – is needed to better understand and contextualize how parental reaction during the coming out process affects subsequent sexual risk behaviors.

Despite this surprising finding, >80% of YMSM reported that at least one parent was extremely or somewhat supportive of their sexuality, which is similar to rates described among Chicago YMSM (7). Ryan *et al.* recently found that parental rejection was associated with sexual risk behavior as well as attempted suicide, depression, and illegal drug use (6). In the present study, parental support at coming out was not significantly associated with participants' early sexual risk, but current maternal support was protective against recent HIV/STI diagnosis, and paternal support reflected a similar protective pattern against HIV/STI risk.

The strengths of our study include targeted recruitment of YMSM near the time of same-sex sexual debut, collection of partner-specific data about each participant's first three partners, and HIV/STI testing. This study also had limitations. Because it was designed as feasibility study of a novel study population, we had a relatively small sample size and limited statistical power, particularly for our biological outcomes. This precluded our ability to construct multivariate models for most analyses or conduct in-depth analyses of female partners. We employed a combination of recruitment methods, which yielded a racially/ethnically diverse sample that was representative of the demographics of Seattle. We cannot say how representative of all YMSM our sample was, but given the difficulty of enumerating a sampling frame for the MSM population, that is true of all MSM studies. While enrolling participants soon after their sexual debut should help minimize memory error, approximately 40% of YMSM reported either >10 lifetime male partners or were >5 years beyond same-sex sexual debut, suggesting the possibility of recall bias. If participants changed their behavior (or reporting of behavior) because of study monitoring, we may have underestimated their sexual risk behavior. Finally, many of measures used in this study were adapted for, but not specifically validated among, YMSM.

After just a few sexual partnerships, YMSM are already at significant risk for HIV/STI. By their third male partnership, nearly half have engaged in unprotected anal sex. Given that one-third of YMSM had same-sex sexual debut prior to age 16, these findings support the benefits of early sex education, which we found to be protective against sexual risk behavior and HIV/STI. Parental support was also associated with lower levels of risk behavior, highlighting the importance of continued and positive engagement among parents of sexual minority youth.

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Table 1

Characteristics of 94 young men who have sex with men enrolled in the DASH Study, Seattle WA, 2009–2010.

Participant Characteristic	# (%)
<i>Demographics:</i>	
Age at study enrollment, <21 years	46 (48.9)
Non-white race	38 (40.4)
Gay (vs. bisexual, queer, straight, and/or other)	79 (84.0)
Ever came out as gay, bisexually, or sexually attracted to men	92 (97.9)
<i>Contextual characteristics during adolescence and early adulthood:</i>	
Age at coming out, <16 years	29 (31.5)
Ever came out to mother or mother figure ^a	73 (79.4)
Maternal support about sexuality when first came out ^b	
Not supportive	13 (17.8)
Somewhat supportive	29 (39.7)
Extremely supportive	31 (42.5)
Ever came out to father or father figure ^a	56 (70.9)
Paternal support about sexuality when first came out ^b	
Not supportive	14 (25.0)
Somewhat supportive	22 (39.3)
Extremely supportive	20 (35.7)
Ever called names because gay, before age 16	69 (73.4)
Ever had rumors spread because gay, before age 16	59 (62.8)
Ever excluded because gay, before age 16	40 (43.0)
Ever threatened because gay, before age 16	25 (26.6)
Attended any sex education course in middle school	78 (83.0)
Attended any sex education course in high school	67 (71.3)
Participation in LGBT group in high school	20 (21.7)
<i>Contextual characteristics at baseline:</i>	
Maternal support about sexuality now ^c	
Not supportive	6 (7.3)
Somewhat supportive	19 (23.2)
Extremely supportive	57 (69.5)
Paternal support about sexuality now ^c	
Not supportive	12 (18.2)
Somewhat supportive	24 (36.4)
Extremely supportive	30 (45.5)
Current isolation from family	28 (30.1)
Current isolation from friends	5 (5.3)
Depressed (CES-D 10 Score ≥ 10)	26 (27.7)
Substance use	

Participant Characteristic	# (%)
Alcohol abuse (CAGE score ≥ 2)	20 (21.3)
Used marijuana in past 6 months	49 (52.7)
Used poppers (amyl or butyl nitrites) in past 6 months	13 (13.8)
Used powder cocaine in past 6 months	16 (17.0)
Used methamphetamines in past 6 months	5 (5.3)

^aOnly asked if participant included names of mother (n=92) and/or father figures (n=79) in parental questions

^bOnly asked if participant included names of mother and/or father figures in parental questions and ever came out to mother (n=73) or father (n=56).

^cOnly asked if participant included names of mother and/or father figures in parental questions, and either ever came out to parent or indicated that mother (n=82) or father (n=66) knew he was sexually attracted to other men.

Characteristics of first three male sexual partners and trends across subsequent partnerships among 94 young men who have sex with men enrolled in the DASH Study, Seattle WA, 2009–2010.

Table 2

Cumulative ^a	Linear trend across partnerships				ORadj ^b (95% CI)	p-value
	n=94 # (%)	n=83 # (%)	n=63 # (%)	n=94 # (%)		
<i>Participant and partner characteristics:</i>						
Participant age <16 when had sex with partner	29 (30.9)	13 (15.7)	5 (7.9)	29 (30.9)	0.37 (0.24–0.57)^c	<0.001
Partner's age 10+ years older	9 (9.6)	11 (13.3)	11 (17.5)	19 (20.2)	1.42 (0.95–2.12)	0.092
How did you meet?						
Through friend or family	21 (22.3)	22 (26.5)	13 (20.6)	41 (43.6)	0.99 (0.66–1.48)	0.956
School	35 (37.2)	18 (21.7)	11 (17.5)	47 (50.0)	0.54 (0.36–0.82)	0.004
Internet	21 (22.3)	33 (39.8)	31 (49.2)	50 (53.2)	1.99 (1.48–2.68)	<0.001
Other	17 (18.1)	10 (12.1)	8 (12.7)	26 (27.7)	0.78 (0.47–1.29)	0.328
Knew partner 1 day or less before first sex	16 (17.2)	14 (17.7)	22 (36.1)	36 (38.3)	1.69 (1.15–2.48)	0.008
<i>Characteristics of sexual partnership:</i>						
How long did the partnership last?						
1 day	31 (33.0)	26 (31.7)	24 (39.3)	54 (57.5)	1.19 (0.86–1.66)	0.298
> 1 day – 6 months	35 (37.2)	36 (43.9)	23 (37.7)	58 (61.7)	1.06 (0.77–1.45)	0.727
6+ months	28 (29.8)	20 (24.4)	14 (23.0)	42 (44.7)	0.77 (0.55–1.06)	0.112
Partner was a “main” partner ^d	32 (34.0)	30 (36.1)	20 (31.8)	52 (55.3)	0.97 (0.69–1.35)	0.855
Forced or frightened to have sex	7 (7.6)	5 (6.0)	3 (4.8)	12 (12.8)	0.82 (0.44–1.54)	0.540
Insertive anal sex	32 (34.0)	36 (43.9)	22 (35.5)	58 (61.7)	1.05 (0.78–1.42)	0.753
Unprotected insertive anal sex	24 (25.5)	24 (28.9)	13 (20.6)	45 (47.9)	0.87 (0.63–1.19)	0.381
Receptive anal sex	48 (51.1)	33 (40.2)	30 (48.4)	66 (70.2)	0.93 (0.70–1.23)	0.602
Unprotected receptive anal sex	29 (30.9)	21 (25.3)	12 (19.1)	45 (47.9)	0.72 (0.52–1.01)	0.054
Partner ever discussed HIV status	45 (48.4)	45 (54.9)	39 (61.9)	70 (74.5)	1.39 (1.01–1.90)	0.041
You ever discussed HIV status	39 (41.9)	43 (52.4)	39 (61.9)	68 (72.3)	1.62 (1.16–2.27)	0.004
Nonconcordant unprotected anal intercourse ^e	16 (17.2)	13 (15.9)	7 (11.1)	27 (28.7)	0.78 (0.53–1.16)	0.222

^a Across all 3 partnerships

^b Adjusted for age at start of partnership (coded by tertiles), race (white vs. non-white), and year at start of partnership (coded by tertiles).

^c Only adjusted for race and year at start of partnership

^d "Main" partner is "your boyfriend, your only sex partner, or the partner you consider to be the most important if you have more than one partner."

^e Anal sex with a partner with a discordant or unknown HIV status and did not always use a condom

Table 3

Association between contextual factors and non-concordant unprotected anal intercourse (NC UAI) and new HIV/STI diagnosis during one year of follow-up among 94 young men who have sex with men enrolled in the DASH Study, Seattle WA, 2009–2010.

	NC UAI ^a in the past 3 months		New HIV/STI	
	GEE Analysis OR (95% CI)	p-value	GEE Analysis OR (95% CI)	p-value
<i>Participant demographics:</i>				
Age at study enrollment, <21 years	1.06 (0.42–2.67)	0.909	0.55 (0.17–1.79)	0.321
Non-white race	1.32 (0.52–3.30)	0.559	1.33 (0.41–4.31)	0.631
Non-gay sexual orientation	0.50 (0.18–1.40)	0.185	0.31 (0.04–2.41)	0.265
<i>Contextual characteristics during adolescence and early adulthood:</i>				
Age at coming out, <16 years	2.16 (0.84–5.55)	0.110	0.45 (0.12–1.63)	0.223
Ever came out to mother or mother figure	2.71 (0.74–9.94)	0.133	0.60 (0.15–2.36)	0.467
Maternal support about sexuality when first came out ^b				
Not supportive	Reference		Reference	
Somewhat supportive	0.48 (0.12–1.90)	0.295	0.33 (0.07–1.59)	0.167
Extremely supportive	0.79 (0.20–3.18)	0.741	0.23 (0.05–1.03)	0.055
Ever came out to father or father figure	3.72 (1.25–11.03)	0.018	1.03 (0.25–4.22)	0.969
Paternal support about sexuality when first came out ^b				
Not supportive	Reference		Reference	
Somewhat supportive	0.88 (0.22–3.48)	0.850	0.35 (0.06–2.13)	0.256
Extremely supportive	0.35 (0.09–1.32)	0.121	0.26 (0.05–1.42)	0.118
Ever called names because gay, < age 16	2.56 (0.79–8.31)	0.117	2.85 (0.36–22.63)	0.321
Ever had rumors spread because gay, < age 16	2.01 (0.81–5.02)	0.133	2.92 (0.80–10.72)	0.106
Ever excluded because gay, < age 16	2.03 (0.82–5.01)	0.124	2.57 (0.84–7.84)	0.096
Ever threatened because gay, < age 16	2.07 (0.76–5.64)	0.153	1.16 (0.30–4.52)	0.830
Attended any sex education in middle school	0.23 (0.09–0.61)	0.003	0.95 (0.27–3.43)	0.943
Attended any sex education in high school	0.51 (0.19–1.38)	0.186	0.26 (0.08–0.81)	0.020
Participation in LGBT group in high school	0.73 (0.22–2.45)	0.614	1.87 (0.53–6.64)	0.331
<i>Contextual characteristics at baseline and during follow-up:</i>				
Maternal support about sexuality now ^c				
Not supportive	Reference		Reference	
Somewhat supportive	0.16 (0.02–1.12)	0.066	0.18 (0.03–1.00)	0.050
Extremely supportive	0.64 (0.17–2.42)	0.513	0.13 (0.04–0.46)	0.002
Paternal support about sexuality now ^c				
Not supportive	Reference		Reference	
Somewhat supportive	0.65 (0.17–2.51)	0.529	0.24 (0.06–1.06)	0.059
Extremely supportive	0.64 (0.18–2.28)	0.494	0.25 (0.05–1.16)	0.077
Current isolation from family	2.15 (1.01–4.57)	0.047	1.41 (0.43–4.69)	0.572
Current isolation from friends	7.83 (2.15–28.53)	0.002	3.33 (0.69–16.09)	0.134
Called names because gay in past 3 months	1.77 (0.83–3.76)	0.138	0.28 (0.03–2.34)	0.237

	NC UAI ^a in the past 3 months		New HIV/STI	
	GEE Analysis OR (95% CI)	p-value	GEE Analysis OR (95% CI)	p-value
Had rumors spread because gay in past 3 months	1.94 (0.68–5.56)	0.215	<i>d</i>	
Excluded because gay in past 3 months	1.93 (0.66–5.64)	0.229	<i>d</i>	
Threatened because gay in past 3 months	6.27 (2.02–19.44)	0.001	<i>d</i>	
Depressed (CES-D 10 Score 10)	1.47 (0.59–3.69)	0.409	1.03 (0.35–3.02)	0.952
Substance use				
Alcohol abuse (CAGE score 2)	2.85 (1.18–6.88)	0.019	1.23 (0.27–5.53)	0.791
Used marijuana in past 3 months	1.02 (0.47–2.21)	0.964	1.02 (0.31–3.38)	0.971
Used poppers in past 3 months	3.50 (1.23–9.94)	0.019	4.23 (1.15–15.52)	0.030
Used powder cocaine in past 3 months	2.61 (1.01–6.71)	0.047	1.60 (0.44–5.81)	0.475
Used meth in past 3 months	3.71 (0.69–19.92)	0.126	<i>d</i>	

^a Anal sex with a partner with a discordant or unknown HIV status and did not always use a condom.

^b Only asked if participant included names of mother and/or father figures in parental questions in baseline survey, and ever came out to mother or father.

^c Only asked if participant includes names of mother and/or father figures in parental questions in each follow-up survey, and ever came out to mother or father or indicated that parent “knew” he was sexually attracted to other men.

^d Model did not converge