



Published in final edited form as:

AIDS Behav. 2012 February ; 16(2): 404–411. doi:10.1007/s10461-011-9976-0.

Relationship Factors Associated with HIV Risk Among a Sample of Gay Male Couples

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Abstract

More HIV prevention research is needed to better understand how relationship factors may affect sexual risk behaviors among gay male couples. Our cross-sectional study collected dyadic data from 144 gay male couples to examine which relationship factors and characteristics were associated with men having UAI with a secondary sex partner. We targeted male couples by using a variety of recruitment strategies. Multilevel random-effects logistic regression modeling was used to examine which factors were predictive of men in gay couples who had UAI with a secondary sex partner. Analyses revealed that men were less likely to have had UAI with a secondary sex partner if they reported being in a strictly monogamous relationship, receiving an HIV test within the previous three months, and being committed to their sexual agreement. Future HIV prevention interventions must consider how relationship factors may influence sexual risk behaviors among gay male couples.

INTRODUCTION

Gay, bisexual, and other men who have sex with men (MSM) continue to be disproportionately affected by HIV/AIDS. According to the Centers for Disease Control and Prevention [1], MSM represent approximately 2% of the US population, yet account for more than half of all new HIV infections with nearly 30,000 new cases occurring each year. The increase in HIV infections among MSM correlates with the observed increases in unprotected anal intercourse (UAI), the primary risk factor for HIV transmission in MSM [2]. Individuals, including gay men, who engage in UAI are at greater risk for contracting HIV because the virus is transmitted more efficiently when compared to vaginal or oral sex [3–6].

Recent estimates by Sullivan et al. indicate that over two-thirds of gay men acquire HIV from their main sexual partners while in a relationship [7]. Yet, the majority of research has focused on individual factors as predictors of UAI. For instance, previous empirical research suggests that the increase in UAI among MSM may be attributed to their: optimism about improved HIV treatment [8–14]; complacency about sexual risk [15, 16]; lack of knowledge of HIV serostatus [15, 17]; substance use [15, 17–20]; complex sexual decision making [17,

21]; seeking sex partners on the Internet [17, 22, 23]; and failure to practicing safer sex [17, 21].

Relationship factors also have been identified as possibilities for explaining why MSM practice UAI. The few studies that have examined relationship factors indicate these dynamics are important for better understanding HIV risk among gay male couples. For example, gay men in sexual relationships [24, 25] have embraced UAI as way to show their love, intimacy, and trust toward one another [26–32] as well as for strengthening their relationship commitment and satisfaction [29–33]. Other relationship factors that have been identified as possible contributors to increased HIV risk among gay male couples include partner's sexual history [34–36], familiarity with the partner in general [31, 34], perceived monogamy [36], relationship status or partner types [24–26, 29, 30, 37–40], unknown or assumed partner's HIV status [28, 38, 41], and faulted sexual agreements [28, 38, 41–46].

Some gay male couples have adopted sexual agreements as a prevention strategy to reduce their HIV risk [43, 44, 47]. One example of a sexual agreement is called negotiated safety, which allows HIV negative seroconcordant gay male couples to practice UAI within their relationship as long as both partner's serostatus remain HIV negative and both men practice safer sex with secondary partners [47–49]. However, previous research on sexual agreements as an HIV prevention tool with gay male couples has shown mixed results [41, 47], particularly when UAI was practiced within the relationship and safer sex was not practiced with secondary partners. The factors that influence gay men in HIV negative seroconcordant relationships to practice UAI with their main partner, and engage in UAI with secondary partners remain understudied.

Because more gay men are acquiring HIV from their main partners, there is a need for research that explores the influence of relationship factors on HIV risk, particularly within the context of a relationship [7, 27, 28, 42, 45, 46]. The present study builds on the existing literature by examining how relationship commitment, trust, sexual agreement, relationship status, and other factors might be associated with HIV risk (i.e., UAI with both a primary and a secondary partner) among a convenience sample of gay male couples who lack a known HIV infection. Our aim was to determine whether these same relationship factors that influence gay men to practice UAI with their main partner [24–33, 36–40], are also factors that influence them to engage in UAI with a secondary partner. We hypothesized that men who were less committed to their relationship, trusted their main partner less, were less invested in their sexual agreement (when established), and in a non-monogamous relationship, would be more likely to engage in UAI with a secondary partner. Measures that represented the interdependent, dyadic nature of a sexual relationship, and had previously been validated with gay male couples, were purposely selected to assess relationship commitment, trust, and investment in one's sexual agreement [50–52].

METHODS

A cross-sectional study design paired with a standard reciprocal dyadic data collection method was used for examining the association of relationship factors with UAI with a secondary sex partner among individuals who were in gay male couples. The institutional

review board at Oregon State University reviewed and approved all procedures for this original study.

Recruitment and Eligibility

A convenience sample of 144 gay male couples was recruited from Portland, Oregon and Seattle, Washington between June and November 2009. Recruitment methods included distribution of business cards and flyers at gay-identified events and venues, referrals from local organizations providing social services to gay men and other MSM, and electronic invitations sent to profiles located on websites frequented by gay men in the Pacific Northwest. Gay couples that were interested in the study were encouraged to refer other gay couples to participate as a form of snowball sampling. Potential participants were informally screened as eligibility criteria were listed on all recruitment materials. A response rate for recruitment was not recorded.

The present study targeted men in same-sex relationships (i.e., gay couples). Study participants had to: 1) be English speaking; 2) be HIV negative or have unknown HIV status; 3) self identify as gay, bisexual, queer, or homosexual; 4) be eighteen years of age or older; 5) be able to follow simple online instructions to complete an electronic survey on a computer; 6) be in a sexual relationship for at least 3 months with another man who also identified as gay, bisexual, homosexual, or queer; and 7) have had anal intercourse within the three months prior to study recruitment. Both members of the gay couple had to meet all inclusion criteria to enroll in the study.

Procedure

At a pre-arranged appointment, each qualified male in every couple was given an identification number and was directed to a laptop to read the electronic consent form and complete the 15 to 25 minute self-administered anonymous, electronic survey simultaneously, yet independently. Steps were taken to protect the anonymity of participants' responses to the survey. Personal identifying information also was not collected in order to help decrease measurement error and participation bias [53]. The survey was hosted, and participant data were collected and stored by the host server surveymonkey.com. Data from 144 gay male couples were then downloaded from the host server, screened for eligibility criteria, missing values, and adjusted accordingly based on recommendations made by Acock [54]. Data from two couples were deleted due to ineligibility and inconsistencies in responses.

Measures

Outcome Variable—Men were asked if they had had unprotected anal intercourse with their main partner and any secondary partners within the past three months. Both dichotomous variables contained a 'yes' or 'no' response. Because we were most interested in risky sexual behaviors that occurred outside the relationship, unprotected anal intercourse with a secondary sex partner was used as the outcome variable for this study's analysis. Number of secondary sex partners, acts of UAI, and HIV serostatus of secondary sex partners were not recorded.

Independent Variables—Unless otherwise noted, all participants were asked to complete every measure. The present study collected the following demographic information from each of the study participants: sexual identity, age, race, ethnicity, highest education-level achieved, employment status, personal income, environment of residence, recruitment city, and self-reported HIV status and testing history. Each member of the couple was asked to identify his own HIV status and testing history as well as his partner's presumed HIV status and testing history.

Relationship characteristics also were assessed and included: cohabitation, length of cohabitation, length of relationship, type of sexual relationship, whether a sexual agreement was established, type of sexual agreement, explicitness of a sexual agreement, break in a sexual agreement, and disclosure of a break in a sexual agreement. Type of sexual relationship referred to whether the participants had a strictly monogamous relationship or some form of an open relationship. The establishment of a sexual agreement assessed whether the participants had made an agreement with their main partner about having sex with a secondary partner. Type of sexual agreement was used to describe the participant's sexual agreement. Explicitness of a sexual agreement determined the level that the participants actively discussed the terms of their sexual agreement. Appendix A provides the questions and response formats for these measures.

The Trust Scale was used to assess the degree to which gay men had faith in their main partners and viewed their partners as dependable and predictable [50]. The 17-item validated measure consisted of three subscales: the predictability subscale assessed the consistency and stability of a partner's specific behaviors based on past experience ($\alpha = .71$); the dependability subscale assessed the dispositional qualities of the partner which warrant confidence in the face of risk and potential hurt ($\alpha = .68$); and the faith subscale assessed feelings of confidence in the relationship and the responsiveness and caring expected from the partner in the face of an uncertain future ($\alpha = .86$); [50]. The overall measure had a reliability of .87. Response options for each item were captured on a 7-point Likert-type scale ranging from -3 = Strongly Disagree to 3 = Strongly Agree.

The Investment Model was used to examine the processes in which gay men persist within their sexual relationship with their main partner [55, 56]. The 22-item validated scale consisted of four constructs. Commitment level assessed long-term orientation toward the partnership, intention to remain in a relationship, and psychological attachment to a partner ($\alpha = .78$) [55, 57, 58]. Satisfaction level assessed, in a comparative fashion, the negative and positive outcomes of the relationship ($\alpha = .87$). Quality of alternatives assessed the perception that being single or an attractive alternative partner existed outside of the main relationship, and that this alternative would provide superior outcomes when compared to the current relationship ($\alpha = .75$) [55]. Investment size assessed the existence of concrete or tangible resources in the relationship that would be lost or greatly reduced if the relationship ends ($\alpha = .71$) [55]. The combination of satisfaction level, quality of alternatives, and investment size were an index of the level of commitment existing in interpersonal relationships and in turn, the probability that the relationship will persist [51]. The overall measure had a reliability of .87. Response options for each item were captured on a 7-point Likert-type scale ranging from 0 = Do Not Agree at All to 6 = Agree Completely.

The Sexual Agreement Investment Scale (SAIS) was used to assess participants' value, commitment, and satisfaction with a sexual agreement with the main partner [52]. The 13-item validated measure included three domains: value of the agreement ($\alpha = .92$), commitment to the agreement ($\alpha = .90$), and satisfaction with the agreement ($\alpha = .80$) [52]. The overall measure had a reliability of .94. Response options for each item were captured on a 5-point Likert-type scale ranging 0 = Not at All to 4 =Extremely. Only participants who reported the existence of a sexual agreement were asked to complete this measure.

Data Analysis—Responses to several questions were appropriately categorized and descriptive statistics were calculated. For example, self-reported and main partner's last HIV test was dichotomized into two categories (i.e., < 3 months vs. > 3 months and never) to determine whether recent testing for HIV had any effect on sexual risk behavior (i.e., UAI) during the same time period. Certain scale items in the Trust and Investment Model measures were reverse coded for analytical purposes. Recommendations from Kenny et al. [62] were used to arrange the data into an appropriate format for random-intercept logistic regression, a multilevel modeling analytical technique used to calculate individual probabilities from dyadic data [63]. In this case, data from both men in each couple were used to predict which factor(s) were associated with the likelihood (i.e. odds) that at least one of the men had UAI with a secondary sex partner within the past three months.

Dyadic data from 142 gay male couples were analyzed using Stata version 11 (StataCorp LP, College Station, TX). Prior to data collection, a minimum sample size of 140 couples was calculated to achieve an estimated power of .95 for assessing nonindependence within same-sex couples and for detecting subject-specific probabilities regarding UAI with a secondary sex partner in a multilevel random-intercept logistic regression model with dyadic data [62–64].

Multilevel logistic random-intercept regression models (i.e. xtlogit) and bivariate analyses were used to explore and identify which factors to include in the final multilevel logistic model for predicting UAI with a secondary sex partner. Bivariate analyses compared men who had UAI with a secondary sex partner and men who did not have UAI with a secondary sex partner by using the Pearson chi-square test, Fisher's exact test, the independent t-test, and the Mann-Whitney rank-sum test as appropriate.

Variables that differed significantly in bivariate analyses at $P < 0.05$ were then analyzed for multicollinearity in a pairwise deletion correlation matrix with Bonferroni correction. A few predictors were significantly and strongly correlated with one or more independent variables (i.e., type of relationship and type of sexual agreement). In these instances, we selected the predictors that were most strongly correlated with the outcome variable and were least correlated with the other significant independent variables. All predictors that were significant at $P < 0.05$ and had minimal issues of multicollinearity were included in the final multilevel random-intercept logistic regression model to assess associations between having had UAI with a secondary sex partner and selected factors. Recruitment site was added as a control variable to the final model. Having UAI with a secondary sex partner (vs. no UAI with a secondary sex partner) was the dependent variable. Odds ratios and their associated 95% confidence intervals were then calculated.

RESULTS

The mean age for individuals and couples was 34.1 years (SD 8.4 and 7.6, respectively). The majority of men in the sample ($N = 284$) self-identified as: gay (95%); non-Hispanic (92%); and/or Caucasian (85%). Most lived in an urban/city environment (82%); had at least a bachelor's degree (68%); were employed (85%); earned more than \$30,000 per year (79%); practiced UAI with their main partner within the past three months (90%); were HIV negative (95%); and/or perceived their partner to be HIV negative (93%). About a quarter of the men (24%) reported their last HIV test occurred within three months prior to the survey and 15% perceived that their partner's last test also occurred within three months prior to the survey. Ten percent of the men ($N = 28$) reported engaging in UAI with a secondary sex partner within the prior three months.

Regarding relationship characteristics, 82% of the men reported they lived with their partner and 58% had been with their main partner for less than five years. About half of the men stated they were in a strictly monogamous relationship with their partner (51%). Two-thirds of the sample reported having made a sexual agreement (66%). Among the men who reported having made an agreement ($N = 187$), 77% reported that they explicitly discussed their agreement in detail and 20% had definitively broke their agreement with their main partner.

On average, the participants had faith in their main partners and viewed their partners as dependable and predictable. The men also were invested in their relationship and sexual agreement with their main partner. As mentioned previously, not all men reported having a sexual agreement. A selection of relationship characteristics and measures are presented in Table 1. Table 2 presents results from the bivariate analyses.

Among the sample of gay male couples, several factors were significantly associated with one or both partners who engaged in UAI with a secondary sex partner. The odds of engaging in UAI with a secondary sex partner were negatively associated with commitment to a sexual agreement (OR = 0.22 [CI 0.07 – 0.66], $P < 0.01$). Further, the odds of engaging in UAI with a secondary sex partner were also negatively associated with being in a strictly monogamous relationship (OR = 0.03 [CI 0.001 – 0.47], $P < 0.05$), and receiving an HIV test within the previous three months (OR = 0.18 [CI 0.04 – 0.88], $P < 0.05$). Men who had either of these characteristics were less likely to have had UAI with a secondary sex partner compared to men who were not in a strictly monogamous relationship, had not been tested for HIV within the previous three months, and were less committed to their sexual agreement with their main partner. Results from the multilevel random-intercept logistic regression model analysis are presented in Table 3.

DISCUSSION

Because UAI is the primary sexual risk behavior for HIV acquisition among gay men, the risk for acquiring and transmitting HIV to a main partner increases when UAI is practiced with the main partner as well as with any secondary sex partners. Sexual concurrency and the frequency of UAI occurring within a relationship may help explain why more gay men

are contracting HIV from their main partners than from secondary sex partners [7, 27, 28, 42, 45, 46]. Findings from this study may help provide insight on why some HIV-negative gay men practice UAI with their main partner and with a secondary sex partner. The majority of gay men in the sample practiced UAI with their main relationship partner. This finding has been supported in a number of other studies with gay male couples [24–33, 37–40, 43, 44]. Within this same sample, a smaller subset of gay men also engaged in UAI with a secondary sex partner.

Analyses from the present study identified factors that were negatively and significantly associated with gay men engaging in UAI with a secondary sex partner among a sample of 142 HIV-negative concordant gay male couples. Because men who had these characteristics were less likely to have had UAI with a secondary sex partner, these factors suggest and may provide an indirect level of protection from acquiring HIV. For example, being committed to their sexual agreement may reinforce gay men to not engage in UAI with secondary sex partners. Although men who were committed to their sexual agreement were less likely to have had UAI with a secondary sex partner, it remains unknown on whether these men were permitted to have UAI with any secondary sex partners. Specific rules of sexual agreements, including sexual behaviors with any secondary sex partners, were not examined. Further, those who got tested for HIV within the prior three months may have received some type of risk-reduction counseling, which in turn, may have encouraged these men to refrain from having UAI with a secondary sex partner. These findings suggest that being committed to the sexual agreement with a main partner, being in a strictly monogamous relationship, and testing for HIV recently may reduce the likelihood that a gay male who practices UAI with his main partner would engage in UAI with a secondary sex partner.

Previous research with gay male couples has also highlighted the importance that certain relationship factors, such as sexual agreements, have on HIV risk [24–36, 37–45, 47–49]. For instance, Hoff et al. explored the dynamics between relationship characteristics (i.e., relationship satisfaction and commitment), sexual agreements, and HIV status among gay male couples [44, 47]. Findings from this research highlighted important motivators that gay men in same-sex HIV-negative seroconcordant relationships reported for making a sexual agreement with their main partner, including: protecting oneself and his partner from HIV and STDs, building trust, being honest, and strengthening the relationship [47]. Men also reported reasons on why they broke their sexual agreement with their main partner, such as being sexually aroused, desired for sex, and perceiving a secondary sex partner as attractive [44]. Despite these prior findings, little is known about what specific factors motivate or influence gay men in HIV-negative seroconcordant relationships to engage in UAI with a secondary sex partner while practicing UAI with their main partner.

Additional research has suggested that gay men have adopted other HIV prevention strategies besides using condoms for anal intercourse, including serosorting [15, 17, 65] and strategic positioning [15, 65–67]. Although the present study did not collect data on these particular measures, future research must consider how these behavioral practices and relationship factors influence some gay men in same-sex HIV-negative seroconcordant relationships to engage in UAI with their main partner and secondary sex partners.

Limitations of the present study include the use of a cross-sectional study design and a convenience sample. The absence of data on the HIV serostatus of secondary sex partners and specific rules pertaining to sexual risk behaviors of sexual agreements are two additional limitations. The main strengths of the study are its large sample size, use of dyadic data, and specific focus on HIV risk among self-reported HIV-negative concordant gay male couples. Findings from the present study offer valuable information to better understand how certain relationship factors were negatively associated with UAI with a secondary sex partner among a sample of gay male couples.

Future HIV prevention efforts must focus on integrating relationship factors to help minimize HIV risk among gay male couples. Prevention services for couples are particularly important because of the interdependent behavior of sex. Services that help gay male couples establish and maintain their commitment to their sexual agreement may be particularly important for minimizing their risk for HIV. New research that further explores how relationship factors affect the practice of UAI among gay male couples is needed in order to help design and implement future HIV prevention strategies for this particular population.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

This manuscript was supported by the center (P30-MH52776) and NRSA (T32-MH19985) grants from the National Institute of Mental Health. Special thanks are extended to the participants for their time and effort.

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Table 1

Descriptive Statistics for UAI, HIV Testing, Relationship Characteristics, and Measures Used to Examine Partner Trust, Relationship Commitment, and Investment in Sexual Agreement

Relationship Characteristics	% (N = 284)
Had UAI with main within past 3 months	90% (257)
Had UAI with a secondary partner within past 3 months	10% (28)
Self reported last HIV test	
< 3 months	24% (68)
> 3 months	75% (212)
Perceived main partner's last HIV test	
< 3 months	15% (44)
> 3 months	82% (232)
Type of relationship	
Strictly monogamous	51% (144)
Open to some degree	49% (140)
Made sexual agreement with main partner	66% (187)
Type of sexual agreement	
Only sex with each other	47% (87)
Sex together while with others	44% (81)
Sex with whomever whenever	9% (17)
Broke sexual agreement with main partner	20% (38)
Disclosed break in sexual agreement to main partner	43% (18)
Relationship Factor [range]	Mean (SD)
Trust [0–6]	
Predictability	4.36 (1.16)
Dependability	4.38 (1.08)
Faith	4.91 (0.94)
Investment Model [0–6]	
Commitment	5.40 (0.77)
Satisfaction	4.78 (0.97)
Investment	4.65 (0.87)
Quality of alternatives	3.38 (1.12)
Sexual Agreement Investment Scale [0–4]	
Commitment	3.46 (0.65)
Satisfaction	2.99 (0.81)
Value	3.35 (0.71)

Notes: Regarding last HIV test, 4 men self-reported that they have never been tested and 5 men perceived their main partner as never been tested. Minimal missing data existed for perceived main partner's last test (3 cases) and type of sexual agreement (1 case). 1 male reported 'Sex together and only he can with others' for type of sexual agreement. A subsample of 187 men who reported having made a sexual agreement with their main partner also reported on their type of sexual agreement, any breaks, and disclosure of those breaks.

Table 2

Bivariate Analyses: Identification of Significant Predictors ($P < 0.05$) of Men in Gay Couples Who Had UAI with a Secondary Partner (vs. no UAI with Secondary Partner) by Independent Variable

Independent Variable	Significance Level
Ethnicity	P = 0.035
Type of relationship	P = 0.000*
Last HIV test	P = 0.005*
Partner's last HIV test	P = 0.011
Type of sexual agreement	P = 0.000*
Break in sexual agreement	P = 0.000*
Investment Model: Quality of alternatives	P = 0.011
Sexual Agreement Investment Scale: Value	P = 0.000*
Sexual Agreement Investment Scale: Commitment	P = 0.000*

Note:

* Variable remained significant after Bonferroni correction was applied.

Table 3

Odds Ratios and 95% Confidence Intervals from Random-effects Logistic Regression Analysis of Men in Gay Couples Who Had UAI with a Secondary Partner (vs. no UAI with Secondary Partner) by Characteristic

Characteristic	OR	95% CI
Type of relationship (Monogamy vs. Open)	0.03*	0.001 – 0.47
Last HIV test (< 3 months vs. > 3 months or none)	0.18*	0.04 – 0.88
Sexual Agreement Investment Scale Commitment	0.22**	0.07 – 0.66
Recruitment city	0.71	0.14 – 3.53
Model n	185 obs., 119 dyads	
Log likelihood	-47.25	
Wald χ^2 (p-value)	12.55 (< .01)	

Note: Model controlled for recruitment city.

OR odds ratio, *CI* confidence interval

* $P < 0.05$,

** $P < 0.01$