



Published in final edited form as:

*Arch Sex Behav.* 2014 January ; 43(1): 161–171. doi:10.1007/s10508-013-0211-0.

## Gay Male Couples' Attitudes Toward Using Couples-based Voluntary HIV Counseling and Testing

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### Abstract

Many men who have sex with men (MSM) acquire HIV from their primary male partners while in a relationship. Studies with gay couples have demonstrated that relationship characteristics and testing behaviors are important to examine for HIV prevention. Recently, couples-based voluntary HIV counseling and testing (CVCT) has become available to male couples throughout the U.S. However, HIV-negative couples' attitudes toward using CVCT and how their relationship characteristics may affect their use of CVCT remain largely unknown. This information is particularly relevant for organizations that offer CVCT. To assess couples' attitudes, and associated factors toward using CVCT, a cross-sectional study design was used with a novel Internet-based recruitment method to collect dyadic data from a national sample of 275 HIV-negative gay couples. Multivariate multilevel modeling was used to identify factors associated with differences between and within couples about their attitudes towards using CVCT. Findings revealed that couples were "somewhat" to "very likely" to use CVCT. More positive attitudes toward using CVCT were associated with couples who had higher levels of relationship satisfaction and commitment toward their sexual agreement and among those who had at least one partner having had sex outside of the relationship. Less positive attitude toward using CVCT was associated with couples who had higher levels of trust toward their partners being dependable. Differences within couples, including age between partners, whether sex had occurred outside of the relationship, and value toward a sexual agreement also affected their attitudes toward using CVCT. Providing additional testing methods may help HIV-negative gay couples better manage their HIV risk.

### Keywords

gay male couples; couples-based voluntary HIV counseling and testing (CVCT); relationship characteristics; sexual orientation

### INTRODUCTION

HIV incidence among men who have sex with men (MSM) continues to increase each year in the United States (CDC, 2012). Over the past decade, studies indicate that the majority of

MSM acquire HIV while in a same-sex relationship (Davidovich et al., 2001; Sullivan, Salazar, Buchbinder, & Sanchez, 2009; Xiridou, Geskus, de Wit, Coutinho, & Kretzschmar, 2003). For example, estimates indicate that between one-third and two-thirds of MSM in the U.S. acquire HIV from their main sex partners (e.g., male couples) (Goodreau et al., 2012; Sullivan et al., 2009).

Within male couples' relationships, increases in HIV risk are attributed to a number of factors, including lack of confirmation of both partners' HIV-status (as negative) before having unprotected anal intercourse (UAI), higher number of sex acts, more frequent receptive roles, and lower condom use during anal sex (Sullivan et al., 2009). Among MSM and male couples, UAI is the primary sexual risk behavior for acquiring and transmitting HIV (Coates, 2008). Research has identified reasons why MSM have UAI with their primary male partners, including to show their love, intimacy, and trust toward one another (Appleby, Miller, & Rothspan, 1999; Blais, 2006; Davidovich, de Wit, & Stroebe, 2004; de Vroome, Stroebe, Sandfort, de Wit, & Van Griensven, 2000; McLean et al., 1994; McNeal, 1997; Worth, Reid, & McMillian, 2002), to strengthen their relationship commitment and satisfaction (Davidovich, de Wit, & Stroebe, 2006; de Vroome et al., 2000; McLean et al., 1994; McNeal, 1997; Worth et al., 2002), and as a primary reason for establishing a sexual agreement within their relationship (Mitchell, 2013). Other possible contributors to increased HIV risk among gay male couples include assuming that a partner's HIV status is negative (Davidovich, de Wit, & Stroebe, 2000; Davidovich et al., 2004; Elford, Bolding, Maguire, & Sherr, 1999) and discrepancies about and non-adherence to a sexual agreement (Davidovich et al., 2000, 2001, 2004; Elford et al., 1999; Hoff & Beougher, 2008; Hoff et al., 2009; Gomez et al., 2012; Kippax et al., 2003; Mitchell, 2013; Mitchell, Harvey, Champeau, Moskowicz, & Seal, 2012; Xiridou et al., 2003). A sexual agreement is an explicit agreement made between two primary male partners about which sexual behaviors may occur within and outside of their sexual relationship, with the overall aim of minimizing HIV risk and enhancing some aspect of their relationship (Hoff & Beougher, 2008; Mitchell, 2013).

Conversely, relationship characteristics may help decrease a couple's risk for HIV acquisition. Gomez et al. (2012) found that men with higher levels of trust, communication (within the relationship), commitment, and social support were less likely to report breaking their sexual agreement. Another study with 566 MSM couples showed that HIV-specific social support from peers reduced UAI with casual sexual partners (Darbes, Chakravarty, Beougher, Neilands, & Hoff, 2012). Additionally, Mitchell, Harvey, Champeau, and Seal (2012) reported that the odds of one or both men engaging in UAI with a casual sexual partner were lower in couples with higher levels of commitment to their sexual agreement. Thus, relationship characteristics are important to study for HIV prevention with gay male couples.

HIV testing must also be an essential component to HIV prevention among gay male couples. Though few studies with gay couples have assessed their testing behaviors, research has found that HIV testing patterns and rates of men who engage in UAI within and outside of their relationships vary considerably (Chakravarty, Hoff, Neilands, & Darbes, 2012; Mitchell & Petroll, 2012a). For example, one national study found that, among HIV-

negative partnered MSM who had engaged in UAI within and outside of their relationships, 6% of the men reported they would test every 3–4 months, 33% would test approximately once a year, and another 31% of the men would only test if they felt they were at-risk (Mitchell & Petroll, 2012a). A different study in San Francisco, yet with a similar population, found that 25% of men who recently engaged in UAI with an outside partner of discordant or unknown serostatus had been tested within the previous three months and 60% had been tested within the past year (Chakravarty, Hoff, Neilands, & Darbes, 2012). Further, a study with HIV-negative gay couples noted that men who recently tested for HIV (e.g., < 3 months) were more likely to have had UAI with a casual MSM partner during the same timeframe, which may suggest that these men might be aware of their risk for acquiring HIV and are possibly using testing as an approach to harm-reduction (Mitchell & Petroll, 2012b). Similarly, other analyses provided by Mitchell and Petroll (2012c) indicated that men who perceived their primary male partners as having been recently tested for HIV were more likely to have had UAI within and outside of their relationship.

Previous research has demonstrated that relationship characteristics and testing behaviors are key and essential components to address for preventing new HIV infections among at-risk gay male couples. The combination of these components may be particularly critical for HIV prevention given how common UAI is practice within HIV-negative gay male couples' relationships, and when some of these partnered men also practice UAI with casual MSM partners. Although sex and relationships are dynamic, interdependent, and require the participation of at least two partners, the majority of HIV prevention research and efforts have targeted MSM at the individual- and community-levels (El-Bassel et al., 2010; Herbst et al., 2007). Research has thus recognized the need to develop specific HIV prevention interventions for at-risk male couples because few programs currently exist (Burton, Darbes, & Operario, 2010; El-Bassel et al., 2010; Grossman et al., 2011; Herbst et al., 2007). To this calling, Stephenson et al. (2011) recently developed and started implementing an HIV testing intervention for male couples in the U.S. called couples-based voluntary HIV counseling and testing (CVCT).

During CVCT, male couples participate in the whole cycle of testing together, which includes that they receive their pretest information, counseling and risk assessment, results from the test(s), and post-test counseling, together (Hageman, Tichacek, & Allen, 2009). A few studies within the U.S. and South Africa have recently explored whether partnered MSM would use CVCT (Stephenson et al., 2011, 2012). Stephenson et al. (2011) reported an overwhelming acceptance of CVCT among partnered MSM in Seattle, Chicago, and Atlanta. Other research with U.S. MSM has found that men who had a primary male partner in the last 12 months were approximately twice as willing to use CVCT within the next 12 months compared to those who did not have a primary male partner within the last 12 months (Wagenaar et al., 2012). However, whether gay male couples from other areas of the U.S. are willing to use CVCT, the characteristics of gay male couples who would use CVCT, and whether differences exist between partners and couples with regards to their attitudes toward using CVCT remains currently unknown.

One of the primary goals of the National HIV/AIDS Strategy of the United States is to increase the percentage of persons who are aware of their HIV-positive serostatus (Office of

National AIDS Policy, 2010). One way to help achieve this goal is to conduct research that will help HIV-service organizations target and identify at-risk gay male couples who may benefit from using CVCT. As new HIV testing methods become available, research must assess whether at-risk gay male couples are willing to use such methods and how best to target and promote these testing options to them. Our study aimed to partially fulfill this knowledge gap by assessing HIV-negative gay male couples' attitudes toward using CVCT. Relationship characteristics, such as trust, relationship commitment, communication patterns, and investment in a sexual agreement have previously been shown to affect gay couples' risk for acquiring HIV. As such, the present study examined whether differences of relationship characteristics existed within and between the couples and how these differences may have affected their attitudes toward using CVCT.

## METHOD

### Participants

Characteristics of the study sample are provided in Table 1. Most men in our sample of same-sex couples self-identified as: gay (98%); living in an urban or suburban setting (88%); being employed (81%); and/or having health insurance (76%). Twenty-seven percent of men were either living in the South, Midwest, or Western regions of the U.S., respectively, while the remaining 19% of men were living in the Northeast. The mean age for the individual and couple was 31.4 years (SD 10.0, 9.4) and the average age difference between partners was 4.5 years (SD 5.2). Though most men self-identified as White (81%), almost a third of the couples were multiracial (30%). Half of the men (50%) reported having at least a bachelor's degree whereas 36% of couples had both men who had a bachelor's degree or higher. Two-thirds of couples (67%) had both men employed either full- or part-time.

The average duration of the couples' relationship was 56.8 months (SD = 61.9) with a median of 34 months. Most couples cohabitated (75%) and had been doing so for approximately 43.5 months (SD = 60.6). The majority of men and couples (83% and 80%, respectively) reported having had insertive and/or receptive UAI within their relationship (i.e., with their primary male partners). About a quarter of the men (24%,  $n = 132$ ) reported that they had sex with a casual MSM partner within the previous three months. Specifically, among the sample of 275 gay male couples, 83 couples (30%) had both primary partners reporting that they had sex outside of their relationship, which included 19 couples (23%) who had both men having had UAI with a casual MSM partner and 31 couples (37%) who only had one male having had UAI with a casual MSM partner. Regarding sexual agreements, 71% of men indicated that they had a sexual agreement with their primary partner, yet, only 59% of couples actually had concurred about having an established sexual agreement within their relationship.

### Measures

**Outcome variables**—Participants' attitudes toward using couples-based voluntary HIV/STI counseling and testing (CVCT) was assessed by 1-item with a 5-point Likert-type scale that had response options ranging from 0 (*Not at all*) to (*Extremely likely*). We asked

participants how likely they would use CVCT with their primary male partner. Starting with the stem, “Hypothetically, if the following service became readily available...” participants were then asked: “How likely would you use couples-based HIV/STI testing with your partner (i.e., you test together)?”

The information previously provided describes how participants’ attitude toward using CVCT with their primary partner was assessed. To better understand how best to promote and improve HIV testing behaviors of HIV-negative gay male couples in the U.S., we created two outcome variables for this testing method to detect differences that existed *between* and *within* couples of our sample. The average of both partners’ scores on their attitude toward using CVCT was calculated to detect differences *between* couples in the sample. Differences within couples (e.g., absolute difference between partners) were calculated by subtracting one partners’ score from the other partners’ score on their attitude toward using CVCT. In total, two outcome variables were constructed to account for the differences *between* and *within* couples of our sample regarding their attitudes toward using CVCT.

**Independent variables**—A variety of measures were used to assess couples’ demographic, relationship, sexual behavior, and testing characteristics. Participants were asked about their sociodemographic characteristics, including whether they had health insurance. Relationship characteristics assessed included relationship duration, cohabitation duration, and aspects about a sexual agreement. Details about the sample’s sexual agreements and prior HIV and STI testing behaviors have been reported in detail elsewhere (Mitchell, 2013; Mitchell & Petroll, 2012a).

Men were also asked to report their HIV serostatus, their primary partner’s perceived HIV serostatus, and how often they had insertive and receptive UAI with their primary male partner within the previous three months. Similarly, participants were asked whether they had had sex with any casual MSM partners within the previous three months, including UAI.

Several validated scales were used to assess additional characteristics within gay male couples’ relationships, including their levels of trust (Rempel, Holmes, & Zanna, 1985), relationship commitment (Rusbult, Martz, & Agnew, 1998), investment in a sexual agreement (Neilands, Chakravarty, Darbes, Beougher, & Hoff, 2009), and communication patterns (Christensen & Shenk, 1991). Table 2 provides detailed information about these validated scales, including the names of the subscales, response options, and reliability coefficients. These same validated scales have been detailed in-depth elsewhere (Gomez et al., 2011; Mitchell, Champeau, & Harvey, 2012; Mitchell et al., 2012).

## Procedure

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 10 week recruitment period during the Summer of 2011, advertisements were displayed to individual Facebook members (i.e., not couples) whose profile demographics matched our study eligibility criteria: males living in the U.S., 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 three banner advertisements. In total, the banner advertisements were shown 8.5 million times (i.e., impressions) on potential participant profiles. The advertisements briefly described the purpose of the study and included a picture of a male couple. The advertisements and eligibility criteria aimed to target individual same-sex partnered men. These men, once deemed eligible, were then asked to invite their main partners to also participate in the study through a partner-referral system that was embedded in our online survey. 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 (51%) potential participants answered our eligibility questions; 722 MSM, representing both men of 361 same-sex couples, qualified, enrolled, and completed the survey, and were included in the original study. Data collected from these couples indicated that none of the couples had both men who had responded to the Facebook advertisements.

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 primary, male relationship partner to participate in the study, as well as to have to complete the survey independently and separately from their partner (e.g., partner referral system). Both men in the couple had to meet the following eligibility criteria to participate: be 18 years of age or older, live in the U.S., be in a sexual relationship with another male for at least three months, and have had oral and/or anal sex with this partner within the previous three months. Eligible participants were directed to an electronic consent form to provide consent before taking the 30–40 minute confidential survey.

To assess differences within the couple (e.g., between partners) and between couples, we embedded a partner referral system in the survey to collect data from both men in the couple (e.g., dyadic data). Specifically, participants were required to input their own and their primary male partner’s email address. The participant’s primary 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. Before incentives were provided, post-hoc analyses were conducted to help verify the legitimacy of the couples’ relationship by comparing responses to certain key variables (e.g., relationship duration and age), email addresses and IP addresses. Every fifth verified couple (i.e., 5th, 10th, etc.) that completed the survey received two \$20 Amazon electronic gift card incentives via email (i.e., one gift card per partner). The Medical College of Wisconsin Institutional Review Board approved the study protocol.

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 (i.e., <https://>). Only the primary investigator of the study and managers at Survey Gizmo had access to the study data. Other than email addresses, no personal identifying information

was collected in order to help decrease measurement error and participation bias (Catania, Gibson, Chitwood, & Coates, 1990). Email addresses were deleted after data collection and verification of the couples' relationships.

**Data analysis**—Prior to data collection, a minimum sample size of 250 dyads was estimated to provide a power of 0.90 for detecting regression coefficient estimates for the outcome variables (Kenny, Kashy, & Cook, 2006; Rabe-Hesketh & Skrondal, 2008). To account for the non-independence of dyadic data, data were arranged and prepared in an appropriate format to conduct multilevel modeling analyses. All analyses were conducted using Stata Version 12 (StataCorp, College Station, TX).

Several variables were transformed for descriptive purposes. Participants' engagement of UAI, with both primary and casual MSM partners, was transformed into binary variables to indicate whether an individual had engaged in those behaviors (or not) in the three months prior to assessment. In addition, a participant's self-report of race was compared to his partners self-report of race to create a dummy variable that represented whether the couple was multiracial (or not). This same format was also used to construct other dummy couple-level variables, including education level of the couple, employment status of the couple, to account for whether the couple concurred about having a sexual agreement and/or engagement of UAI within their relationship, as well as whether both partners had sex with a casual MSM partner outside of their relationship.

Though dyadic data from 361 gay male couples (722 individuals) were collected in the original study, we restricted our sample for this secondary study to only include 275 HIV-negative concordant couples. We excluded HIV-discordant and positive concordant couples for this particular study. We were most interested in assessing how HIV-negative gay male couples' attitudes toward using a newer HIV testing method (e.g., CVCT) was associated with their relationship characteristics without accounting for how a HIV-positive primary partner may affect the couples' dynamics with regards to HIV prevention.

Descriptive statistics including means, SDs, rates, and percentages were calculated, as appropriate, for the measures. To assess how relationship characteristics may affect couples' attitudes toward using CVCT, we examined the relationship factors of commitment, trust, investment in a sexual agreement, and communication patterns in two specific ways. First, the average of both partners' scores on each factor was calculated and then entered into a multilevel regression model to assess differences that existed *between* couples in the sample regarding their attitudes toward using CVCT. Second, the absolute difference between the two partners' score of the relationship factor was also calculated and then entered into a multilevel regression model to examine differences that existed *within* couples with respect to their attitudes toward using CVCT. Specifically, between couples' relationship factor(s) were included in the multilevel models to predict the outcome of between couples' attitudes toward using CVCT. This same approach was then used and applied for the within couples' relationship factors(s) to predict within couples' attitudes toward using CVCT.

Bivariate analyses of univariate multilevel regression models with maximum likelihood estimation were used to identify which factors and relationship characteristics were

significantly associated with the outcome variable. Relationship factors and characteristics that remained statistically significant (i.e.,  $p < .05$ ) with the outcome variable were then included in the multivariate multilevel regression model with maximum likelihood estimation for that particular outcome variable (e.g., between factors with between couples' attitudes about using CVCT). Two final multilevel regression models were then analyzed. For each multivariate multilevel regression model, we used a backward eliminate strategy to remove variables that remained non-significant until all variables, excluding the pre-determined confounders, had remained significant, including the overall final model (i.e.,  $p < .05$ ). We included age of the couple (both average and difference, respectively, for those models), race of the couple, relationship duration, and engagement of UAI within the relationship as potential confounders for the multivariate multilevel regression models. Though all data were analyzed at the couple-level, we specifically used multilevel modeling to account for the non-independence of using dyadic data for our analyses as well as to provide more conservative estimates of our findings. We report the coefficients, SEs, and statistical significance for the factors in the univariate and multivariate multilevel regression models.

## RESULTS

Table 3 describes the individual and couple-level scores of the samples' relationship characteristics and attitude toward using CVCT. In general, participants' scores and couples' averages (i.e., differences between dyads) about their relationship characteristics indicated that they were committed to their relationship, trusted their primary partner, were invested in their sexual agreement, and were communicating constructively with their primary partner. Participants' scores and couples' averages also reflected that they would be "somewhat likely" to "very likely" to use CVCT with their primary partner. In contrast, some notable differences within couples about their relationship characteristics were detected. For instance, within couples, partners seemed to differ about their perceptions of whether an alternative option for a relationship partner or relationship type (e.g., being single) existed (i.e., quality of alternatives), whether they thought their partner was predictable for being trustworthy, and whether they communicated constructively or by avoidance and withholding.

### **Bivariate Associations Between and Within Couples' Factors and Attitudes About Using CVCT**

Results from the bivariate analyses are provided in Table 4. Several relationship factors significantly differed with couples' attitudes toward using CVCT. Between the sample of couples, more positive attitudes toward using CVCT were associated with couples who concurred about having a sexual agreement,  $\beta = 0.43$ ,  $SE = 0.11$ ,  $p < .001$ , and among those who had one or both men who reported having had sex outside of their relationship,  $\beta = 0.31$ ,  $SE = 0.12$ ,  $p < .01$ . More positive attitudes toward using CVCT were also associated with couples who: had higher scores on relationship satisfaction,  $\beta = 0.23$ ,  $SE = 0.07$ ,  $p < .01$ , viewed their partner as being dependable for trustworthiness,  $\beta = 0.14$ ,  $SE = 0.07$ ,  $p < .05$ , had faith in their partner for being trustworthy,  $\beta = 0.22$ ,  $SE = 0.07$ ,  $p < .01$ , and communicated constructively,  $\beta = 0.18$ ,  $SE = 0.04$ ,  $p < .001$ . Further, more positive attitudes



toward using CVCT were associated with couples who reported higher scores on investment of their sexual agreement, such as their commitment,  $\beta = 0.47$ ,  $SE = 0.16$ ,  $p < .01$ , satisfaction,  $\beta = 0.32$ ,  $SE = 0.12$ ,  $p < .01$ , and value  $\beta = 0.51$ ,  $SE = 0.15$ ,  $p < .01$ , of the agreement. In contrast, less positive attitudes toward using CVCT were associated with couples who had been in their relationship longer than the sample's average relationship duration,  $\beta = -0.01$ ,  $SE = 0.00$ ,  $p < .05$ , and among those couples who had higher scores of communication by avoidance and withholding,  $\beta = -0.13$ ,  $SE = 0.04$ ,  $p < .01$ .

Within couples (i.e., between the two partners), greater differences between the partners regarding attitudes towards using CVCT were associated with greater differences in valuing their sexual agreement,  $\beta = 0.24$ ,  $SE = 0.12$ ,  $p < .05$ . As age differences increased within the couple, there was less difference within the couple in attitudes towards CVCT,  $\beta = -0.03$ ,  $SE = 0.01$ ,  $p < .05$ . Also, less difference within the couple in attitudes towards CVCT was associated with couples who had one or both men having had sex outside of their relationship,  $\beta = -0.20$ ,  $SE = 0.12$ ,  $p < .05$ . No other factors were significantly associated with between and within couples' attitudes toward using CVCT.

### Factors Predicting Differences Between and Within Couples' Attitudes About Using CVCT

Table 5 highlights which factors predicted significant differences between and within couples' attitudes toward using CVCT.

**CVCT between couples**—After controlling for potential confounding factors, more positive attitudes toward using CVCT were associated with couples who had: one or both partners reporting having had sex outside of the relationship,  $\beta = 0.49$ ,  $SE = 0.15$ ,  $p < .01$ , higher scores of relationship satisfaction,  $\beta = 0.36$ ,  $SE = 0.12$ ,  $p < .01$ , and higher scores of commitment to their sexual agreement,  $\beta = 0.47$ ,  $SE = 0.18$ ,  $p < .01$ . Less positive attitudes toward using CVCT were associated with couples who reported higher scores of dependability for trustworthiness,  $\beta = -0.23$ ,  $SE = 0.11$ ,  $p < .05$ . Overall, the model explained approximately 34% of the estimated variance for predicting attitude differences toward using CVCT between couples in our sample.

**CVCT within couples**—After controlling for potential confounders, greater differences between the partners regarding attitudes towards using CVCT were associated with greater differences in valuing their sexual agreement,  $\beta = 0.26$ ,  $SE = 0.11$ ,  $p < .05$ . Within couples, as the difference between the two partners' scores increased about valuing their sexual agreement and become less similar, the difference between the two partners' attitudes about using CVCT also increased and became less similar. In contrast, as age differences increased within the couples, there was less difference within the couple in attitudes toward using CVCT,  $\beta = -0.02$ ,  $SE = 0.01$ ,  $p < .05$ . Compared to behaviorally monogamous couples, the difference between partners' attitudes about using CVCT decreased when one or both of the men in the couple had had sex outside of their relationship (e.g., behaviorally non-monogamous couples),  $\beta = -0.28$ ,  $SE = 0.11$ ,  $p < .05$ . This model accounted for approximately 10% of the estimated variance for predicting attitude differences toward using CVCT within couples in our sample.

## DISCUSSION

Findings from our national study provided support that HIV-negative seroconcordant gay male couples were likely to use couples-based HIV CVCT. Our results suggest that certain key relationship characteristics played an important role toward couples' attitudes of using CVCT. For instance, couples who reported having higher levels on certain relationship characteristics, such as perceiving their main partner to be dependable for trustworthiness, being satisfied with their relationship, and being committed toward their sexual agreement, had more positive attitudes toward using CVCT. Other research has shown that couples who have higher levels of these relationship characteristics are more likely to establish and adhere to a sexual agreement (Gomez et al., 2012; Mitchell et al., 2012) and less likely to have UAI outside of their relationship (Mitchell et al., 2012; Mitchell & Petroll, 2012c), thereby reducing the individual's and couples' risk for HIV. This information is relevant and useful for AIDS-service and other community-based organizations (ASOs and CBOs) that currently provide, or plan to provide, CVCT to male couples within the U.S. Specifically, practitioners of ASOs and CBOs could emphasize that, in addition to gay male couples getting tested for HIV and STIs together, they will also have the opportunity to discuss aspects of their relationship and how best both men can meet their individual sexual health needs as well as the needs of their relationship. Thus, our findings highlight how gay male couples' relationships could potentially benefit from participating in CVCT far more than the men learning about their current HIV and STI statuses.

Couples who engaged in sexual behavior outside of their relationship also had more positive and similar attitudes toward using CVCT. These couples may have a higher awareness of HIV prevention and may value the importance of having a specific testing method, such as CVCT, that allows them to talk about having sex outside of their relationship and aspects of a sexual agreement. For this particular sample, the average time since their last HIV test was two years. Previous research with HIV-negative gay male couples has shown quite variability in their testing frequency and patterns for HIV, regardless of whether UAI had occurred within and/or outside of the relationship (Chakravarty et al., 2012; Mitchell & Petroll, 2012a, 2012b). Because many HIV-negative gay male couples practice UAI within their relationships and, to some extent, also engaged in UAI with casual MSM partners, it is crucially important to promote and offer alternative HIV testing methods (e.g., CVCT) to increase testing behaviors for HIV and STIs.

In addition, trust within the relationship (e.g., viewing a main partner as dependable for trustworthiness) may affect the couples' attitude toward using CVCT. Men within these relationships may not view themselves as being at-risk for acquiring HIV, needing a testing service like CVCT, and may depend on their main partners to inform them if their risk for HIV has changed within the context of their relationship. Prior research has shown that gay men often struggle and don't disclose to their main partners if they have had sex, including UAI, outside of their relationship when it is not a consented behavior for their relationship and/or a part of their sexual agreement (Gass, Hoff, Stephenson, & Sullivan, 2012; Hoff & Beougher, 2008; Hoff et al., 2009; Mitchell, 2013). As such, practitioners who offer CVCT should emphasize the importance for gay male couples to test for HIV, particularly among those who engage or plan to engage in UAI within their relationship, and how CVCT can be

a useful service to help increase the couples' understanding of what sexual behaviors are allowed to occur and what can be done when their agreement is broken. Prior findings by Wagenaar et al. (2012) support this notion, such that partnered MSM were wanting to participate in CVCT for a number of reasons, including "would give us a chance to talk about rules for our relationship," "would strengthen us as a couple," and "to support each other."

Another noteworthy finding included the age difference between partners appears to affect couples' attitudes toward using CVCT. One recent national study with U.S. MSM found that age affects uptake of CVCT; specifically, men under the age of 45 years were significantly more willing to participate in CVCT compared to men who were older than 45 (Wagenaar et al., 2012). Regarding HIV risk, one study with gay male couples found that men who had an older primary partner were significantly less likely to have had UAI within and outside of their relationship, thus suggesting that age does play a factor for HIV prevention for gay couples (Mitchell et al., 2012). Additional research is needed to further explore how age difference between partners within a couple specifically affects whether they will test for HIV, including the use of CVCT, as well as participating in any other HIV prevention services.

Because a significant proportion of MSM acquire HIV while in a same-sex relationship (Goodreau et al., 2012; Sullivan et al., 2009) and that testing rates among at-risk HIV-negative gay male couples are low and worrisome (Mitchell & Petroll, 2012a), the availability of CVCT as an additional testing method holds promise for averting new, and identifying current, HIV infections among at-risk gay male couples. This study supports that relationship characteristics are important and necessary to consider when targeting and promoting CVCT to HIV-negative gay male couples. Though our data reflect that many of our couples were well-educated, living in urban locales, and were "somewhat" to "very likely" to use CVCT, additional research with a more diverse sample of gay male couples is warranted, particularly with those who live in rural locations throughout the U.S.

The limitations of this study are important to note. Causal inference is not possible due to the use of a cross-sectional study design. With the use of an online convenience sample, our findings were not representative of all gay male couples in the U.S. In addition, the demographic and relationship factors that were assessed for this study were not exhaustive. Other factors, such as perceived risk for HIV acquisition and presence of intimate partner violence (IPV), may exist and influence the couples' attitudes toward using CVCT. Although the content used in our online survey was critiqued by members of the target population before study enrollment began, it is possible that some participants may have misinterpreted CVCT to be two partnered men getting tested for HIV simultaneously yet independently instead of both men getting tested together—as a gay couple. This may have biased our results and future instruments should include a full description of the process of CVCT as well as an assessment of other potential moderating factors, including intimate partner violence (IPV). Further research is warranted to examine gay couples' motivations and under what context they would use CVCT. Despite these limitations, our study's main strengths were the large sample size of HIV-negative gay couples, the use of dyadic data

with multilevel modeling analyses, and ascertaining how relationship characteristics affected couples' attitudes toward using CVCT.

Given that most MSM acquire HIV within the context of a relationship, researchers must create novel HIV prevention programs that emphasize the importance of couples' sexual and relationship health while encouraging them to test according to their sexual behaviors and risk for acquiring HIV. Ideally, these programs would emphasize the need for couples to make decisions about their sexual health, needs, and testing patterns together, given they are provided with accurate prevention information and multiple testing and prevention options. CVCT provides a novel and timely testing option for gay male couples in the U.S. In addition to the findings of this study, other studies with at-risk gay male couples are needed to further evaluate the acceptability of CVCT and how best to increase couples' use of CVCT, given their sexual and relationship health needs. Providing gay male couples with CVCT as an option to test for HIV that specifically considers the context of their relationship with a myriad of other HIV prevention tools may ultimately provide the best strategy for reducing new HIV infections among MSM, including at-risk gay male couples.

## Acknowledgments

Data collected for this article 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**

Characteristics of the HIV-negative sample (550 MSM, 275 male couples)

<b>Individual-level characteristic</b>	<b>% (N = 550)</b>
Sexual orientation	
Gay	98% (539)
Bisexual	2% (11)
Race/ethnicity	
White	81% (446)
Hispanic or Latino	6% (35)
African American	3% (17)
Asian	2% (10)
Mixed race	6% (30)
Other <sup>a</sup>	2% (12)
Highest education level	
Some graduate school or completion of adv. degree(s)	25% (138)
Bachelors degree	25% (136)
Some college, associate degree or trade cert.	40% (222)
Some H.S., H.S. diploma, or G.E.D.	10% (54)
Employment status	
Full or part-time employed	81% (447)
Unemployed	19% (103)
Geographic region of the U.S.	
Northeast	19% (102)
South	27% (147)
Midwest	27% (149)
West	27% (152)
Geographic area of residence	
Urban or suburban	88% (485)
Rural	12% (65)
Had health insurance	76% (416)
Had UAI with primary partner within previous 3 months	83% (456)
Had sex with a casual MSM partner within previous 3 months	24% (132)
Had UAI with a casual MSM partner <sup>b</sup>	53% (70)
Self-reported having a sexual agreement with primary partner	71% (392)
	<i>M (SD)</i>
Age: Individual, couple (range, 18–67 years)	31.4 (10.0, 9.4)
Relationship duration in months	56.8 (61.9)
Duration of couple living together in months	43.5 (60.6)
Last HIV test in months	24.1 (45.1)
Last STI test in months	20.2 (39.6)

Couple-level characteristic	% (N = 275)
Multiracial	30% (83)
Education level	
Both partners had Bachelors degree or higher	36% (98)
Only one partner had a Bachelors degree or higher	28% (78)
Neither partner had a Bachelors degree	36% (99)
Employment status	
Both partners were employed	67% (190)
Only one partner was employed	28% (77)
Neither partner was employed	5% (13)
Cohabitate	75% (207)
UAI within the relationship	
Both male partners concurred yes	80% (218)
One partner reported yes, the other reported no	7% (20)
Both male partners concurred no	13% (37)
Both male partners had sex outside of their relationship	30% (83)
Both partners had UAI with a casual MSM partner <sup>c</sup>	23% (19)
Only one partner had UAI with a casual MSM partner <sup>c</sup>	37% (31)
Concurred about having a sexual agreement	59% (162)
	<i>M (SD)</i>
Age difference between partners (range, 0–32 years)	4.5 (5.2)

Notes.

<sup>a</sup> Other included MSM who self-identified as Native American Indian, Native Hawaiian/Pacific Islander, or having another race not listed

<sup>b</sup> Percentage represents the proportion of men who reported having had sex with a casual MSM partner within the previous three months

<sup>c</sup> Among the 83 gay male couples who had both men reporting having had sex with a casual MSM partner, 19 couples had both partners reporting they had UAI with a casual MSM partner while 31 couples had only one partner reporting that he had UAI with a casual MSM partner



**Table 2**

Measures used to assess relationship dynamics of trust, relationship commitment, investment in one's sexual agreement, and communication patterns

Measure with subscales	No. of items	Cronbach's alpha
Investment model <sup>a</sup>	22	0.90
Commitment level	7	0.84
Satisfaction level	5	0.91
Investment size	5	0.74
Quality of alternatives	5	0.80
Trust scale <sup>b</sup>	17	0.89
Predictability	5	0.72
Dependability	5	0.69
Faith	7	0.90
Sexual Agreement Investment scale <sup>c</sup>	13	0.96
Commitment	4	0.93
Satisfaction	3	0.85
Value	6	0.94
Communication Patterns scale <sup>d</sup>	11	
Mutual constructive	3	0.83
Mutual avoidance and withholding	8	0.85

Notes.

<sup>a</sup>Response scale was a 7-point Likert: "Do not agree" to "Agree completely"

<sup>b</sup>Response scale was a 7-point Likert: "Strongly disagree" to "Strongly agree"

<sup>c</sup>Response scale was a 5-point Likert: "Not at all" to "Extremely"

<sup>d</sup>Response scale was a 9-point Likert: "Very unlikely" to "Very likely"

**Table 3**

Individual and couple-level scores of relationship factors and attitude about using couples-based HIV voluntary counseling and testing among 275 HIV-negative gay male couples

Factor (range)	Individual		Couple
		Between dyads	Differences within dyads
	<i>M</i> (SD)	<i>M</i> (SD)	<i>M</i> (SD)
Investment model (0 – 6)			
Commitment	5.43 (0.82)	5.43 (0.64)	0.69 (0.80)
Relationship satisfaction	4.96 (1.07)	4.96 (0.87)	0.92 (0.87)
Investment size	4.75 (0.99)	4.74 (0.80)	0.91 (0.75)
Quality of alternatives	3.74 (1.32)	3.73 (1.08)	1.13 (1.03)
Trust scale (1 – 7)			
Predictability	5.34 (1.19)	5.34 (0.96)	1.07 (0.87)
Dependability	5.63 (1.06)	5.63 (0.83)	1.02 (0.86)
Faith	6.04 (1.00)	6.03 (0.81)	0.86 (0.78)
Sexual Agreement Investment scale (0 – 4)			
Commitment	3.57 (0.60)	3.58 (0.45)	0.55 (0.59)
Satisfaction	3.26 (0.77)	3.26 (0.58)	0.74 (0.71)
Value	3.48 (0.63)	3.48 (0.47)	0.58 (0.58)
Communication Patterns scale (1 – 9)			
Mutual constructive	7.25 (1.59)	7.26 (1.26)	1.37 (1.26)
Mutual avoidance and withholding	3.41 (1.67)	3.39 (1.43)	1.32 (1.08)
Attitudes about using CVCT (0 – 4)			
Couples-based voluntary counseling and testing	2.84 (1.14)	2.84 (0.93)	0.94 (0.90)

**Table 4**

Selected univariate associations of HIV-negative gay male couples' relationship factors with their attitude about using couples-based HIV voluntary counseling and testing

Factor	CVCT	
	Between dyads	Within dyads
	$\beta$ (SE)	$\beta$ (SE)
Relationship duration (months)	-0.01 (0.00)*	-0.00 (0.01)
Race of the couple	0.07 (0.12)	-0.19 (0.12)
Age of couple (years) <sup>a</sup>	-0.03 (0.01)	-0.03 (0.01)*
Education level of couple <sup>b</sup>	-0.06 (0.13)	-0.17 (0.12)
Employment status of couple <sup>b</sup>	0.04 (0.13)	0.01 (0.13)
Cohabitate	-0.05 (0.06)	0.02 (0.06)
Lives in an urban environment (vs. not)	-0.01 (0.02)	0.01 (0.03)
UAI within relationship (vs. not) <sup>c</sup>	0.11 (0.08)	0.01 (0.08)
Concurred about having a sexual agreement	0.43 (0.11)***	0.13 (0.16)
One or both partners had sex outside of their relationship	0.31 (0.12)**	-0.20 (0.12)*
Last reported HIV test (months)	-0.00 (0.00)	0.00 (0.00)
Investment model		
Commitment level	0.13 (0.09)	-0.03 (0.07)
Satisfaction level	0.23 (0.07)**	-0.04 (0.06)
Investment size	-0.08 (0.07)	-0.07 (0.08)
Quality of alternatives	0.04 (0.05)	0.03 (0.06)
Trust scale		
Predictability	0.07 (0.06)	-0.03 (0.06)
Dependability	0.14 (0.07)*	-0.05 (0.06)
Faith	0.22 (0.07)**	-0.07 (0.07)
Sexual Agreement Investment scale		
Commitment	0.47 (0.16)**	0.12 (0.12)
Satisfaction	0.32 (0.12)**	0.17 (0.10)
Value	0.51 (0.15)**	0.24 (0.12)*
Communication Patterns scale		
Mutual constructive	0.18 (0.04)***	0.02 (0.04)
Mutual avoidance and withholding	-0.13 (0.04)**	-0.01 (0.05)

Notes.

Selected results of exploratory univariate multilevel maximum likelihood regression models. Each within dyad-level relationship dynamic or factor was regressed with the within dyad-level outcome, whereas each between dyad-level relationship dynamic or factor was regressed with the between dyad-level outcome.

\*  $p < .05$ ,

\*\*  $p < .01$ ,

\*\*\*  
 $p < .001$

<sup>a</sup> Age of couple included couple's average age for the between dyads univariate models and couple's difference in age (between partners) for the within dyads univariate models.

<sup>b</sup> Education level between couples included couples with either both or neither men who had achieved a Bachelors degree or higher versus couples with only one partner who had achieved a Bachelors degree. Education level within couples included couples with only one partner who had achieved a Bachelors degree or higher versus couples with either both or neither men who had achieved a Bachelors degree. Employment status of the couple was similarly constructed.

<sup>c</sup> UAI within the relationship represented couples with one or both men self-reporting that they had UAI with their primary male partner within the previous three months compared to couples who had both men reporting not having had UAI within their relationship.

**Table 5**

Association of relationship factors with HIV-negative gay male couple's attitudes about using couples-based HIV voluntary counseling and testing

Factor	CVCT	
	Between dyads	Within dyads
	$\beta$ (SE)	$\beta$ (SE)
Age of couple (years) <sup>a</sup>		-0.02 (0.01)*
One or both partners had sex outside of their relationship	0.49 (0.15)**	-0.28 (0.11)*
Investment model		
Satisfaction level	0.36 (0.12)**	
Trust scale		
Dependability	-0.23 (0.11)*	
Sexual Agreement Investment scale		
Commitment	0.47 (0.18)**	
Value		0.26 (0.11)*
LR $\chi^2$	33.63***	10.14*

Notes.

Results of final multivariate multilevel random-effects maximum likelihood regression models. Both models included relationship duration, race and age of the couple, and UAI within the relationship as potential confounders.

\*  $p < .05$ ,

\*\*  $p < .01$ ,

\*\*\*  $p < .001$

<sup>a</sup> Age of the couple included couple's average age for the between dyads multivariate models and couple's difference in age (between partners) for the within dyads multivariate models.