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Do male couples agree on their sexual agreements? An analysis of dyadic data

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Abstract

Male couples often formulate sexual agreements, but little is known about the extent to which partners concur about their exact terms. Disagreements, particularly with respect to sex outside the relationship, may induce stress and potentially increase the risk of HIV and other sexually transmitted infections. Our study sought to describe concordance between male partners on several aspects of their sexual agreements, overall, as well as stratified by dyadic HIV serostatus and relationship duration. Between July 2014 and May 2016, we collected bidirectional data from 160 male couples residing in Atlanta, Boston, and Chicago. Overall, we observed weak concordance for whether or not couples had a mutual agreement about sex with outside partners. Even among 110 couples in which both partners reported having an agreement, there was weak to moderate concordance for general rules that might apply to having sex outside the relationship (e.g., forming emotional relationships is not allowed, outside sexual activities must be disclosed), and for specific sexual behaviors allowed or disallowed (e.g., topping without a condom, bottoming without a condom). Concordance for the type of sexual agreement was higher within HIV seroconcordant negative partnerships compared to HIV serodiscordant partnerships, and lower within relationships 5 years and 1 to <5 years compared to those <1 year. Dyadic interventions for male couples (e.g. couples HIV testing and counseling, relationship education programs) can offer unique opportunities for skills building around negotiating sexual agreements, and might

especially benefit HIV serodiscordant partnerships, and those in the formative stages of their relationships.

Keywords

Sexual and Gender Minorities; Sexual Behavior; Sexual Partners; HIV Infections; Sexually Transmitted Diseases

Introduction

Men who have sex with men (MSM) remain disproportionately impacted by HIV in the United States (US). According to the Centers for Disease Control and Prevention (CDC), in 2015, MSM accounted for 82% of new HIV diagnoses among all males aged 13 years and older, and 67% of the total new diagnoses (CDC, 2017a). A quarter of MSM currently living with HIV are unaware of their serostatus (CDC, 2016), inadvertently putting their sexual partners at risk. MSM also face a high burden of other sexually transmitted infections (STIs), such as gonorrhea, chlamydia, and syphilis, which themselves are well-established risk factors for HIV (CDC, 2017b). Understanding different frameworks in which transmissions occur is essential for developing effective prevention interventions.

Modeling suggests that one-third to two-thirds of HIV transmissions can be attributed to sex within the context of male couples (Goodreau et al., 2012; Sullivan, Salazar, Buchbinder, & Sanchez, 2009). Higher number of sex acts with main partners, more frequent receptive roles, and lower condom use during anal sex, under the assumption that both partners are HIV-negative, can result in an enhanced risk (Hoff, Chakravarty, Beougher, Neilands, & Darbes, 2012; Sullivan et al., 2009). Research also indicates that MSM in relationships are getting tested for HIV at lower rates compared to the general MSM population, even after being potentially exposed (Chakravarty, Hoff, Neilands, & Darbes, 2012). Although HIV testing and counseling services in the US have been traditionally focused on the individual, consensus is growing that engaging male couples in comprehensive HIV prevention efforts should be prioritized (Purcell et al., 2014).

Recently, there has been an increase in research focusing on relational dynamics of male couples, an important component of which are sexual agreements (Perry, Huebner, Baucom, & Hoff, 2016; Stephenson, White, & Mitchell, 2015). Sexual agreements refer to a mutual understanding between two partners about the extent and types of sexual activities permitted within and outside their relationship. General categories include “closed” agreements (i.e., sex with outside partners is not allowed) and “open” agreements (i.e., sex with outside partners is allowed). Prior studies with male couples have found that sexual agreements are common, with estimates ranging from 58% (Cuervo & Whyte, 2015) to 99% (Hoff, Beougher, Chakravarty, Darbes, & Neilands, 2010). Establishing and adhering to such agreements might be beneficial as they can serve as the basis for a couple’s decision to refrain from risky sexual behaviors with outside partners, and help enhance intimacy, pleasure, and reciprocal trust within the relationship (Hoff & Beougher, 2010).

Variations exist in the manner in which sexual agreement data have been elicited and analyzed across different studies. “Closed” agreements are usually considered to be a single entity (Gass, Hoff, Stephenson, & Sullivan, 2012), but may be separated into “implicit” (i.e., assumed without an actual discussion between partners) and “explicit” (i.e., established after a discussion) (Mitchell, Moskowitz, & Seal, 2012). “Open” agreements are usually categorized into those with certain restrictions for sex with outside partners, and those without any restrictions (Pruitt, White, Mitchell, & Stephenson, 2015), and may also be “implicit” or “explicit”. Some researchers have also used more descriptive terminologies to document an “open” agreement (e.g., “threesome-only” (Hosking, 2013), “monogamish” (Parsons, Starks, DuBois, Grov, & Golub, 2013), “polyamorous” (Séguin et al., 2017)). Successes of couples-based HIV prevention approaches for MSM will ultimately be contingent upon open and honest dyadic communication regarding not just the type of sexual agreement formulated between partners, but also its precise details including specific restrictions, permitted behaviors, and agreement breakage disclosure (Stephenson, White, Darbes, Hoff, & Sullivan, 2015).

Despite a growing body of work in this area, some critical questions about male couples’ sexual agreements remain unanswered. For example, little is known about the degree to which male couples concur about different attributes of their relationship (e.g., kissing frequency, sexual positioning which includes insertive anal sex [topping] and receptive anal sex [bottoming]). Additionally, there is lack of information on concordance regarding any restrictions that might apply to having sex with outside partners (e.g., forming emotional relationships is not allowed, outside sexual activities must be disclosed), and specific sexual behaviors allowed or disallowed outside the relationship (e.g., topping without a condom, bottoming without a condom). Disagreements on these domains could potentially induce stress and conflict between partners, and negatively impact the dyadic risk of acquiring and transmitting HIV and other STIs. To help address this knowledge gap, we used a multisite sample of male couples residing in the US to report concordance measures for several aspects of their sexual agreements, overall, as well as stratified by dyadic HIV serostatus and relationship duration. From a public health perspective, the availability of such data can help stakeholders refine prevention efforts that are geared towards MSM in relationships through encouraging mutual discussions of sexual behavior.

Methods

Stronger Together is a randomized controlled trial of a dyadic counseling intervention for HIV serodiscordant male couples in Atlanta, Boston, and Chicago ([ClinicalTrials.gov](https://clinicaltrials.gov/ct2/show/study/NCT01772992) Identifier: NCT01772992). The study design, recruitment process and data collection methods have been described in detail elsewhere (Stephenson et al., 2017). Briefly, participants were recruited using a multimodal strategy involving both online and in-person outreach endeavors. Online recruitment included advertising on social media (e.g., Facebook, Twitter), geospatial mobile apps (e.g., Grindr, Scruff), and sex-seeking sites (e.g., BarebackRT). In-person recruitment was conducted by study staff who attended lesbian, gay, bisexual, and transgender (LGBT) events, met potential participants at clinics providing HIV testing, and posted flyers in local venues frequented by MSM (e.g., nightclubs, restaurants). All recruitment modalities provided interested individuals with the study’s uniform resource

locator (URL), containing a brief description of the proposed research, and study staff contact information.

Initially, the criteria used to screen individuals online were cis-gender male, 18 years of age or older, currently in a committed relationship for at least 1 month, residing in the Atlanta, Boston, or Chicago metropolitan areas for 3 or more months, and not in an HIV seroconcordant positive partnership. Couples who met these criteria were scheduled to attend an in-person visit for which they received \$50 per person. They were taken into separate rooms, and asked to provide written informed consent. If both partners in the couple gave consent, they were administered separate baseline surveys. Not surprisingly, our original screening process resulted in a heterogeneous sample of predominantly HIV seroconcordant negative couples and few HIV serodiscordant couples. Only the HIV serodiscordant couples were eligible to be randomized to either the intervention or control arm of the trial. In order to better focus our recruitment efforts, we subsequently revised our screening criteria to only include men in HIV serodiscordant partnerships, and updated the information on [ClinicalTrials.gov](https://www.clinicaltrials.gov). Data presented in this manuscript include baseline survey responses from both seroconcordant negative couples (not enrolled in the trial) as well as serodiscordant couples (enrolled in the trial). Study approval was obtained from the Institutional Review Boards (IRBs) at Emory University, The Fenway Institute, and Ann and Robert H Lurie Children's Hospital of Chicago.

Demographic information collected in the baseline survey included age, race and ethnicity, sexual orientation, highest educational level, and annual income. Participants were asked a series of questions pertaining to their current relationship including its label (e.g., boyfriend, partner, husband), cohabitation status, the amount of time spent together in the past month (days and nights), and intimate behavioral characteristics such as kissing frequency, time (month and year) of last penetrative anal sex, sexual positioning during last penetrative anal sex, and condom use during last penetrative anal sex. Couples-based recruitment helped ensure near-identical observation timelines within each dyad. Participants were also asked about whether or not they had a mutual agreement about sex with outside partners, and their type of sexual agreement (i.e., “closed”, “open” with certain restrictions, “open” without any restrictions). Those who reported having a mutual agreement were asked about general rules that might apply to having sex with outside partners (e.g., “Select all that apply to your agreement with [Partner Name]: (a) We can have sex with outside partners only if one of us is traveling or is out of town; (b) We are not allowed to have active accounts on “hook-up” apps or sites [e.g., Jackd, Grindr, Adam4Adam, ManHunt]”). Finally, a set of 30 questions was used to elicit bidirectional information about specific sexual behaviors in which participants and their partners could or could not engage outside their relationship (e.g., “For each of the following, please indicate if this act is allowed, is not allowed, or if you do not have an agreement about this act: (a) You mutually masturbating or jacking off with someone else; (b) [Partner Name] mutually masturbating or jacking off with someone else”).

Statistical analyses were conducted using SAS 9.4. Descriptive statistics were used to summarize the demographic characteristics of the sample at the individual and dyadic level. Three measures were calculated to assess concordance between partner responses to questions in each of the following domains: relationship attributes, general rules that might

apply to having sex with outside partners, and specific sexual behaviors allowed or disallowed outside the relationship. Observed agreement (P_0) was obtained by taking the ratio of the number of responses for which both partners agreed to the total number of responses. One limitation of this measure is that it does not account for the possibility that sometimes partners might agree on a specific characteristic solely due to chance. Cohen's kappa statistic (K), introduced in 1960 (Cohen, 1960), corrects for the amount of agreement that can be expected to occur by chance, and has been frequently employed to measure inter-rater reliability in clinical studies (Brennan & Hays, 1992; Sim & Wright, 2005). Recently, this measure has also been utilized to assess the concordance of self-reported research data from male couples (Hernández-Romieu et al., 2016). K was estimated as the ratio of P_0 minus the chance-expected agreement and 1 minus the chance-expected agreement (McHugh, 2012). A common criticism of K is that it is highly dependent on prevalence, defined as the probability with which a specific characteristic is classified into a particular response category (e.g., some rule for sex with outside partners applies, or does not apply) (Cicchetti & Feinstein, 1990; Feinstein & Cicchetti, 1990). Variations in prevalence might result in low values of K for some characteristics, but this does not necessarily reflect a low level of agreement between partners. The prevalence-adjusted bias-adjusted kappa statistic (PABAK), proposed by Byrt in 1993 (Byrt, Bishop, & Carlin, 1993), accounts for imbalances caused by differences in prevalence while assuming the absence of any systematic errors in classification. PABAK was calculated by subtracting 1 from two times the value of P_0 . Reporting this measure is being increasingly recommended as a supplement to K in healthcare research (Girianelli & Thuler, 2007; Mak, Yau, & Chan, 2004). All three concordance measures were calculated for the overall sample, as well as stratified by dyadic HIV serostatus (seroconcordant negative, serodiscordant) and relationship duration (<1 year, 1 to <5 years, 5 years). McHugh's recommendations were used to interpret the values of K and PABAK as follows: 0.59 indicates "weak" concordance, 0.60–0.79 indicates "moderate" concordance, and 0.80 indicates "strong" concordance (McHugh, 2012).

Results

Between July 2014 and May 2016, 410 individuals, i.e., 205 couples presented for participation at the Stronger Together study sites in Atlanta, Boston, and Chicago. Of these, 398 participants, i.e., 199 couples (97.1%) provided written informed consent and were administered separate baseline surveys. Our analytic sample is restricted to 320 participants, i.e., 160 couples (80.4%) who answered questions pertaining to specifics of their current relationship. No statistically significant demographic differences were observed between participants who were included and those who were excluded due to missing data.

Table 1 describes the demographic composition of our sample. Regarding individual level characteristics, the majority of 320 participants were younger than 35 years, non-Hispanic white, and identified as homosexual/gay. More than two-thirds reported completing college or having a higher educational level, and more than half reported an annual income of more than \$50,000. Regarding dyadic level characteristics, the majority of 160 couples were comprised of partners aged within 5 years of each other, and of the same race and ethnicity, and same sexual orientation. However, more than half of the couples were comprised of partners with different levels of education and annual income. One hundred and ten couples

(69%) were HIV seroconcordant negative, and 50 couples (31%) were HIV serodiscordant. Thirty-nine couples (24%) had been together for <1 year, 71 couples (44%) had been together for 1 to <5 years, and 50 couples (31%) had been together for ≥5 years (data not shown in Table 1).

Overall concordance measures for each of our three domains of interest (relationship attributes, general rules that might apply to having sex with outside partners, and specific sexual behaviors allowed or disallowed outside the relationship) are presented in Table 2. Strong concordance was observed for cohabitation status (151 of 160 couples concurred, $K=0.85$, $PABAK=0.89$), as well as the intimate behavioral characteristics of sexual positioning (118 of 131 couples concurred, $K=0.82$, $PABAK=0.80$) and condom use during last penetrative anal sex (120 of 130 couples concurred, $K=0.74$, $PABAK=0.85$). However, this was not the case for whether or not couples had a mutual agreement about sex with outside partners (120 of 160 couples concurred, $K=0.24$, $PABAK=0.50$). Of the 120 couples with concordant responses to this question, both partners in 110 couples (92%) reported having an agreement, both partners in 9 couples (8%) reported not having an agreement, and both partners in 1 couple (1%) reported being unsure as to whether they had an agreement (data not shown in Table 2).

Among the 110 couples who concurred about having a mutual agreement about sex with outside partners, concordance regarding the type of sexual agreement was moderate (87 of 110 couples concurred, $K=0.63$, $PABAK=0.58$). Thirty-nine couples (35%) concurred it was “closed”, 46 couples (42%) concurred it was “open” with certain restrictions, 2 couples (2%) concurred it was “open” without any restrictions, and 23 couples (21%) provided discordant responses to their type of sexual agreement (data not shown in Table 2). Of these 23 couples, 11 couples (48%) disagreed such that one partner reported it was “closed” whereas the other reported it was “open” with certain restrictions, 1 couple (4%) disagreed such that one partner reported it was “closed” whereas the other reported it was “open” without any restrictions, 8 couples (35%) disagreed such that one partner reported it was “open” with certain restrictions whereas the other reported it was “open” without any restrictions, and 3 couples (13%) disagreed such that one partner reported it was “open” with certain restrictions whereas the other reported not knowing the type of sexual agreement.

Weak to moderate concordance was observed for almost all general rules that might apply to having sex outside the relationship. Notably, only 67 of 110 couples agreed on whether or not they were allowed to form emotional relationships with outside partners ($K=0.22$, $PABAK=0.22$). Two exceptions where higher agreement was observed included the rule that both partners must be present during sex with outside partners (100 of 110 couples concurred, $K=0.76$, $PABAK=0.82$), and the rule that one can only have sex with outside partners if traveling or out of town (107 of 110 couples concurred, $K=0.65$, $PABAK=0.95$). Regarding specific sexual behaviors allowed or disallowed outside the relationship, weak to moderate concordance was observed for almost all behaviors including topping and bottoming without a condom.

Table 3 summarizes the concordance measures for each domain stratified by dyadic HIV serostatus. Higher levels of agreement were observed for whether or not condoms were used

during last penetrative anal sex within seroconcordant negative partnerships compared to serodiscordant partnerships. Both partners in 81 of the 89 HIV seroconcordant negative couples who concurred on this aspect (91%) reported not using a condom, and both partners in 23 of the 31 HIV serodiscordant couples who concurred on this aspect (74%) reported not using a condom (data not shown in Table 3). Concordance for the type of sexual agreement was also higher within seroconcordant negative partnerships compared to serodiscordant partnerships. Among the 65 HIV seroconcordant negative couples who concurred about having a sexual agreement, 32 couples (49%) concurred it was “closed”, and 33 couples (51%) concurred it was “open” with certain restrictions. Among the 22 HIV serodiscordant couples who concurred about having a sexual agreement, 7 couples (32%) concurred it was “closed”, 13 couples (59%) concurred it was “open” with certain restrictions, and 2 couples (9%) concurred it was “open” without any restrictions (data not shown in Table 3). Distinct trends were not observed for general rules that might apply to having sex outside the relationship across these two strata. PABAK values for almost all specific sexual behaviors allowed or disallowed with outside partners were greater within seroconcordant negative partnerships compared to serodiscordant partnerships, reflecting higher levels of agreement in that stratum.

Finally, the concordance measures for each domain stratified by relationship duration are presented in Table 4. Although greater agreement was observed for the relationship attribute of label (e.g., boyfriend, partner, husband) among couples who had been together for 5 years compared to fewer, this trend was reversed for some intimate behavioral characteristics including time (month and year) of last penetrative anal sex, sexual positioning during last penetrative anal sex, and condom use during last penetrative anal sex. Concordance for whether or not couples had a mutual agreement about sex with outside partners was higher within relationships 5 years compared to those 1 to <5 years and <1 year. However, concordance for the type of sexual agreement between partners was lower within relationships 5 years and 1 to <5 years compared to those <1 year. PABAK values for most of the general rules that might apply to having sex outside the relationship were greater for couples who had been together for 1 to <5 years compared to <1 year or 5 years, reflecting higher levels of agreement in that stratum. No distinct trends were observed for specific sexual behaviors allowed or disallowed with outside partners across these three strata.

Discussion

Our study used a dyadic data collection method for describing the extent to which male couples mutually concur about various aspects of their sexual agreements. Overall, we found higher levels of agreement on factual issues such as cohabitation status and sexual positioning, but lower levels of agreement on subjective issues such as relationship label (e.g., boyfriend, partner, husband) and the amount of time spent together in the past month (days and nights). Importantly, we observed weak concordance for whether or not couples had a mutual agreement about sex with outside partners, as reflected by the low values of K and PABAK. Even among couples in which both partners reported having a sexual agreement, we found moderate concordance for its type (i.e., “closed”, “open” with certain restrictions, “open” without any restrictions). Furthermore, we observed weak to moderate concordance for general rules that might apply to having sex outside the relationship, as well

as for specific sexual behaviors. Variations in agreement levels were also noted for some domains on stratifying the sample by dyadic HIV serostatus and relationship duration. Below we discuss the significance and implications of our findings for advancing HIV prevention efforts with male couples in the US.

Despite reports that sexual agreements are becoming increasingly common (Cuervo & Whyte, 2015; Hoff et al., 2010), not all male couples formulate an agreement or concur about its specific characteristics. In our study, 120 of 160 couples (75%) provided consistent responses regarding whether or not they had a mutual agreement about sex with outside partners, but the low values observed for our chance-corrected concordance measures (K and PABAK) are a cause for concern. One explanation could be potentially varying interpretations of our survey question (“Do you and [Partner Name] currently have an agreement about whether or not you can have sex with people besides each other?”) by different participants. For example, some participants might have assumed that the word “agreement” means an implied mutual understanding, instead of an actual conversation with their partners. Methodologically, it might be helpful for researchers to distinguish between “implicit” and “explicit” sexual agreements when collecting data from male couples, analogous to what was done a recent study of MSM who were dating or married to women (Mitchell et al., 2012). Framing the survey question as “Have you and [Partner Name] had a discussion about whether or not you can have sex with people besides each other?” could help enhance clarity.

Of course, having a two-way conversation is essential for working out the exact terms of a sexual agreement. Inconsistencies observed between the types of agreements reported, general rules that might apply to having sex with outside partners, and specific sexual behaviors allowed or disallowed outside the relationship suggest that male couples might not be engaging in discussions about issues that could directly influence their sexual health. In more than half of the 23 couples who provided discordant responses to their type of sexual agreement, one partner reported it was “closed” whereas the other reported it was “open” (with or without restrictions). Strikingly, a large proportion of couples did not agree on whether or not they were allowed to form emotional relationships with outside partners. Qualitative research has shown that male couples in “open” relationships value the separation of physical and emotional intimacy, a condition central to how they reconcile their desire for sex with outside partners with their desire for a meaningful connection with their main partners (Hoff & Beougher, 2010).

Programmatically, these results highlight the need to prioritize effective couples-based interventions for MSM that address such discrepancies by encouraging and facilitating constructive mutual communication (Purcell et al., 2014). Examples of such approaches include couples HIV testing and counseling (CHTC) for male couples, and relationship education programs that aim to teach behavioral and communication skills to discuss, form and maintain sexual agreements.

CHTC for male couples, currently in the early stages of dissemination and adoption in the US, is a strategy that can provide the foundation for a comprehensive HIV prevention, care, and treatment package (Sullivan, Stephenson, et al., 2014). It comprises of a structured 30–

60 minute session between a couple and a trained tester/counselor, including a pre-test discussion of risks, testing of both partners, return of test results together, and a post-test discussion based on dyadic HIV serostatus. An additional component that has been incorporated into this service for male couples is skills building around negotiating sexual agreements (Sullivan, White, et al., 2014). CHTC providers receive extensive training on the concept and types of sexual agreements, learn how to facilitate discussions on formulating agreements, and practice counseling techniques to deal with potential disclosures of broken agreements during a session (Sullivan, Stephenson, et al., 2014; Sullivan, White, et al., 2014). Therefore, in addition to assisting with disclosure of dyadic HIV serostatus, and facilitating the uptake of prophylactic and therapeutic services as warranted, CHTC offers male couples a unique opportunity to learn how to communicate about formulating and abiding by their sexual agreements under expert guidance. Engaging in such discussions may help address the potential need for more frequent screening for those who test HIV-negative (Beougher et al., 2015), and inform the recommendation of newer biomedical prevention strategies such as pre-exposure prophylaxis (PrEP).

Relationship education programs use a preventive approach to promote long-term health by teaching both individuals and couples techniques for maintaining healthy and satisfying relationships (Markman & Rhoades, 2012). Given that the ability to constructively discuss mutual expectations are associated with a higher concordance between male partners on several aspects of their sexual agreements (Gomez et al., 2012), such approaches heavily emphasize skills building in communication and conflict management. A recent trial assessing the feasibility, acceptability and preliminary efficacy of a dyadic HIV prevention and relationship education intervention for young male couples (2GETHER) found decreases in HIV risk behavior and improvement in relationship investment (Newcomb et al., 2017). It consisted of four interactive weekly sessions with male couples focusing on enhancing communication skills, coping with relationship stress, applying problem-solving techniques to relationship issues, and formulating sexual agreements. Difficulties in communication have been demonstrated to predict the future likelihood of breaking sexual agreements (Prestage et al., 2006), therefore it is critical to support the development of culturally sensitive adaptations of relationship education for male couples (Whitton, Weitbrecht, Kuryluk, & Hutsell, 2016).

Our study found higher levels of agreement for whether or not condoms were used during last penetrative anal sex within HIV seroconcordant negative partnerships compared to HIV serodiscordant partnerships. Consistent with the existing literature among male couples in the US (Mitchell, 2013), condom use among seroconcordant negative couples was less frequent than condom use among serodiscordant couples. Previous research with HIV serodiscordant male couples has shown that those who always use condoms during sex perceive that guarding each other's health provides mutual benefit, and demonstrates their commitment to their relationship (Nieto-Andrade, 2009). Studies have also suggested that HIV-positive partners might be willing to forgo immediate sexual gratification to protect their HIV-negative partners (Gamarel et al., 2014; Golub, Tomassilli, & Parsons, 2009), but the first step is to jointly create a prevention plan that is feasible, and one in which each partner feel supported and confident about minimizing the risk of HIV transmission. Such efforts would be additionally beneficial if they address the availability of newer biomedical

prevention strategies such as PrEP for the HIV-negative partner, improve antiretroviral medication adherence in the HIV-positive partner, and incorporate behavioral approaches such as limiting the number of outside partners to assist with risk reduction. In our study, concordance for the type of sexual agreement was higher within HIV seroconcordant negative partnerships compared to HIV serodiscordant partnerships, suggesting suboptimal dyadic communication in the latter group. Half of the seroconcordant negative couples who concurred about having a sexual agreement were in an “open” relationship, in contrast with two-thirds of the serodiscordant couples. Previous research has indicated that men in seroconcordant negative relationships discuss their agreements significantly more explicitly than those in serodiscordant relationships (Hoff et al., 2009). Conversations around sexual risks among serodiscordant couples can be disconcerting at times, emphasizing the ongoing need to develop and test novel interventions to facilitate the process of agreement negotiation.

Recently, there has been some interest in examining if certain aspects of male couples’ sexual agreements (e.g., establishment, type, adherence) differ as a function of relationship duration (Gomez et al., 2012). Couples likely form agreements at varying stages or time points in their relationships, which is important to consider when designing and promoting HIV and other STI prevention programs. Communication and perceptions about the extent and nature of sexual activities permitted outside the relationship are also likely to evolve over time. In our study, although concordance for whether or not couples had a mutual agreement about sex with outside partners was higher within relationships of a longer duration, concordance for the type of sexual agreement was lower. Our results mirror findings from a national online survey in which male couples who had been together for longer periods of time were more likely to concur about the existence of an agreement, but less likely to concur about their agreement type (Mitchell, 2014). Changes in relational dynamics over the years could influence partners’ understandings of previously formulated agreements. Another possibility could be that couples might have only engaged in a discussion about the terms of their sexual agreement once, and eventually drifted in their understandings of rules for sex and sexual behaviors permitted with outside partners. Overall, these trends indicate that couples in the early formative stages of their relationships might need support in establishing sexual agreements, and those who have been together for longer might benefit from regular discussions on the specifics of their agreements, both of which can be addressed through CHTC or relationship education programs.

Strengths of our study include the use of dyadic data, and the calculation of at least three different concordance measures. K (which corrects for the amount of agreement that can be expected to occur by chance) and PABAK (which adjusts K for high or low prevalence while assuming the absence of bias in classification) are considered to be more robust for making inferences in comparison to P_0 . Our findings fill an important gap in the current literature about how multiple aspects of male couples’ sexual agreements vary across dyadic HIV serostatus and relationship duration. However, we acknowledge that our study is not without limitations. Because participants were residents of the Atlanta, Boston, or Chicago metropolitan areas, our results cannot be generalized to male couples residing in rural areas of the US, or those in other urban areas. We cannot comment with certainty if the weak concordance observed for having or not having a mutual agreement about sex with outside

partners reflects a somewhat poor interpretation of our survey question or a real world phenomenon. Finally, not all couples answered questions about their own and their partner's allowed or disallowed sexual behaviors outside the relationship. We also acknowledge that presenting more nuanced options in this domain that address the HIV status of outside partners, and whether or not they are currently on PrEP (HIV-negative) or virally suppressed (HIV-positive), would have captured risk levels more accurately than just "topping" or "bottoming" without a condom.

Nonetheless, we believe that our analyses help further our current understanding of sexual agreements among male couples, a demographic not sufficiently being engaged in HIV and other STI prevention efforts. Given that such negotiations can guide the extent and types of sexual activities allowed within and outside the relationship, helping couples establish a mutual agreement and revisiting its precise details at regular intervals could protect both partners and potentially enhance relationship satisfaction. Prevention services such as CHTC and sexual health promotion for male couples in the US, regardless of their dyadic HIV serostatus or relationship duration, need to be urgently prioritized.

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References

- Beougher SC, Bircher AE, Chakravarty D, Darbes LA, Mandic CG, Neilands TB, ... Hoff CC (2015). Motivations to test for HIV among partners in concordant HIV-negative and HIV-discordant gay male couples. *Archives of sexual behavior*, 44(2), 499–508. [PubMed: 25550145]
- Brennan PF, & Hays BJ (1992). Focus on psychometrics the kappa statistic for establishing interrater reliability in the secondary analysis of qualitative clinical data. *Research in nursing & health*, 15(2), 153–158. [PubMed: 1565808]
- Byrt T, Bishop J, & Carlin JB (1993). Bias, prevalence and kappa. *Journal of clinical epidemiology*, 46(5), 423–429. [PubMed: 8501467]
- CDC. (2016). HIV infection risk, prevention, and testing behaviors among men who have sex with men: National HIV Behavioral Surveillance, 20 U.S. cities, 2014. HIV Surveillance Special Report 15. Retrieved from <http://www.cdc.gov/hiv/pdf/library/reports/surveillance/cdc-hiv-hssr-nhbs-msm-2014.pdf>
- CDC. (2017a). HIV among gay and bisexual men. Fact Sheet. Retrieved from <https://www.cdc.gov/nchhstp/newsroom/docs/factsheets/cdc-msm-508.pdf>
- CDC. (2017b). Sexually Transmitted Disease Surveillance 2016. Retrieved from <https://www.cdc.gov/std/stats16/default.htm>
- Chakravarty D, Hoff CC, Neilands TB, & Darbes LA (2012). Rates of testing for HIV in the presence of serodiscordant UAI among HIV-negative gay men in committed relationships. *AIDS and Behavior*, 16(7), 1944–1948. [PubMed: 22460227]
- Cicchetti DV, & Feinstein AR (1990). High agreement but low kappa: II. Resolving the paradoxes. *Journal of clinical epidemiology*, 43(6), 551–558. [PubMed: 2189948]
- Cohen J (1960). A coefficient of agreement for nominal scales. *Educational and psychological measurement*, 20(1), 37–46.

- Cuervo M, & Whyte J (2015). The effect of relationship characteristics on HIV risk behaviors and prevention strategies in young gay and bisexual men. *Journal of the Association of Nurses in AIDS Care*, 26(4), 399–410. [PubMed: 26066694]
- Feinstein AR, & Cicchetti DV (1990). High agreement but low kappa: I. The problems of two paradoxes. *Journal of clinical epidemiology*, 43(6), 543–549. [PubMed: 2348207]
- Gamarel KE, Starks T, Dilworth S, Neilands T, Taylor J, & Johnson M (2014). Personal or relational? Examining sexual health in the context of HIV serodiscordant same-sex male couples. *AIDS and Behavior*, 18(1), 171–179. [PubMed: 23636681]
- Gass K, Hoff CC, Stephenson R, & Sullivan PS (2012). Sexual agreements in the partnerships of internet-using men who have sex with men. *Aids Care*, 24(10), 1255–1263. [PubMed: 22375729]
- Girianelli VR, & Thuler LCS (2007). Evaluation of agreement between conventional and liquid based cytology in cervical cancer early detection based on analysis of 2,091 smears: Experience at the Brazilian National Cancer Institute. *Diagnostic cytopathology*, 35(9), 545–549. [PubMed: 17703446]
- Golub SA, Tomassilli JC, & Parsons JT (2009). Partner serostatus and disclosure stigma: Implications for physical and mental health outcomes among HIV-positive adults. *AIDS and Behavior*, 13(6), 1233. [PubMed: 18843532]
- Gomez AM, Beougher SC, Chakravarty D, Neilands TB, Mandic CG, Darbes LA, & Hoff CC (2012). Relationship dynamics as predictors of broken agreements about outside sexual partners: Implications for HIV prevention among gay couples. *AIDS and Behavior*, 16(6), 1584–1588. [PubMed: 22020757]
- Goodreau SM, Carnegie NB, Vittinghoff E, Lama JR, Sanchez J, Grinsztejn B, ... Buchbinder SP (2012). What drives the US and Peruvian HIV epidemics in men who have sex with men (MSM)? *PloS one*, 7(11).
- Hernández-Romieu AC, Sullivan PS, Rothenberg R, Grey J, Luisi N, Sanchez T, ... Rosenberg ES (2016). Concordance of demographic characteristics, sexual behaviors, and relationship attributes among sex dyads of black and white men who have sex with men. *Archives of sexual behavior*, 45(6), 1463–1470. doi:10.1007/s10508-015-0668-0 [PubMed: 26758456]
- Hoff CC, & Beougher SC (2010). Sexual agreements among gay male couples. *Archives of sexual behavior*, 39(3), 774–787. [PubMed: 18686027]
- Hoff CC, Beougher SC, Chakravarty D, Darbes LA, & Neilands TB (2010). Relationship characteristics and motivations behind agreements among gay male couples: Differences by agreement type and couple serostatus. *Aids Care*, 22(7), 827–835. [PubMed: 20635246]
- Hoff CC, Chakravarty D, Beougher SC, Darbes LA, Dadasovich R, & Neilands TB (2009). Serostatus differences and agreements about sex with outside partners among gay male couples. *AIDS Education & Prevention*, 21(1), 25–38. [PubMed: 19243229]
- Hoff CC, Chakravarty D, Beougher SC, Neilands TB, & Darbes LA (2012). Relationship characteristics associated with sexual risk behavior among MSM in committed relationships. *AIDS patient care and STDs*, 26(12), 738–745. [PubMed: 23199191]
- Hosking W (2013). Agreements about extra-dyadic sex in gay men's relationships: Exploring differences in relationship quality by agreement type and rule-breaking behavior. *Journal of Homosexuality*, 60(5), 711–733. [PubMed: 23593955]
- Mak HK, Yau KK, & Chan BP (2004). Prevalence-adjusted bias-adjusted κ values as additional indicators to measure observer agreement. *Radiology*, 232(1), 302–303.
- Markman HJ, & Rhoades GK (2012). Relationship education research: Current status and future directions. *Journal of Marital and Family Therapy*, 38(1), 169–200. [PubMed: 22283386]
- McHugh ML (2012). Interrater reliability: The kappa statistic. *Biochemia Medica*, 22(3), 276–282. [PubMed: 23092060]
- Mitchell JW (2013). HIV-negative and HIV-discordant gay male couples' use of HIV risk-reduction strategies: differences by partner type and couples' HIV-status. *AIDS and Behavior*, 17(4), 1557–1569. [PubMed: 23247364]
- Mitchell JW (2014). Aspects of gay male couples' sexual agreements vary by their relationship length. *Aids Care*, 26(9), 1164–1170. [PubMed: 24512593]

- Mitchell JW, Moskowitz DA, & Seal DW (2012). Understanding the agreements and behaviors of men who have sex with men who are dating or married to women: Unexpected implications for a universal HIV/STI testing protocol. *International Public Health Journal*, 4(4), 393–402.
- Newcomb ME, Macapagal KR, Feinstein BA, Bettin E, Swann G, & Whitton SW (2017). Integrating HIV prevention and relationship education for young same-sex male couples: A pilot trial of the 2GETHER intervention. *AIDS and Behavior*, 21(8), 2464–2478. [PubMed: 28083833]
- Nieto-Andrade B (2009). The effect of HIV-discordance on the sexual lives of gay and bisexual men in Mexico City. *Journal of Homosexuality*, 57(1), 54–70.
- Parsons JT, Starks TJ, DuBois S, Grov C, & Golub SA (2013). Alternatives to monogamy among gay male couples in a community survey: Implications for mental health and sexual risk. *Archives of sexual behavior*, 42(2), 303–312. [PubMed: 22187028]
- Perry NS, Huebner DM, Baucom BR, & Hoff CC (2016). Relationship power, sociodemographics, and their relative influence on sexual agreements among gay male couples. *AIDS and Behavior*, 20(6), 1302–1314. [PubMed: 26391687]
- Prestage G, Mao L, McGuigan D, Crawford J, Kippax S, Kaldor J, & Grulich A (2006). HIV risk and communication between regular partners in a cohort of HIV-negative gay men. *Aids Care*, 18(2), 166–172. [PubMed: 16338775]
- Pruitt KL, White D, Mitchell JW, & Stephenson R (2015). Sexual agreements and intimate-partner violence among male couples. *International Journal of Sexual Health*, 27(4), 429–441.
- Purcell DW, Mizuno Y, Smith DK, Grabbe K, Courtenay-Quirk C, Tomlinson H, & Mermin J (2014). Incorporating couples-based approaches into HIV prevention for gay and bisexual men: Opportunities and challenges. *Archives of sexual behavior*, 43(1), 35–46. [PubMed: 24233328]
- Séguin LJ, Blais M, Goyer M-F, Adam BD, Lavoie F, Rodrigue C, & Magontier C (2017). Examining relationship quality across three types of relationship agreements. *Sexualities*, 20(1–2), 86–104.
- Sim J, & Wright CC (2005). The kappa statistic in reliability studies: Use, interpretation, and sample size requirements. *Physical therapy*, 85(3), 257–268. [PubMed: 15733050]
- Stephenson R, Suarez NA, Garofalo R, Hidalgo MA, Hoehnle S, Thai J, ... Wimply T (2017). Project Stronger Together: Protocol to test a dyadic intervention to improve engagement in HIV care among sero-discordant male couples in three US cities. *JMIR research protocols*, 6(8).
- Stephenson R, White D, Darbes L, Hoff C, & Sullivan P (2015). HIV testing behaviors and perceptions of risk of HIV infection among MSM with main partners. *AIDS and Behavior*, 19(3), 553–560. [PubMed: 25081599]
- Stephenson R, White D, & Mitchell JW (2015). Sexual agreements and perception of HIV prevalence among an online sample of partnered men who have sex with men. *Archives of sexual behavior*, 44(7), 1813–1819. [PubMed: 26048482]
- Sullivan PS, Salazar L, Buchbinder S, & Sanchez TH (2009). Estimating the proportion of HIV transmissions from main sex partners among men who have sex with men in five US cities. *AIDS*, 23(9), 1153–1162. [PubMed: 19417579]
- Sullivan PS, Stephenson R, Grazer B, Wingood G, Diclemente R, Allen S, ... Montgomery J (2014). Adaptation of the African couples HIV testing and counseling model for men who have sex with men in the United States: An application of the ADAPT-ITT framework. *SpringerPlus*, 3(1), 249. [PubMed: 24877036]
- Sullivan PS, White D, Rosenberg ES, Barnes J, Jones J, Dasgupta S, ... Stephenson R (2014). Safety and acceptability of couples HIV testing and counseling for US men who have sex with men: A randomized prevention study. *Journal of the International Association of Providers of AIDS Care*, 13(2), 135–144. [PubMed: 23995295]
- Whitton SW, Weitbrecht EM, Kuryluk AD, & Hutsell DW (2016). A randomized waitlist-controlled trial of culturally sensitive relationship education for male same-sex couples. *Journal of Family Psychology*, 30(6), 763. [PubMed: 27089235]

Table 1:

Individual and dyadic level demographic characteristics of male couples recruited from Atlanta, Boston, and Chicago, July 2014 through May 2016.

Characteristic	n	(%)
Individual level^a		
Age (years) ^b		
18–24	65	(20)
25–34	121	(38)
35–44	59	(18)
45	75	(23)
Race and ethnicity		
Non-Hispanic white	231	(72)
Non-Hispanic black/African American	37	(12)
Hispanic	29	(9)
Other ^c	23	(7)
Sexual orientation		
Homosexual/gay	287	(90)
Bisexual	18	(6)
Other ^d	15	(5)
Highest educational level		
Associate's/Technical degree or lower ^e	101	(32)
Bachelor's degree	136	(43)
Master's/Doctoral degree	83	(26)
Annual income		
<\$30,000	79	(25)
\$30,001–\$50,000	63	(20)
\$50,001–\$80,000	61	(19)
\$80,001–\$100,000	33	(10)
\$100,001	84	(26)
Dyadic level^f		
Age (years)		
Same	13	(8)
Within 5 years of each other	88	(55)
>5 years apart	59	(37)
Race and ethnicity		
Same	97	(61)
Different	63	(39)
Sexual orientation		
Same	134	(84)
Different	26	(16)

Characteristic	n	(%)
Highest educational level		
Same	70	(44)
Different	90	(56)
Annual income		
Same	78	(49)
Different	82	(51)

^aData represent 320 participants.

^bAge: Mean=36, Median=34, Range=19–69.

^cIncludes 15 multiracial, 6 Asian, 1 Native American/Alaskan Native, and 1 other.

^dIncludes 11 queer, 2 questioning/unsure, and 2 other.

^eIncludes 77 with an Associate's/Technical degree or some college education, 23 with a high school diploma or General Educational Development (GED), and 1 with some high school education.

^fData represent 160 couples.

Table 2:

Overall concordance between responses provided by male couples recruited from Atlanta, Boston, and Chicago, July 2014 through May 2016.

Characteristic	F ^a	P ₀ ^b	K ^c (95% CI ^d)	PABAK ^e
Relationship attributes^f				
Label (e.g., boyfriend, partner, husband)	109/160	68	0.56 (0.46–0.65)	0.36
Cohabitation status	151/160	94	0.85 (0.76–0.94)	0.89
Days seen partner in the past month	98/143	68	0.45 (0.34–0.55)	0.37
Nights spent with partner in the past month	108/147	73	0.56 (0.45–0.66)	0.47
Frequency of kissing partner	118/160	74	0.42 (0.29–0.55)	0.48
Time (month and year) of last penetrative anal sex	107/152	70	0.69 (0.61–0.76)	0.41
Sexual positioning during last penetrative anal sex	118/131	90	0.82 (0.73–0.91)	0.80
Condom use during last penetrative anal sex	120/130	92	0.74 (0.59–0.89)	0.85
Mutual agreement about sex with outside partners	120/160	75	0.24 (0.08–0.40)	0.50
Type of sexual agreement	87/110	79	0.63 (0.50–0.75)	0.58
General rules for sex with outside partners^g				
Both partners must be present during sex	100/110	91	0.76 (0.61–0.90)	0.82
Only certain sexual activities are allowed	87/110	79	0.29 (0.07–0.51)	0.58
Forming emotional relationships is not allowed	67/110	61	0.22 (0.03–0.40)	0.22
Only casual sex or “hook-ups” are allowed	83/110	75	0.22 (0.01–0.43)	0.51
Outside sexual activities must be disclosed	83/110	75	0.49 (0.33–0.65)	0.51
Can only have sex if traveling or out of town	107/110	97	0.65 (0.29–1.00)	0.95
Can only have sex in certain places	98/110	89	0.09 (–0.17–0.35)	0.78
Accounts on “hook-up” apps or sites are not allowed	92/110	84	0.47 (0.26–0.68)	0.67
Specific sexual behaviors with outside partners^h				
Kissing	46/61	75	0.41 (0.18–0.63)	0.51
Groping	52/61	85	0.49 (0.23–0.76)	0.70
Mutually masturbating	53/62	85	0.59 (0.37–0.82)	0.71
Frottage	39/51	76	0.47 (0.24–0.70)	0.53
Rimming	46/60	77	0.49 (0.28–0.69)	0.53
Giving oral sex without a condom	51/60	85	0.62 (0.44–0.81)	0.70
Receiving oral sex without a condom	51/61	84	0.55 (0.32–0.78)	0.67
Giving oral sex with a condom	40/61	66	0.38 (0.18–0.57)	0.31
Receiving oral sex with a condom	39/59	66	0.39 (0.20–0.59)	0.32
Topping without a condom	44/61	72	0.52 (0.36–0.69)	0.44
Bottoming without a condom	45/58	78	0.59 (0.43–0.75)	0.55
Topping with a condom	45/63	71	0.39 (0.18–0.60)	0.43
Bottoming with a condom	42/61	66	0.45 (0.26–0.64)	0.31
Vaginal sex without a condom	30/54	56	0.31 (0.13–0.50)	0.11
Vaginal sex with a condom	29/55	53	0.33 (0.16–0.51)	0.05

^aFrequency of agreement. Denominators might not add to total due to missing responses.

^b Observed agreement expressed as a percentage.

^c Cohen's kappa statistic.

^d CI: Confidence interval.

^e Prevalence-adjusted bias-adjusted kappa statistic.

^f Data represent 160 couples.

^g Data represent 110 couples who concurred about having a mutual agreement about sex with outside partners.

^h Data represent 64 couples who concurred about having a mutual agreement about sex with outside partners, and answered questions about their own and their partner's allowed or disallowed behaviors.

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Concordance between responses provided by male couples recruited from Atlanta, Boston, and Chicago stratified by dyadic HIV serostatus, July 2014 through May 2016.

Table 3:

Characteristic	Dyadic HIV serostatus							
	Seroconcordant negative			Serodiscordant				
	F ^d	P ₀ ^b	K ^c (95% CI) ^d	PABAK ^e	F ^d	P ₀ ^b	K ^c (95% CI) ^d	PABAK ^e
Relationship attributes^f								
(110 couples)								
Label (e.g., boyfriend, partner, husband)	74/110	67	0.52 (0.40–0.64)	0.35	35/50	70	0.61 (0.46–0.77)	0.40
Cohabitation status	104/110	95	0.86 (0.75–0.97)	0.89	47/50	94	0.83 (0.67–1.00)	0.88
Days seen partner in the past month	65/99	66	0.42 (0.30–0.55)	0.31	33/44	75	0.51 (0.33–0.70)	0.50
Nights spent with partner in the past month	71/102	70	0.50 (0.38–0.62)	0.39	37/45	82	0.68 (0.50–0.86)	0.64
Frequency of kissing partner	79/110	72	0.34 (0.16–0.51)	0.44	39/50	78	0.57 (0.38–0.76)	0.56
Time (month and year) of last penetrative anal sex	74/105	70	0.68 (0.59–0.77)	0.41	33/47	70	0.67 (0.54–0.81)	0.40
Sexual positioning during last penetrative anal sex	81/92	88	0.79 (0.67–0.90)	0.76	36/39	92	0.91 (0.78–1.00)	0.85
Condom use during last penetrative anal sex	89/91	98	0.88 (0.71–1.00)	0.96	31/39	79	0.60 (0.37–0.83)	0.59
Mutual agreement about sex with outside partners	86/110	78	0.29 (0.09–0.49)	0.56	34/50	68	0.14 (–0.13–0.40)	0.36
Type of sexual agreement	65/79	83	0.67 (0.52–0.82)	0.65	22/31	71	0.51 (0.26–0.77)	0.42
(79 couples)								
General rules for sex with outside partners^g								
Both partners must be present during sex	73/79	92	0.81 (0.67–0.95)	0.85	27/31	87	0.53 (0.13–0.93)	0.74
Only certain sexual activities are allowed	60/79	76	0.31 (0.07–0.55)	0.52	27/31	87	–0.05 (–0.13–0.03)	0.74
Forming emotional relationships is not allowed	49/79	62	0.23 (0.02–0.45)	0.24	18/31	58	0.18 (–0.15–0.51)	0.16
Only casual sex or “hook-ups” are allowed	62/79	78	0.14 (–0.13–0.40)	0.57	21/31	68	0.27 (–0.09–0.62)	0.35
Outside sexual activities must be disclosed	59/79	75	0.48 (0.29–0.67)	0.49	24/31	77	0.52 (0.23–0.81)	0.55
Can only have sex if traveling or out of town	78/79	99	0.79 (0.40–1.00)	0.97	29/31	94	0.47 (–0.12–1.00)	0.87
Can only have sex in certain places	74/79	94	0.25 (–0.20–0.70)	0.87	24/31	77	–0.10 (–0.21–0.01)	0.55
Accounts on “hook-up” apps or sites are not allowed	65/79	82	0.39 (0.13–0.65)	0.65	27/31	87	0.63 (0.30–0.96)	0.74
(33 couples)								
Specific sexual behaviors with outside partners^h								
Kissing	26/31	84	0.23 (–0.23–0.68)	0.68	20/30	67	0.41 (0.14–0.68)	0.33
Groping	29/31	94	0.00 (0.00–0.00)	0.87	23/30	77	0.51 (0.22–0.79)	0.53
Mutually masturbating	28/31	90	0.00 (0.00–0.00)	0.81	25/31	81	0.63 (0.38–0.88)	0.61

Characteristic	Seroconcordant negative				Dyadic HIV serostatus				Serodiscordant			
	F ^d	P ^b	K ^c (95% CI) ^d	PABAK ^e	F ^d	P ^b	K ^c (95% CI) ^d	PABAK ^e	F ^d	P ^b	K ^c (95% CI) ^d	PABAK ^e
Frottage	19/24	79	-0.08 (-0.17-0.00)	0.58	20/27	74	0.56 (0.31-0.81)	0.48				
Rimming	22/32	69	0.12 (-0.17-0.40)	0.38	24/28	86	0.73 (0.50-0.96)	0.71				
Giving oral sex without a condom	28/31	90	0.38 (0.19-0.57)	0.81	23/29	79	0.64 (0.42-0.87)	0.59				
Receiving oral sex without a condom	27/31	87	0.17 (-0.10-0.44)	0.74	24/30	80	0.62 (0.36-0.88)	0.60				
Giving oral sex with a condom	24/33	73	0.06 (-0.16-0.28)	0.45	16/28	57	0.39 (0.14-0.64)	0.14				
Receiving oral sex with a condom	22/31	71	0.10 (-0.24-0.44)	0.42	16/28	57	0.41 (0.18-0.63)	0.14				
Topping without a condom	24/32	75	0.35 (0.03-0.67)	0.50	20/29	69	0.53 (0.32-0.75)	0.38				
Bottoming without a condom	28/31	90	0.66 (0.35-0.97)	0.81	17/27	63	0.46 (0.24-0.69)	0.26				
Topping with a condom	26/33	79	0.15 (-0.22-0.52)	0.58	19/30	63	0.43 (0.19-0.67)	0.27				
Bottoming with a condom	23/31	74	0.42 (0.12-0.73)	0.48	19/30	63	0.44 (0.19-0.69)	0.27				
Vaginal sex without a condom	13/26	50	0.24 (-0.03-0.51)	0.00	17/28	61	0.38 (0.13-0.64)	0.21				
Vaginal sex with a condom	13/26	50	0.30 (0.04-0.56)	0.00	16/29	55	0.36 (0.12-0.60)	0.10				

^a Frequency of agreement. Denominators might not add to total due to missing responses.

^b Observed agreement expressed as a percentage.

^c Cohen's kappa statistic.

^d CI: Confidence interval.

^e Prevalence-adjusted bias-adjusted kappa statistic.

^f Data represent 160 couples.

^g Data represent 110 couples who concurred about having a mutual agreement about sex with outside partners.

^h Data represent 64 couples who concurred about having a mutual agreement about sex with outside partners, and answered questions about their own and their partner's allowed or disallowed behaviors.

Table 4: Concordance between responses provided by male couples recruited from Atlanta, Boston, and Chicago stratified by relationship duration, July 2014 through May 2016.

Characteristic	Relationship duration												
	<1 year					1 to <5 years					5 years		
	F ^a	P ^b	K ^c (95% CI) ^d	PABAK ^e	F ^a	P ^b	K ^c (95% CI) ^d	PABAK ^e	F ^a	P ^b	K ^c (95% CI) ^d	PABAK ^e	
Relationship attributes^f													
	(39 couples)					(71 couples)					(50 couples)		
Label (e.g., boyfriend, partner, husband)	26/39	67	0.28 (0.06–0.50)	0.33	46/71	65	0.50 (0.35–0.65)	0.30	37/50	74	0.60 (0.42–0.77)	0.48	
Cohabitation status	36/39	92	0.83 (0.64–1.00)	0.85	66/71	93	0.70 (0.47–0.94)	0.86	49/50	98	0.82 (0.55–1.00)	0.96	
Days seen partner in the past month	19/37	51	0.37 (0.19–0.56)	0.03	45/61	74	0.45 (0.26–0.63)	0.48	34/45	76	0.41 (0.17–0.65)	0.51	
Nights spent with partner in the past month	23/35	66	0.58 (0.40–0.76)	0.31	47/64	73	0.50 (0.31–0.68)	0.47	39/48	81	0.50 (0.28–0.73)	0.63	
Frequency of kissing partner	24/39	62	0.31 (0.07–0.54)	0.23	58/71	82	0.55 (0.35–0.75)	0.63	36/50	72	0.35 (0.11–0.60)	0.44	
Time (month and year) of last penetrative anal sex	31/38	82	0.80 (0.67–0.93)	0.63	51/69	74	0.72 (0.61–0.83)	0.48	24/45	53	0.54 (0.39–0.68)	0.07	
Sexual positioning during last penetrative anal sex	31/36	86	0.75 (0.57–0.94)	0.72	61/63	97	0.94 (0.86–1.00)	0.94	26/32	81	0.69 (0.47–0.90)	0.63	
Condom use during last penetrative anal sex	33/35	94	0.84 (0.63–1.00)	0.89	60/63	95	0.80 (0.59–1.00)	0.90	27/32	84	0.52 (0.19–0.86)	0.69	
Mutual agreement about sex with outside partners	26/39	67	0.19 (–0.10–0.48)	0.33	48/71	68	0.16 (–0.06–0.38)	0.35	46/50	92	0.46 (0.03–0.90)	0.84	
Type of sexual agreement	20/23	87	0.76 (0.54–0.99)	0.74	33/43	77	0.58 (0.37–0.79)	0.53	34/44	77	0.51 (0.27–0.75)	0.55	
General rules for sex with outside partners^g													
	(23 couples)					(43 couples)					(44 couples)		
Both partners must be present during sex	22/23	96	0.83 (0.53–1.00)	0.91	41/43	95	0.88 (0.73–1.00)	0.91	37/44	84	0.59 (0.32–0.86)	0.68	
Only certain sexual activities are allowed	19/23	83	0.39 (–0.09–0.88)	0.65	33/43	77	0.15 (–0.20–0.50)	0.53	35/44	80	0.36 (0.03–0.68)	0.59	
Forming emotional relationships is not allowed	14/23	61	0.21 (–0.18–0.59)	0.22	32/43	74	0.03 (–0.26–0.32)	0.49	31/44	70	0.41 (0.15–0.68)	0.41	
Only casual sex or “hook-ups” are allowed	16/23	70	–0.18 (–0.31–0.04)	0.39	33/43	98	0.24 (–0.09–0.58)	0.95	34/44	77	0.35 (0.03–0.68)	0.55	
Outside sexual activities must be disclosed	18/23	78	0.56 (0.24–0.88)	0.57	34/43	79	0.57 (0.33–0.81)	0.58	31/44	70	0.38 (0.12–0.64)	0.41	
Can only have sex if traveling or out of town	23/23	100	1.00 (1.00–1.00)	1.00	43/43	100	1.00 (1.00–1.00)	1.00	41/44	93	0.37 (–0.20–0.93)	0.86	
Can only have sex in certain places	19/23	83	–0.10 (–0.18–0.00)	0.65	40/43	93	–0.03 (–0.08–0.01)	0.86	39/44	89	0.24 (–0.21–0.68)	0.77	
Accounts on “hook-up” apps or sites are not allowed	19/23	83	0.55 (0.16–0.94)	0.65	37/43	86	0.61 (0.33–0.89)	0.72	36/44	82	0.10 (–0.26–0.46)	0.64	

Characteristic	Relationship duration											
	<1 year				1 to <5 years				5 years			
	F ^a	P ^b	K ^c (95% CI) ^d	PABAK ^e	F ^a	P ^b	K ^c (95% CI) ^d	PABAK ^e	F ^a	P ^b	K ^c (95% CI) ^d	PABAK ^e
Specific sexual behaviors with outside partners^h	(10 couples)											
Kissing	5/7	71	0.50 (0.12–0.99)	0.43	12/20	60	0.24 (–0.08–0.57)	0.20	29/34	85	0.49 (0.11–0.87)	0.71
Groping	7/10	70	0.30 (–0.25–0.85)	0.40	13/17	76	0.34 (–0.06–0.74)	0.53	32/34	94	0.73 (0.37–1.00)	0.88
Mutually masturbating	5/8	63	0.35 (–0.11–0.82)	0.25	16/20	80	0.56 (0.20–0.91)	0.60	32/34	94	0.73 (0.37–1.00)	0.88
Frottage	7/9	78	0.51 (0.06–0.97)	0.56	12/15	80	0.59 (0.24–0.94)	0.60	20/27	74	0.36 (0.00–0.72)	0.48
Rimming	8/10	80	0.44 (–0.13–1.00)	0.60	13/18	72	0.46 (0.09–0.83)	0.44	25/32	78	0.50 (0.23–0.77)	0.56
Giving oral sex without a condom	7/10	70	0.39 (–0.03–0.81)	0.40	14/17	82	0.64 (0.32–0.97)	0.65	30/33	91	0.69 (0.43–0.96)	0.82
Receiving oral sex without a condom	8/10	80	0.43 (–0.15–1.00)	0.60	13/17	76	0.52 (0.14–0.91)	0.53	32/34	94	0.59 (0.28–0.91)	0.88
Giving oral sex with a condom	4/9	44	–0.02 (–0.67–0.63)	–0.11	14/19	74	0.56 (0.25–0.86)	0.47	22/33	67	0.36 (0.10–0.62)	0.33
Receiving oral sex with a condom	4/10	40	0.08 (–0.35–0.50)	–0.20	12/17	71	0.52 (0.19–0.85)	0.41	23/32	72	0.42 (0.16–0.68)	0.44
Topping without a condom	6/10	60	0.38 (0.00–0.75)	0.20	15/18	83	0.66 (0.32–0.99)	0.67	23/33	70	0.51 (0.29–0.73)	0.39
Bottoming without a condom	9/10	90	0.82 (0.54–1.00)	0.80	15/18	83	0.66 (0.32–0.99)	0.67	21/30	70	0.49 (0.28–0.69)	0.40
Topping with a condom	6/10	60	0.22 (–0.26–0.69)	0.20	14/19	74	0.45 (0.07–0.84)	0.47	25/34	74	0.40 (0.11–0.69)	0.47
Bottoming with a condom	5/10	50	0.33 (–0.04–0.71)	0.00	13/18	72	0.46 (0.09–0.83)	0.44	24/33	73	0.49 (0.23–0.75)	0.45
Vaginal sex without a condom	4/9	44	0.17 (–0.21–0.54)	–0.11	8/17	47	0.22 (–0.11–0.55)	–0.06	18/28	64	0.43 (0.18–0.68)	0.29
Vaginal sex with a condom	5/9	56	0.32 (–0.18–0.83)	0.11	8/18	44	0.24 (–0.02–0.49)	–0.11	16/28	57	0.38 (0.14–0.63)	0.14

^aFrequency of agreement. Denominators might not add to total due to missing responses.

^bObserved agreement expressed as a percentage.

^cCohen’s kappa statistic.

^dCI: Confidence interval.

^ePrevalence-adjusted bias-adjusted kappa statistic.

^fData represent 160 couples.

^gData represent 110 couples who concurred about having a mutual agreement about sex with outside partners.

^hData represent 64 couples who concurred about having a mutual agreement about sex with outside partners, and answered questions about their own and their partner’s allowed or disallowed behaviors.