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ORIGINAL PAPER

HIV-Negative and HIV-Discordant Gay Male Couples' Use of HIV Risk-Reduction Strategies: Differences by Partner Type and Couples' HIV-Status

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Abstract Previous research has found that gay men and other men who have sex with men have adopted a variety of HIV risk-reduction strategies to engage in unprotected anal intercourse (UAI). However, whether gay male couples' use these strategies within and out of their relationships remains unknown. The present national cross-sectional study collected dyadic data from an online sample of 275 HIV-negative and 58 discordant gay male couples to assess their use of these strategies, and whether their use of these strategies had differed by partner type and couples' HIV-status. The sample used a variety of risk-reduction strategies for UAI. Some differences and patterns by partner type and couples' HIV-status were detected about men's use of these strategies. Findings indicate the need to bolster HIV prevention and education with gay male couples about their use of these strategies within and outside of their relationships.

Resumen Investigaciones anteriores han encontrado que los hombres gay y otros hombres que tienen sexo con hombres (HSH) han adoptado una variedad de VIH estrategias de reducción de riesgos de tener relaciones sexuales anales sin protección (UAI). Sin embargo, si las parejas de hombres gay 'utilizar estas estrategias dentro y fuera de sus relaciones sigue siendo desconocido. El presente transversal nacional estudio recopiló datos diádicos de una muestra en línea de 275 VIH negativos y 58 parejas discordantes homosexuales masculinos para evaluar el uso de estas estrategias, y si el uso de estas estrategias se había diferenciado por tipo de socio y "parejas VIH-estado. La muestra utilizada una variedad de estrategias de reducción de riesgos para la UAI. Algunas diferencias y patrones por tipo de socio y el estado de las parejas VIH fueron detectados sobre el uso de los hombres de estas estrategias. Los resultados indican la necesidad de reforzar la prevención del VIH y la educación con parejas de hombres gays sobre el uso de estas estrategias dentro y fuera de sus relaciones.

Keywords Risk-reduction strategies · Gay male couples · UAI · HIV risk

Introduction

Prevention efforts to avert new HIV infections among men who have sex with men (MSM) have had limited success, and have mostly targeted the individual, group and community-levels of MSM [1, 2]. For instance, HIV and other sexually transmitted infections (STIs) continue to disproportionately affect MSM, including those who are younger, of racial and ethnic minority groups (e.g. African American, Hispanic/Latino), and who self-identify as gay or bisexual [3, 4]. Moreover, ~68 % [CI 58–78 %] of MSM acquire HIV while in a same-sex relationship (e.g. gay male couples) [5].

The majority of MSM acquire HIV by engaging in unprotected anal intercourse (UAI), the primary sexual risk behavior for the transmission of HIV [6]. The reasons why MSM engage in UAI, as well as the factors that predict MSMs' engagement of UAI, have previously been well studied [4, 7–20]. Some examples of those predictors associated with UAI among MSM include their use of substances [4, 7, 21–23], optimism toward improved antiretroviral (ART) treatments for HIV [8–14], and seeking sex partners

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on the Internet [7, 16, 17]. In addition, other research has found that MSM have UAI with their male sexual partners because they perceive to know them "well" and have previously had anal intercourse with them [19, 20].

Moreover, research with gay male couples has also highlighted that men practice UAI within their relationships to strengthen their relationship commitment and satisfaction [24–28], as a way to show their love, intimacy and trust toward one another [25–31], and as a reason and allowed behavior as part of their established sexual agreement [32]. Thus, the reasons for, and factors associated with MSMs' engagement of UAI (either as individuals or within the context of a relationship) are complex, and may be contingent upon their own and sexual partners' HIV-status.

Because HIV is prevalent within MSM and gay male communities, men have adopted a number of risk-reduction strategies, in lieu of using condoms, to help reduce their risk of acquiring and/or transmitting HIV when engaging in UAI. These strategies, collectively, have been referred to as "seroadaptive strategies" because men use actual or perceived knowledge of their and others' HIV-status to decide whether to engage in UAI. Specifically, serosorting refers to when an individual chooses to have anal sex with someone who has the same HIV-status [33]. Strategic positioning, also called sero-positioning, refers to when HIV-status differs between the two men, such that the HIV-positive male takes on the receptive role (i.e. bottom) while the HIV-negative male takes on the insertive role (i.e. top) during UAI [34]. Strategic positioning may also refer to when a HIV-negative male purposely chooses to engage as the insertive male to reduce his risk for acquiring HIV when engaging in UAI with another male, regardless of the other males' HIV-status. Inversely, the same logic could be applied for a HIV-positive male who purposely chooses to be the receptive male during UAI with another MSM. In addition, some men use knowledge about a HIV-positive males' viral load to negotiate whether to have UAI [35–37] while other men use withdrawal before ejaculation as a strategy to reduce their risk for acquiring and/or transmitting HIV [34, 38]. The use of seroadaptive strategies is contingent and relies on the disclosure of HIV-status between MSM and their male sexual partners [39–42]. However, not all MSM, including those living with HIV, disclose their status before engaging in UAI [40, 43].

Research has identified sociodemographic characteristics of MSM who used these seroadaptive strategies. Although Wei et al. [44] found no differences in men's use of seroadaptive strategies by their race or ethnicity, they did note that Black and Latino HIV-positive MSM were significantly more likely to report using no, preventive seroadaptive strategy. A difference between African American and White HIV-negative MSM who used serosorting was found in a different study: African American MSM were more likely to test HIV-positive when compared to their White MSM counterparts [45]. In addition, the socioeconomic status of MSM appears to not have an affect on whether they use (or not use) seroadaptive strategies. For example, research with a poor sample of HIV-positive MSM reported that men's low socioeconomic status had no effect on their use of seroadaptive strategies, including strategic positioning, with their male sexual partners [46]. MSMs' types of male sexual partners and their ability to cope with stress did appear to matter with regard to their use of these strategies. Specifically, Van den Boom et al. [47] found that HIV-negative MSM who had a regular casual partner (i.e. "sex buddy") were more likely to practice serosorting than MSM who engaged in one-night stands. Regarding discussions of viral load by MSM, Horvath et al. [35] reported that discussions occurred with 93 % of main partners and about half of the time with casual sexual partners (e.g. 53 %). Regardless of the men's HIV-status, MSM who had higher levels of coping self-efficacy (i.e. to perform coping behaviors under stress) were more likely to practice serosorting compared to MSM who had lower levels of coping self-efficacy [48].

In addition to reporting the sociodemographic characteristics of MSM who used these seroadaptive strategies, other research has assessed how common MSM had used the strategies by their HIV-status. Among HIV-positive MSM, studies reported their use of serosorting [34, 38, 49], strategic positioning [34, 38, 46, 49, 50], withdrawal without ejaculation [38], and discussions about viral load [35–37] to reduce the possibility of transmitting HIV to their male sexual partners. Other studies have noted that HIV-negative MSM primarily used serosorting [37, 50, 51] and withdrawal before ejaculation [38] to reduce their risk for acquiring HIV. Moreover, some research has found differences of seroadaptive strategies used between HIV-negative and HIV-positive MSM. For example, studies have shown that serosorting was reported to occur more often by HIV-negative MSM while strategic positioning was reported to occur more often by HIV-positive MSM [38, 44]. However, one study noted that serosorting occurred equally with both HIV-negative and HIV-positive MSM [52].

The debate of whether MSMs' use of seroadaptive strategies reduces their risk for acquiring and/or transmitting HIV remains [53]. Philip et al. [54] found that HIV-negative MSMs' practice of serosorting was associated with a slight decrease in their risk for HIV seroconversion while sero-positioning had no effect toward their risk for HIV. One recent intervention noted that HIV-negative MSM who specifically received informed sexual decision-making information about serosorting had reduced their number of sexual partners [55]. In contrast, other studies

have indicated that HIV-negative MSMs' use of serosorting offered them limited protection from HIV [56, 57] and may actually inadvertently place themselves more at-risk for HIV [58], particularly when UAI occurs with serodiscordant partners [7]. Additionally, recent research has found that MSMs' use of seroadaptive strategies increases their risk for acquiring other STIs [59, 60].

Though our understanding has increased about MSMs' use of seroadaptive strategies, the methods that prior research has used to assess these strategies is limited. Specifically, few studies had used items that purposely asked whether MSM used seroadaptive strategies to engage in UAI. Instead, most studies examined MSM's patterns of UAI by their own and partners' HIV-status. While this method of assessment is one approach to gauge MSM's use of seroadaptive strategies, it also limits our ability to determine whether men are specifically and purposely using these particular strategies in lieu of using condoms for anal sex. Moreover, the extent that men among gay male couples use certain risk-reduction strategies for UAI and whether they use one or more of these strategies within their relationship and/or outside of the relationship remains largely unknown. Additionally, few studies have examined whether gay couples' use of these strategies vary according to their HIV-status. By using a national, Internet-based convenience sample of 275 HIV-negative concordant and 58 discordant gay male couples, the present study aims to assess: (1) the rates that men within these couples have UAI with their main partners, a casual MSM partner, and with both their main partner and a casual MSM partner during the same time period; (2) men's use of one or more of risk-reduction strategies within and outside of their relationships, and whether their use of these strategies differ by their type of sexual partner (main partner vs. casual MSM partner vs. both partner types) and by the HIV-status of their relationship (i.e. couples' HIV-status). The analysis of this data provides a richer understanding of men's use of seroadaptive and other risk-reduction strategies within the context of their primary relationships, which is critical for preventing new infections of HIV.

Materials and Methods

Recruitment, Eligibility and Procedures

Recruitment was conducted through Facebook® banner advertising. Banner advertisements are shown to individuals who have and use personal home pages. Advertisements target individuals based on demographics that they report on their facebook profile.

During a ten week recruitment period during 2011, advertisements were displayed to facebook members whose profile demographics matched our study eligibility criteria: males living in the US, at least 18 years old, "interested in men," and had a relationship status of "in a relationship, married, or engaged." All facebook users whose profiles met our eligibility criteria had an equal chance of being shown one of the three banner advertisements. In total, the banner advertisements were shown 8.5 million times (i.e. impressions) on potential participant profiles. The ads briefly described the purpose of the study and included a picture of a male couple. A total of 7,994 facebook users clicked on at least one of the advertisements and were then directed to the study webpage. Among those who visited our study webpage (e.g. 7,994), 4,056 potential participants answered our eligibility questions; 722 MSM, representing both men of 361 MSM couples, qualified, enrolled, and completed the survey, and were included in the original study.

The study webpage described the purpose of the study, what a participant could expect if he participated, and asked eligibility questions. Interested and eligible participants were also informed that they would be asked to invite their main, male relationship partner to participate in the study, as well as to have to complete the survey independently and separately from their partner. Both men in the couple had to meet the following eligibility criteria to participate: be 18 years of age or older; live in the US; be in a sexual relationship with another male; and, have had oral and/or anal sex with this partner within the previous 3 months. Eligible participants were directed to an electronic consent form to provide consent before taking the 30–40 min confidential survey.

Because we were interested in collecting data from both men in the couple, we embedded a partner referral system in our survey. Specifically, participants were required to input their own and their main male partner's email address. The participant's main male partner then received an email inviting him to participate in the study. Email addresses were also used for incentive purposes and for linking the survey responses between the two men within each couple. Every fifth couple (i.e. 5th, 10th, etc.) that completed the survey received two modest incentives via email. The Medical College of Wisconsin Institutional Review Board approved the study protocol.

Online Survey

The online survey service provider Survey Gizmo hosted our study webpage, electronic consent form, and confidential, online survey through the use of a secure access portal. Only the primary investigator of the study and managers at Survey Gizmo had access to the study survey and data. Other than email addresses, no personal identifying information was collected. Email addresses were

deleted after data collection and verification of the couples' relationships.

Measures

A variety of measures were used to assess couples' demographic and relationship characteristics, sexual behaviors, and use of risk-reduction strategies. Participants were asked about their sociodemographic characteristics, including whether they had health insurance, and whether their primary medical doctor knew about their sexual behaviors with men. Relationship characteristics assessed included relationship duration and cohabitation duration. Details about the sample's sexual agreements and HIV and STI testing behaviors have been reported elsewhere [32, 61].

Sexual Behaviors

Participants were asked the number of times they had engaged in unprotected insertive and receptive anal sex with their main male partner and any casual MSM partners during the previous 3 months. Men who reported having sex with a casual MSM partner were asked the number of times that they had engaged in unprotected insertive and receptive anal sex with casual MSM partners of perceived negative, positive, and unknown HIV-status.

Risk-Reduction Strategies

Men were additionally asked whether they had used any strategies to increase their sexual pleasure and/or to reduce their risk for HIV/STIs with their main partner, and with casual MSM partners. Ten items with "yes" and "no" response options were used to capture the diversity of possible risk-reduction strategies that men could have used with their main partners, and if applicable, with any casual MSM partners during the 3 months prior to assessment. The ten items assessed included the following: "Only having oral sex and absolutely no anal sex", "Only topping (as insertive male) without a condom when the bottom (receptive male) is HIV-positive", "Only bottoming without a condom when the top is HIV-negative", "Not using a condom for anal sex and ejaculating inside the person because both of us have the same HIV-status", "Not using a condom for anal sex, but not ejaculating inside the person even though we have the same HIV-status", "Always using a condom for anal sex, regardless of his or my HIV-status", "If the person(s) living with HIV is on ARTs, then we would not use a condom for anal sex and will withdrawal (no ejaculation inside)", "If the person(s) living with HIV has an undetectable viral load, then we would not use a condom for anal sex and will withdrawal", "Regardless of HIV-status, we never use condoms and ejaculate inside", and "Always use a condom for anal sex if one of us is HIV-positive".

Data Analysis

Though dyadic data from 361 MSM couples (722 individuals) were collected in the original study, we restricted our sample to only include HIV-negative concordant ($N = 275$) and HIV-discordant ($N = 58$) couples. We excluded HIV-positive concordant couples ($N = 28$) because we were most interested in which risk-reduction strategies men used within and outside of their relationships to reduce their risk for acquiring HIV and/or transmitting HIV.

Several items were transformed for descriptive and analytic purposes. Specifically, participants' engagement of UAI, with both main and casual MSM partners, was transformed into binary variables to indicate whether an individual had engaged in those behaviors (or not) in the 3 months prior to assessment. In addition, two items that assessed men's use of risk-reduction strategies that included using condoms for anal sex were collapsed into a single item labeled as "condoms always for anal sex". Similar strategies were then used to create single items for "serosorting with or without withdrawal" and "knowledge that HIV-positive person is on ARTs and/or has an undetectable viral load".

Items used to assess participants' use of risk-reduction strategies, both within and outside of their relationships, were categorized as either strategies that included the engagement of UAI or strategies that did not include UAI. Specifically, two items were categorized to indicate "No UAI: Safer sex", which included men's use of "condoms always for anal sex" and "oral sex only". The remaining seven strategies were clustered as allowing the "Engagement of UAI". For each category of risk-reduction strategies, items were transformed (e.g. summed) to indicate whether men had used one or more, one only, two, or three or more strategies that allowed UAI or did not allow UAI.

Descriptive statistics including means, standard deviations, rates, and percentages were calculated, as appropriate, for the individual-level and couple-level measures. Using the couple as the unit of analysis, tests of association, including Pearson Chi square and Fisher's exact, were calculated to describe and detect whether differences existed between HIV-negative and discordant couples' engagement of UAI within and outside of their relationship, and use of one or more risk-reduction strategies (e.g. clusters), within their relationships.

Because few couples had both men who had had sex with a casual MSM partner, we were unable to conduct the remaining analyses with using the couple as the unit of analysis. Individual-level tests of association were then

used to describe and detect: (1) whether men's use of one or more risk-reduction strategies with a casual MSM partner varied according to the couples' HIV-status; (2) whether men's use of one or more risk-reduction strategies within his relationship was associated with him using the same strategy outside of his relationship (e.g. main partner, casual MSM partner, both); and (3) whether the use of certain risk-reduction strategies within the relationships, as well as outside of the relationships, had varied according to the couples' HIV-status. All analyses were conducted by using Stata version 12 (StataCorp LP, College Station, TX).

Results

Characteristics of the Sample

The participant's average age was 32.2 years (SD 10.6). Most men in our sample of couples self-identified as: gay (98 %); White (78 %); living in an urban or suburban setting (88 %); being employed (80 %); having current health insurance (75 %); and stating their primary physician knew about their sexual behaviors with men (84 %). Forty-eight percent of the men reported having at least a bachelor's degree while 32 % reported being students.

Couples' average relationship duration was 57.4 months (SD 64.4). Almost 75 % of couples were cohabitating, and had been doing so for ~45.1 months (SD 64.2). The national sample also reported living in one of four regions in the U.S., and included 17 % who lived in the Northeast, 28 % in the South, 25 % in the Midwest, and 30 % who had lived in the Western region. Though most men self-identified as White, 34 % of the couples were interracial ($n = 113$). Regarding age, 57 % of the couples ($n = 190$) had one or both men who reported being 29 years of age or younger, and the average age difference between partners within couples was 4.9 years (SD 5.7).

Eighty-three percent of couples ($N = 275$) were HIV-negative while 17 % of couples ($N = 58$) were discordant. On average, men's last HIV and STI tests occurred 31.3 (SD 57.7) and 19.6 (SD 39.2) months prior to assessment, respectively. Table 1 provides details about the characteristics of the sample.

The majority of men ($n = 530$, 80 %) practiced insertive and/or receptive UAI with their main male partners. Within these relationships, 87 % of HIV-negative couples ($n = 239$) had engaged in UAI compared to 69 % of discordant couples ($n = 40$) ($\chi^2(1) = 22.7$, $p < 0.001$).

Outside of the relationship, almost a quarter of the men ($n = 160$, 24 %) had sex with a casual MSM partner during the 3 months prior to assessment. Among the 160 men who had sex outside of their relationships, over half of them ($n = 84$, 53 %) had UAI with a casual MSM partner.

Table 1 Sociodemographic and relationship characteristics among 333 gay male couples

Individual-level characteristic ($N = 666$ MSM)	N	%
Sexual orientation		
Gay	654	98
Bisexual	12	2
Race/ethnicity		
White	519	78
Hispanic or Latino	61	9
African American	23	3
Mixed race	33	5
Other[a]	30	5
Highest education level		
Some graduate school or completion of advanced degree(s)	162	24
Bachelor's degree	161	24
Some college, associate degree or trade cert.	271	41
Some H.S., H.S. diploma, or G.E.D.	72	11
Employment status		
Full or part-time employed	535	80
Unemployed	131	20
Geographic area of residence		
Urban or suburban	588	88
Rural	78	12
Health insurance		
Yes	501	75
No	165	25
Discussed HIV-status before first sex with main partner	514	77
Had insertive and/or receptive UAI within previous 3 months		
Main partner	530	80
Casual MSM partner	84	13
Both main partner and casual MSM partner	71	11
Had sex with a casual MSM partner	160	24

	M	SD
Age [range: 18-68 years]	32.2	10.6
Last HIV test[b]	31.3	57.7
Last STI test[b]	19.6	39.2

Couple-level characteristic ($N = 333$ dyads)	N	%
YMSM couple[c]	190	57
Race of the couple		
Interracial	113	34
Non-interracial	220	66
Residence in U.S. region		
Northeast	58	17
South	93	28
Midwest	100	25
West	82	30

Table 1 continued

Couple-level characteristic ($N = 333$ dyads)	N	%
HIV serostatus of the couple		
Concordant negative	275	83
Discordant	58	17
	M	SD
Age difference between partners of couple (years)	4.9	5.7
Relationship duration[b]	57.4	64.4
Cohabitation duration[b]	45.1	64.2

[a] Other included MSM who self-identified as Asian, Native American Indian, Native Hawaiian/Pacific Islander, or having another race not listed

[b] Items measured in months

[c] One or both men of the couple self-reported their age as 29 years and younger

~20 % of couples ($n = 63$), both HIV-negative ($n = 51$, 19 %) and discordant ($n = 12$, 21 %), had one or both men who had had UAI with a casual MSM partner. Compared to discordant couples ($n = 2$ of 12, 17 %), more HIV-negative couples had both men who reported having had UAI outside of their relationships ($n = 32$ of 51, 63 %). In contrast, a higher proportion of discordant couples ($n = 10$ of 12, 83 %) had one partner who reported having had UAI with a casual MSM partner than those among the HIV-negative couples ($n = 32$ of 51, 63 %). However, the differences between HIV-negative and discordant couples who had one or both partners having had UAI outside of their relationships were not statistically significant.

Furthermore, 14 % of men ($n = 71$) had UAI with both their main partner and a casual MSM partner during the same time frame. The seventy one men represented 16 % of couples ($n = 53$) of the entire sample, including 17 % ($n = 46$) of HIV-negative couples and 12 % ($n = 7$) of discordant couples. Regardless of the HIV-status of the couple, ~one third of couples had both men who reported having had UAI within and outside of their relationships (i.e. with both their main partner and a casual MSM partner). The remaining two thirds of couples only had one partner who reported having had UAI with both types of partners. No significant differences existed between HIV-negative and discordant couples on whether one or both partners had had UAI within and outside of their relationships. Further data about the couples' engagement of UAI are presented in Table 2.

Risk-Reduction Strategies Used Within the Relationship

Among HIV-negative gay couples, men reported using risk-reduction strategies that involved having UAI with their main partners, including 66 % ($n = 365$) who reported using serosorting with or without withdrawal and 24 % ($n = 130$) who reported "regardless of HIV-status, we never use condoms and ejaculate inside", herein referred to "pleasure > risk". Some men also reported using strategies that did not involve UAI with their main partners, including 23 % ($n = 128$) who used oral sex only and 15 % ($n = 83$) who used condoms always for anal sex. Among discordant gay couples, men reported using strategies that involved having UAI with their main partners. For instance, 32 % of men reported using strategic positioning, 24 % used knowledge that the HIV-positive partner is on ARTs and/or has an undetectable viral load, and 22 % chose pleasure > risk. Men also reported using strategies that did not involve UAI with their main partner, including 31 % ($n = 36$) who used oral sex only and 38 % ($n = 44$) who used condoms always for anal sex. Regardless of whether men used risk-reduction strategies that involved UAI or not with their main partners, no significant differences were detected on the individual-level between the two groups of couples.

However, within the relationships, couple-level differences were noted between HIV-negative and discordant couples' use of risk-reductions strategies that either included or did not include UAI. Overall, 48 % ($n = 160$) of all couples reported not using a specific risk-reduction strategy for UAI, while 52 % had used one or more strategies, 31 % reported used only one of the strategies, 16 % used two strategies, and 6 % of couples had used three or more strategies within their relationships. Compared to discordant couples, a higher proportion of HIV-negative couples reported using one or more specific risk-reduction strategies that involved UAI within their relationships (54 vs. 41 %) ($\chi^2(1) = 6.3$, $p < 0.05$). Thus, over half of discordant couples (59 %, $n = 34$) indicated not using any of these risk-reduction strategies for UAI within their relationships. In contrast, a higher proportion of discordant couples used risk-reduction strategies that did not include UAI (e.g. safer sex) within their relationships when compared to HIV-negative couples. Specifically, 26 % ($n = 15$) of discordant couples required condoms for anal sex compared to 4 % ($n = 12$) of HIV-negative couples ($\chi^2(1) = 32.4$, $p < 0.001$). Though not significant, ~17 % of discordant couples and 11 % of HIV-negative couples reported using oral sex only within their relationships as a risk-reduction strategy that excluded UAI. Additional details about the couples' use of risk-reduction strategies within their relationships are provided in Table 3.

Risk-Reduction Strategies Used Outside the Relationship

In general, men who had sex with a casual MSM partner used a variety of risk-reduction strategies that involved UAI,

Table 2 Differences in self-reports of UAI within and outside of gay male couples' relationships, by HIV-status of the couple

Sample size: Couples	Total sample		HIV-negative concordant		HIV-discordant	
	333 couples		275 couples		58 couples	
	N	%	*N*	%	*N*	%
UAI with main male partner[a,*]	279	84	239	87	40	69
UAI with casual MSM partner	63	19	51	19	12	21
Yes–by both men in the couple[b]	21	33	19	37	2	17
Yes–by one men in the couple[b]	42	67	32	63	10	83
UAI with both main male partner and casual MSM partner	53	16	46	17	7	12
Yes–by both men in the couple[c]	18	34	16	35	2	29
Yes–by one men in the couple[c]	35	66	30	65	5	61

* $p < 0.001$

[a] Few couples ($n = 26$) disagreed about whether they had UAI within their relationship. Due to the low number of these cases, they have been combined with those who concurred about having had UAI within the relationship

[b] Row percentages are based on the total number of couples who had one or both men who self-reported having had UAI with a casual MSM partner during the 3 months prior to assessment

[c] Row percentages are based on the total number of couples who had one or both men who self-reported having had UAI within and outside of their relationships during the 3 months prior to assessment

Table 3 Individual-level and couple-level reports of risk-reduction strategies used within HIV-negative concordant and HIV-discordant gay male couples' relationships

Sample size	Total sample		HIV-negative concordant		HIV-discordant	
	666 MSM		550 MSM		116 MSM	
Risk-reduction strategy: Individual-level	*N*	%	*N*	%	*N*	%
Engagement of UAI						
Pleasure > risk	155	23	130	24	25	22
Serosorting with or without withdrawal	–	–	365	66	–	–
Strategic positioning	–	–	–	–	37	32
Knowledge HIV + person is on ARTs and/or has undetectable viral load	–	–	–	–	28	24
No UAI: Safer sex						
Condoms always for anal sex	127	19	83	15	44	38
Oral sex only	164	25	128	23	36	31
Sample size	333 couples		275 couples		58 couples	
Clustering of strategies: Couple-level	*N*	%	*N*	%	*N*	%
Engagement of UAI						
Did not use a strategy	160	48	126	46	34	59
Used 1 or more strategies[a,*]	173	52	149	54	24	41
Used only 1 strategy[b]	102	31	84	31	18	31
Used 2 strategies[b]	52	16	47	17	5	9
Used 3 or more strategies[b]	19	6	18	6	1	1
No UAI: Safer sex						
Condoms always for anal sex**	27	8	12	4	15	26
Oral sex only	40	12	30	11	10	17

* $p < 0.05$; ** $p < 0.001$

[a] Risk-reduction strategies that involved UAI within the relationship, included: serosorting with or without withdrawal for the HIV-negative couples; strategic positioning and knowledge that HIV-positive partner is taking ARTs and/or has an undetectable viral load for the HIV-discordant couples; and valuing sexual pleasure more than risk (i.e. pleasure > risk) for both HIV-negative and discordant couples

[b] Row percentages are based on the total number of couples who self-reported using a risk-reduction strategy for UAI within their relationship during the 3 months prior to assessment

including: serosorting with or without withdrawal ($n = 43$, 27 %); strategic position ($n = 36$, 23 %); pleasure > risk ($n = 14$, 9 %). Among HIV-negative gay couples, men reported using risk-reduction strategies to have UAI with their casual MSM partners, including 27 % ($n = 36$) who reported using serosorting with or without withdrawal, 22 % ($n = 29$) who used strategic positioning, 8 % ($n = 11$) who reported pleasure > risk, and 1 % ($n = 1$) who indicated knowing that the HIV-positive person was on ARTs and/or had an undetectable viral load. Men among the discordant couples reported similar rates about using risk-reduction strategies to have UAI with their casual MSM partners. Specifically, 25 % ($n = 7$) of these men reported using serosorting, 25 % ($n = 7$) used strategic positioning, 14 % ($n = 4$) indicated that they knew the HIV-positive person was on ARTs and/or had an undetectable viral load, and 11 % ($n = 3$) had reported pleasure > risk. Men between the two groups of couples (HIV-negative and discordant) did not statistically differ about their use of risk-reduction strategies for UAI with a casual MSM partner.

For risk-reduction strategies that did not involve UAI with a casual MSM partner, 38 % ($n = 60$) of men reported always using a condom for anal sex while 51 % ($n = 81$) of men used oral sex only. The rates of using oral sex only with a casual MSM partner were similar between those in a HIV-negative couple ($n = 66$, 50 %) and among those in a discordant couple ($n = 15$, 54 %). Similarly, 40 % ($n = 53$) of men among the HIV-negative couples and 25 % ($n = 7$) of men among the HIV-discordant couples reported always using condoms for anal sex with a casual MSM partner. Men between these two groups of couples (HIV-negative and discordant) did not statistically differ about their use of safer sex risk-reduction strategies with a casual MSM partner.

Two thirds of men ($n = 101$, 63 %) who had sex outside of their relationship indicated not using a risk-reduction strategy. Of the men who did use a strategy for UAI, differences were noted according to the HIV-status of their primary relationship. Compared to men in HIV-negative relationships, a higher proportion of men in discordant couples reported using only one strategy ($n = 6$, 21 % vs. $n = 16$, 12 %) or three or more strategies ($n = 5$, 18 % vs. $n = 12$, 10 %) for UAI with a casual MSM partner. Similarly, a higher proportion of men in discordant relationships reported using one ($n = 12$, 80 % vs. $n = 53$, 65 %) or two ($n = 3$, 20 % vs. $n = 29$, 35 %) safer sex strategies with casual MSM partners compared to those in HIV-negative relationships. However, none of the differences found between the two groups of men and their use of risk-reduction strategies with casual MSM partners were statistically significant. Further information about men's use of risk-reduction strategies outside of their relationships are provided in Table 4.

Risk-Reduction Strategies Used Within and Outside of the Relationship

Among the HIV-negative couples, men who reported pleasure > risk as their risk-reduction strategy for UAI were more likely to report using this same strategy with both types of partners (e.g. main partner and a casual MSM partner) ($\chi^2(1) = 10.8$, $p < 0.01$). Similarly, men who used serosorting with or without withdrawal as their risk-reduction strategy for UAI were more likely to report using this same strategy within and outside of their relationships ($\chi^2(1) = 5.7$, $p < 0.05$). For risk-reduction strategies that did not involve UAI, men who only used oral sex within their relationships were more likely to use this same strategy outside of their relationships, that is, with both partner types ($\chi^2(1) = 11.0$, $p < 0.01$). No other significant patterns were found about men's use of risk-reduction strategies within and outside of their relationships. Additional data about these results are provided in Table 5.

Among the discordant couples, some men were statistically more likely to report using the same risk-reduction strategy for UAI within and outside of their relationships. For instance, men who reported pleasure > risk as their risk-reduction strategy for UAI were more likely to report using this same strategy with both partner types ($\chi^2(1) = 6.0$, $p < 0.05$). Similarly, men who used strategic positioning for UAI were also more likely to report using this strategy for both their main and casual MSM partners ($\chi^2(1) = 8.4$, $p < 0.01$). No other significant patterns were found among men's use of risk-reduction strategies, including the use of safer sex strategies, within and outside of their relationships. Refer to Table 6 for more data about these results.

Discussion

A healthy sex life can be a challenging reality for some gay male couples, particularly when they are trying to find and maintain a balance between pleasure and reducing their risk for acquiring HIV. Most couples in our sample practiced UAI within their relationships. A subset of these couples also had one or both men who had engaged in UAI with a casual MSM partner. Because UAI is commonly practiced among gay male couples, findings from our study provide one perspective of how couples balance their risk for HIV with sexual pleasure through the use of specific behavioral risk-reduction strategies within and outside of their relationships, and how their use of these strategies differed according to the HIV-status of their relationship.

Approximately half of the couples (48 %) indicated not using a particular risk-reduction strategy for UAI within their relationships. Some of these couples may not have identified their engagement of UAI as a sexual risk

Table 4 Individual-level reports of risk-reduction strategies used outside of HIV-negative concordant and HIV-discordant gay male couples' relationships

	Total sample		HIV-negative concordant		HIV-discordant	
Sample size[a]	160 MSM, 101 couples		132 MSM, 83 couples		28 MSM, 18 couples	
Risk-reduction strategy	*N*	%	*N*	%	*N*	%
Engagement of UAI						
Pleasure > risk	14	9	11	8	3	11
Serosorting with or without withdrawal	43	27	36	27	7	25
Strategic positioning	36	23	29	22	7	25
Knowledge HIV + person is on ARTs and/or has undetectable viral load	5	3	1	1	4	14
No UAI: Safer sex						
Condoms always for anal sex	60	38	53	40	7	25
Oral sex only	81	51	66	50	15	54
Clustering of strategies[b]	*N*	%	*N*	%	*N*	%
Engagement of UAI						
Did not use a strategy	101	63	85	64	16	57
Used 1 or more strategies[c]	59	37	47	36	12	43
Used only 1 strategy[d]	22	14	16	12	6	21
Used 2 strategies[d]	20	13	19	14	1	4
Used 3 or more strategies[d]	17	10	12	10	5	18
No UAI: Safer sex[c]	97	61	82	62	15	54
Used 1 strategy[d]	65	67	53	65	12	80
Used 2 strategies[d]	32	33	29	35	3	20

[a] Data represents 160 MSM of 101 gay male couples: 59 couples represented both men having had sex outside of their relationships while 42 couples were represented by one male having had sex outside of his relationship. Among the 83 HIV-negative concordant couples, both men having had sex outside of their relationship was represented by 49 couples and couples who had only one male having had sex outside of their relationship was represented by 34 couples. Among the 18 HIV-discordant couples, both men having had sex outside of their relationship was represented by 10 couples and couples who had only one male having had sex outside of their relationship was represented by 8 couples

[b] Clustering of strategies determined whether men within the couples had used one or more risk-reduction strategies with a casual MSM partner. Because few couples had both men reporting using the same strategy or strategies, data are presented on the individual-level

[c] Risk-reduction strategies that involved UAI outside of the relationship, included: serosorting without or with withdrawal for the HIV-negative couples; strategic positioning and knowledge that HIV-positive partner is taking ARTs and/or has an undetectable viral load for the HIV-discordant couples; and valuing sexual pleasure more than risk (i.e. pleasure > risk) for both HIV-negative and discordant couples. Risk-reduction strategies that did not involve UAI included condoms always for anal sex and oral sex only

[d] Row percentages are based on the total number of men who self-reported using a risk-reduction strategy for UAI (or no UAI) outside of their relationship during the 3 months prior to assessment

behavior, but rather thought of it as enhancing their sexual pleasure and attributes of their relationship [24–32]. In support of this reasoning, ~25 % of men in this sample chose that they valued pleasure over risk as a strategy for UAI with their main partners. Other couples reported using risk-reduction strategies that involved UAI, and about a third of them reported that they used one particular strategy. And although subtle differences existed between the HIV-negative and discordant couples on the number of risk-reduction strategies that they used for UAI, more notably, a significantly higher proportion of discordant couples reported always using condoms for anal sex (26 vs. 4 %) within their relationships. The number and variety of risk-reduction strategies that these couples used, in particular among the discordant couples, signifies the complexity of their behavioral approaches to HIV prevention within the context of their relationship. Other research has recently noted that some discordant gay male couples have established a level of acceptable risk, including practicing UAI, and use a variety of strategies to mitigate their risk of transmitting and/or acquiring HIV within the relationship [62]. Further research is warranted for examining how couples' negotiate and manage their desires for sexual pleasure while trying to reduce their risk for HIV.

Outside of the relationships, men from both HIV-negative and discordant couples reported using a variety of risk-

Table 5 Differences in HIV-negative concordant gay male couples' use of certain risk-reduction strategies within and outside of their relationships

	Main partner		Casual MSM partner[a]		Both partner types	
Sample size: 275 couples/550 MSM	550 MSM		132 MSM		132 MSM	
Risk-reduction strategy	*N*	%	*N*	%	*N*	%
Engagement of UAI						
Pleasure > risk**	130	24	11	8	7	5
Serosorting with or without withdrawal*	365	66	36	27	30	23
No UAI						
Condoms always for anal sex	83	15	53	40	15	11
Oral sex only**	128	23	66	50	23	17

* $p < 0.05$; ** $p < 0.01$

[a] Not all couples had both men self-reporting that they had sex with a casual MSM partner within the previous 3 months

Table 6 Differences in HIV-discordant gay male couples' use of certain risk-reduction strategies within and outside of their relationships

	Main partner		Casual MSM partner[a]		Both partner types	
Sample size: 58 couples/116 MSM	116 MSM		28 MSM		28 MSM	
Risk-reduction strategy	*N*	%	*N*	%	*N*	%
Engage'ment of UAI						
Pleasure > risk*	25	22	3	11	3	11
Strategic positioning**	37	32	7	25	5	18
Knowledge HIV + person is on ARTs and/or has undetectable viral load	28	24	4	14	2	7
No UAI						
Condoms always for anal sex	44	38	7	30	2	7
Oral sex only	36	31	15	54	5	18

* $p < 0.05$; ** $p < 0.01$

[a] Not all couples had both men self-reporting that they had sex with a casual MSM partner within the previous 3 months

reduction strategies for UAI with casual MSM partners. Many of these men indicated that they primarily used one or two of these strategies as opposed to several of them. For instance, ~25 % of men from both groups of couples reported using serosorting or strategic positioning, respectively, as their risk-reduction strategies for UAI with a casual MSM partner. To recall, serosorting refers to when an individual chooses to have anal sex with someone who has the same HIV-status [33], and strategic positioning refers to when the HIV-status differs between the two men, such that the HIV-positive male takes on the receptive role (i.e. bottom) while the HIV-negative male takes on the insertive role (i.e. top) during UAI [34]. Data about men's use of these two particular strategies supports what previous studies have found and contributes to the growing body of literature about MSMs' use of serosorting and strategic positioning with casual MSM partners [34, 38, 44, 46, 47, 49–52].

With regard to men's use of risk-reduction strategies within and outside of their relationships, patterns did exist by partner type. Among both HIV-negative and discordant couples, some men who reported valuing pleasure over risk for UAI with their main partners also reported using this same strategy with their casual MSM partners, thus with both partner types. Men who chose valuing pleasure over risk for UAI within and outside of their relationships is worrisome for HIV prevention given that UAI is the primary sexual risk behavior for acquiring HIV [6], and that many MSM acquire HIV within the context of their relationship [5]. To that calling, new HIV prevention interventions that address the complex sexual health needs of gay male couples, and how these needs may differ according to the couples' HIV-status, are urgently needed. Additionally, among discordant couples, some men who reported using strategic positioning for UAI with their main partners also reported using this same strategy with their casual MSM partners. These men may have accepted a certain level of risk about acquiring HIV.

These findings suggest that the use of risk-reduction strategies for UAI depend on the type of partner as well as the HIV-status of the couple. However, this study did not assess whether both partners within the couple communicated and decided collectively that one or both of them

could use risk-reduction strategies for UAI with casual MSM partners outside of their relationship. That is, we did not ask whether the couples had agreed that they could specifically use one or more risk-reduction strategies for UAI outside of their relationships. Further research in this area is warranted in order to assess the decision-making processes that gay male couples use to determine which risk-reduction strategies they allow to occur with casual MSM partners. However, research has begun to examine which sexual behaviors that couples allow to occur within and outside of their relationships based on their type of sexual agreement [32]. Specifically, Mitchell [32] found that only couples who concurred about having an open sexual agreement had endorsed UAI as an allowed behavior to occur outside of their relationship, that is, with a casual MSM partner. To help further prevention efforts for gay male couples, additional studies are needed to examine how aspects of couples' sexual agreements intersect with their use of risk-reduction and seroadaptive strategies.

The use of a cross-sectional study design with dyadic data from a convenience sample precludes us from making casual inferences and generalizing our findings to all gay male couples who live in the US, as well as, those who do and do not use the internet and/or facebook. Although we did not collect identifying information, participation, social desirability, and recall biases may have influenced the men to inaccurately report information about their HIV-status, sexual behaviors, and use of risk-reduction and seroadaptive strategies. In addition, participants may have completed the survey with their main partners, despite our request for them to complete it independently and separately, and therefore potentially causing some bias. We also did not assess couples' knowledge of HIV transmission-related behaviors and risk-reduction strategies, their perceived risk for acquiring HIV and/or STIs, or their motivations to engage in risk-reduction strategies for UAI. Future research that examines risk-reduction strategies among gay male couples should specifically address these limitations. Despite these limitations, our study obtained dyadic data from a large, geographically and educationally diverse sample of Internet-using gay male couples who reported using risk-reduction strategies within and outside of their relationships.

Our study provides valuable data about HIV-negative and discordant gay male couples' use of risk-reduction strategies within and outside of their relationships. The study's findings suggest that couples use a variety of strategies according to the type of partner and HIV-status of the couple. Current HIV prevention efforts and programs in development should consider how couples are using these strategies, and employ methods to address how best to educate and empower the couples to reduce HIV incidence and risk. Future research that employs a longitudinal study design would also enable a better assessment of how couples communicate, negotiate and use such strategies within the context of their relationship.

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