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Development and Validation of the Sexual Agreement Investment Scale

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Abstract

Introduction—Sexual agreements are ubiquitous among gay men. Lower levels of investment in these agreements may be associated with breaking them or engaging in risky sexual behavior. We developed a scale to measure agreement investment levels among gay men.

Methods—We analyzed qualitative data from 78 gay men in committed relationships to inform item development, followed by quantitative analyses of two larger samples (n=380; n=1001) to assess construct, convergent, and discriminant validity.

Results—The Sexual Agreement Investment Scale (SAIS) is a psychometrically sound measure of level of the investment in sexual agreements among gay men in relationships. Men with higher agreement investment were less likely to break agreements and to engage in unprotected intercourse with outside partners.

Discussion—The SAIS can be used to measure investment in sexual agreements and its impact on sexual behavior in a wide variety of settings, including research on relationships, sexuality, couples therapy, and HIV-prevention.

Keywords

gay male couples; sexual agreements; scale development; validity; HIV

INTRODUCTION

Over the past two decades, the AIDS epidemic has greatly impacted the lives and sexual behavior of gay men in the U.S. Although HIV incidence among gay men significantly decreased throughout the 1980's and 1990's, more recently this trend appears to be reversing (Osmond, Pollack, Paul, & Catania, 2007), suggesting that HIV prevention efforts have fallen short of the current pace of the epidemic. Epidemiological studies report that a significant number of gay men who had recently acquired HIV attributed their infection to unprotected anal intercourse (UAI) with their primary partners (Davidovich et al., 2001; Rosser, Gobby, & Carr, 1999; Xiridou, Gekus, De Wit, Coutinho, & Kretzschmar, 2003). For instance, the Amsterdam Young Men's study conducted between 1995 and 1997 found that 50% of new infections were attributed to UAI with a primary partner (Davidovich, de Wit, & Stroebe,

2000). In order to reduce the toll of HIV on gay men, innovative approaches for identifying the salient influences on gay men's risk behaviors are needed and these approaches need to incorporate relationship-oriented constructs.

Throughout the epidemic HIV prevention efforts targeting gay men have primarily focused on the individual, thereby ignoring other important contextual factors such as relationship status and relationship quality even though previous research has documented differences in sexual behavior between gay men in primary partnerships and single gay men. Specifically, compared to sexually active single gay men, gay men in relationships reported substantially higher rates of UAI with their primary partners, particularly when their partner was of the same serostatus (Bosga et al. 1995; Cáceres and Rosasco 1997; Connell et al., 1989; Crawford et al., 2006; Davidovich et al., 2001; Ekstrand, Stall, Paul, Osmond, & Coates, 1999; Elford, Bolding, Maguire, & Sherr 1999; Fitzpatrick, McLean, Dawson, Boulton, & Hart, 1990; Hays, Kegeles, & Coates, 1990, 1997; Hoff, Coates, Barrett, Collette, & Ekstrand, 1996; Hoff et al. 1997; Hope and MacArthur, 1998; Kippax, Crawford, Davis, Rodden, & Dowsett, 1993; Martin, Dean, Garcia, & Hall, 1989; McKusick, Coates, Morin, Pollack, & Hoff, 1990; Schmidt, Fouchard, Krasnik, & Zoffman, 1992; Stall, Ekstrand, Pollack, McKusick, & Coates, 1990; Stolte, Dukers, Gekus, Coutinho, & de Wit, 2004; Valdiserri et al., 1988; Xiridou et al., 2003).

The increased likelihood of engaging in UAI with primary partners could be partially accounted for by relationship factors such as closeness, investment in and dependence on the relationship, desire for a stable and lasting relationship, and relationship satisfaction (Appleby, Miller, & Rothspan, 1999; Gold, Skinner, & Ross, 1994; Hays, Kegeles, & Coates, 1997; McNeal, 1997). These findings highlight that in order to improve the effectiveness of HIV prevention efforts it is necessary to examine not only the dynamics that shape the relationship but also the relationship itself, since the relationship is the context within which UAI most often occurs. Yet, there are few HIV prevention efforts that target gay men in relationships.

Relationship theories such as interdependence theory (Kelley & Thibaut, 1978; Rusbult, Olsen, Davis & Hannon, 2001), cognitive-behavioral approaches (Gottman, 1995), attachment theory (Hazan and Shaver, 1987) and evolutionary theory (Buss, 1989) have been utilized to provide a framework for understanding behaviors and emotional responses in the context of relationships, including intimate relationships, familial relationships, and friendships. These theoretical approaches have been used in studies of both heterosexual and homosexual couples to explore how relationship processes such as commitment and satisfaction influence relationship outcomes such as longevity, divorce, and infidelity (Allen et al., 2008; Kurdek, 1998). Prior literature specifically focusing on gay male couples has described how factors such as relationship satisfaction (Boesch, Cerqueira, Safer, & Wright, 2007), commitment (Kurdek, 1989, 2000), and social support (Darbes & Lewis, 2005) influence sexual behavior. Sexual agreements can be thought of as another relationship factor - an expression of the many decisions that most gay couples make. Interdependence theory would posit that men make decisions regarding their sexual behavior with primary and outside partners based on such factors as commitment and satisfaction. However, relatively few studies have examined sexual agreements in gay male couples and how the process of negotiating them relates to other factors in the relationship (e.g., commitment, intimacy).

One aspect of agreements that has been addressed is negotiated safety (Kippax et al., 1993, 2003). Negotiated safety is an HIV prevention strategy wherein gay men in concordant negative relationships agree to either be monogamous or to only have safe sex with outside partners in order to have sex without condoms with each other. Although reports on the effectiveness of negotiated safety agreements as an HIV prevention strategy have been mixed (Crawford, Rodden, Kippax, & Van de Ven, 2001; Elford et al., 1999; Guzman et al., 2005), investigations into them have validated that sexual agreements are widespread among concordant negative

gay couples and may play a critical role in HIV prevention. However, beyond establishing the presence of these agreements, and their potential overlap with HIV prevention, there are other issues to consider. An important issue which may diminish the effectiveness of using a sexual agreement as an HIV prevention strategy is that of broken agreements. There is an emerging body of literature examining the consequences of broken agreements (Crawford et al., 2001; Kippax et al., 2003). For example, it has been reported that in situations where agreements prohibit UAI with outside partners, broken agreements could increase HIV transmission risk for both members of the couple.

Building upon the negotiated safety literature, Hoff and Beougher (in press) found that sexual agreements are not limited to concordant negative gay couples. In fact, agreements about sex with outside partners are ubiquitous and integral to nearly all gay male couples regardless of couple serostatus. They also found that sexual agreements serve as a framework for the couples' decision to engage in, or refrain from, sexual behaviors that may place them at increased risk for HIV. Given the level of UAI among gay couples, elucidating the role these agreements play in gay men's sexual decision-making, and in their relationships, is imperative. Moreover, to fully understand how these agreements function, aspects such as breaks need to be incorporated into any investigation in this area.

Considering that most gay men in relationships have agreements with their partners about sex outside the relationship, it is crucial to have a sound method of quantitatively measuring how invested those individuals are in their agreements. Our primary goal in this investigation was to develop a scale with robust psychometric properties that would yield reliable and valid data regarding the level of investment that gay men in relationships have in their sexual agreement. To meet this objective, we utilized qualitative and quantitative data from a multi-pronged parent study which aims to examine relationship-based predictors of sexual risk behavior in gay male couples from the perspective of interdependence theory. We used qualitative data from one sample of gay male couples (Study 1) and quantitative data from two other large, independent samples of gay male couples (Studies 2 and 3). First, we describe the development of the items in the scale from the qualitative interview data in Study 1. Next, we describe the assessment of the validity and reliability of the data obtained from the newly-developed scale in Studies 2 and 3. In the two latter studies, construct validity was assessed via exploratory and confirmatory factor analysis and convergent and discriminant validity were assessed by correlating latent factors from the factor analyses with established instruments from the research literature on gay male and heterosexual dyadic relationships. Finally, in the Discussion, we integrate the results from all three studies regarding the validity and reliability of data obtained from the Sexual Agreement Investment Scale (SAIS).

METHODS

Study 1

Procedures—From February to April 2002 we conducted an investigation of sexual agreements, sexual behavior, and other relationship issues via qualitative interviews with 39 gay male couples living in the San Francisco Bay Area. The objective of these interviews was to investigate the agreements that couples make about whether to allow sex with outside partners and to document factors that contribute to the maintenance of those agreements.

Active and passive recruitment strategies were implemented in community settings. Field research staff reached potential participants either by handing out study postcards or placing flyers and postcards in gay-identified social venues, such as bars, clubs, and cafes as well as in community health and HIV/AIDS service organizations and by placing advertisements in gay-oriented publications, websites, and listservs. Recruitment strategies were designed to produce a diverse sample in terms of race or ethnicity as well as serostatus in an effort to reflect

the demographics of the San Francisco Bay Area. Field research staff reached out specifically to community-based agencies whose constituents were Asian-American and Pacific Islander, Latino, and African-American gay men as well as HIV-positive gay men.

All recruitment materials invited interested potential participants to call a toll-free recruitment hotline for information. Callers were screened over the phone for eligibility and if found eligible, their primary partner was screened separately to determine his eligibility. To be eligible, participants had to have been in their relationship for at least three months, have been 18 years old, be fluent in English, and have knowledge of their own as well as their partner's serostatus. It was important for the parent study to include serostatus knowledge by both partners since risk perception and sexual behavior are influenced by the serostatus composition of the couple. Couples were eligible to participate only after both partners were screened and found to meet the eligibility criteria.

Eligible couples were given appointments to come to the study offices in downtown San Francisco. On the day of the appointment, research staff members obtained consent from each partner individually. Partners were interviewed separately to allow for candid and independent discussion of their relationship, sexual agreement, and any reported breaks in their agreement. Interviews examined the following topics: relationship history, relationship strengths and weaknesses, relationship support, partner roles, a natural history of any agreement made about whether to allow sex with outside partners, whether those agreements had been broken, and future goals for the relationship. Interviewers were instructed in the intent of each question in the interview guide and were not required to ask the questions in any fixed order. They were trained to steer the participants through the interview by posing questions in an open-ended, conversational tone, to probe for clarity when and where necessary, and to allow for topics to emerge naturally. At the end of the interview each participant was paid \$40. All interviews were recorded using cassette recorders and transcribed verbatim.

Data Analysis—Guided by grounded theory (Glaser, 1992; Strauss & Corbin, 1990), which allows themes to emerge from the data, the initial analysis by research staff members identified the following thematic categories: agreements concerning sexual activity within the relationship, agreements concerning sexual activity outside the relationship, sexual behaviors within the relationship, sexual behaviors outside the relationship, perceptions of the risk of acquiring HIV, gay identity, protective factors (e.g., actions or beliefs regarding protection against HIV provided by the relationship, self, or the partner), relationship dynamics, and other (e.g., coded text that did not fall into any other category). From this initial analysis, we generated the following salient agreement-focused codes: agreement type (including those that were monogamous, those that allowed sex with outside partners, and those that allowed threesomes), agreement motivation, maintenance of or commitment to the agreement, agreement acceptability, the explicitness or implicitness of the agreement, broken agreements, disclosure of broken agreements, and changes in agreements.

Research staff members then applied these codes to selected sections of a subsample of transcripts to verify their definitions. Following this, two research staff members independently coded 10 transcripts and compared them for discrepancies. All discrepancies were reconciled in consultation with a third research staff member until both research staff members demonstrated sufficiently consistent coding techniques. Subsequent transcripts were coded by one of the two coders and verified by a third research staff member (Frieze, 2008).

Results

Sample Characteristics: While the sample was diverse in terms of race or ethnicity as well as HIV status, the largest proportion of couples were White and the majority of couples were concordant negative. Of the 39 couples who were interviewed, 18 were White, 7 were African-

American, 3 were Hispanic, 1 was Asian/Pacific Islander, and 10 were interracial. In terms of serostatus, 17 were concordant negative, 10 were concordant positive, and 12 were discordant (see Table 2 for these characteristics at the level of the individual). The mean age of participants was 40 years (SD: 9 years), while the range was 21 to 63 years. The mean relationship length was 7 years (SD: 7 years), while the range was three months to 27 years.

Participants reported a wide range of agreements, from closed or monogamous ones such as, “We only have sex with each other,” to ones that were more open, such as, “When I’m not with my partner, I’m only allowed to have oral sex and masturbate with outside partners” and “Always use condoms when having anal sex with outside partners.” Many couples reported that having a sexual agreement supported the relationship by giving it structure and supported the partners by giving them a clearer sense of what they could expect from one another. For example, those with closed agreements valued that they trusted their partners to be faithful, while those with open agreements trusted that sex with outside partners would not interfere with their relationship. Thus, making sexual agreements represented an important relationship dynamic among gay male couples. Subsequently, the value that gay couples attached to their agreements, as well as their commitment to and satisfaction with them, are all influential factors that should be included in any examination of gay male relationships, akin to general relationship satisfaction or intimacy.

Following the completion of coding, we employed content analysis to identify the primary categories that address one’s investment in intact agreements (Evans, 1996). The primary categories included: value of the agreement, commitment to the agreement, and satisfaction with the agreement. Approximately 12-15 survey items were generated for each of these categories and reviewed by the study team, who then made modifications to the survey items to enhance clarity and minimize redundancy. As a final step, the study team conducted a series of cognitive interviews with volunteers (n=16) in order to ensure item reliability (Fowler, 1995; Willis, 2005). Three members of the study team, trained in cognitive interviewing, queried the volunteers to obtain additional details regarding how they arrived at their responses to each item. Questions in the cognitive interviews included: “What did the question mean to you?”, “Did you understand what we were looking for in that question?”, and “Was there anything in that question that was confusing?” Responses were recorded, summarized, and reviewed by the study team. The cognitive interview and review process further honed the items resulting in the final version of the SAIS (see Appendix). The final instrument contained 13 items, of which six asked participants about how much they valued their current agreement, four asked about their level of commitment to their current agreement, and three asked how satisfied they were with their current agreement. We view these items as representing the maximum known scope of participants’ thoughts and feelings regarding their sexual agreements. Our next step was to ascertain whether all 13 items and each of the three dimensions (value, commitment, and satisfaction) emerged in the quantitative analyses of the data collected in Studies 2 and 3.

Study 2

Procedures—We used data from 380 gay men who were recruited from June to December 2004 in the San Francisco Bay Area. Recruitment was conducted exactly as it was done for Study 1 with the exception that couples who completed the survey were given three referral cards to give to friends who might be interested in participating. The majority of participants (54%) learned about the study through flyers, 30% did so through study postcards, 6% through community-based organizations, 5% through friends and co-workers, and 5% through web media (e.g., ads, e-mails, listservs).

Eligibility criteria remained the same as in Study 1 with the additional criterion that neither partner identifies as transgender. Transgender individuals were excluded because studies

conducted in San Francisco among transgender individuals in primary relationships reported that they exhibit substantially different relationship dynamics from those of gay men (Nemoto, Luke, Mamo, Ching, & Patria, 1999; Nemoto, Operario, Keatley, Han, & Soma, 2004; Nemoto, Operario, Keatley, & Villegas, 2004). Eligible couples were given appointments to come to the study offices in downtown San Francisco to take the survey. To provide privacy and encourage independent responses to the survey questions each partner was seated in a separate cubicle. Participants completed an audio computer-assisted self interview (A-CASI) that required an average of 70 minutes to finish. Upon completion each participant received \$40.00.

Measures—The following measures were administered to the participants.

Demographic Characteristics: These included age, race or ethnicity, level of education, employment status, and income over the preceding 12 months at the time of the interview.

HIV Status: Participant HIV status was determined via self reports of the results from his most recent HIV test. Participants also reported their partner's HIV status.

Length of Relationship: During screening, participants were asked how long they had been in their relationship. Discrepancies between partners in their reports of relationship length were rare and usually minor; these were reconciled between partners.

Agreement Type: Based on data from Study 1, agreements about sex outside the relationship were categorized into three broad types. The survey, after emphasizing to participants that agreements could be either explicit or implicit, asked them: “Which one of the following scenarios best describes the current agreement that you and your primary partner have? (1) Both of us cannot have any sex with an outside partner, (2) We can have sex with outside partners but with some conditions or restrictions, (3) We can have sex with outside partners without any conditions or restrictions.”

Broken Agreement: Participants were asked how many times they had broken their agreement in the preceding 12 months. For purposes of the analyses reported below, these responses were recoded into a binary variable (0: Did not break the agreement in the past 12 months; 1: Broke the agreement at least once in the past 12 months).

UAI with Outside Partners: Participants were asked to report the number of times in the preceding 3 months they had UAI (with or without ejaculation) with an outside partner. The question was asked separately for outside partners of HIV-negative, HIV-positive, and unknown serostatus. For the analyses reported below, a single composite binary variable representing UAI with outside partners of discordant or unknown serostatus was created based upon these responses and the respondent's own serostatus (0: Did not engage in any acts of UAI with an outside partner of discordant or unknown serostatus in the past 3 months; 1: Engaged in at least one act of UAI with an outside partner of discordant or unknown serostatus in the past 3 months).

Investment in Sexual Agreement: Investment in one's agreement was measured on three domains: value of the agreement, commitment to the agreement, and satisfaction with the agreement. A complete list of items appears in the Appendix. Responses were recorded on a 5-point scale ranging from “Not at all” to “Extremely.” Higher scores indicate greater investment in one's agreement.

A number of standardized measures (see Table 1) were also used. These were included in the parent study as part of a separate line of inquiry examining associations between relationship factors and sexual risk behavior, and were selected based on relationship theories such as

interdependence theory and social exchange theory. Many of these measures (e.g., relationship satisfaction, relationship commitment, social support) have been previously utilized in studies of gay men and found to generate reliable responses (Boesch et al. 2007; Darbes & Lewis 2005; Kurdek, 2000).

Data Analysis—SAS 9.1 was used to generate the demographic and other descriptive characteristics of the sample which consisted of measures of central tendency for continuous variables and one-way frequency tables for categorical variables. The presence of multiple items in our newly-developed scale enabled the use of latent variable methods such as exploratory factor analysis, confirmatory factor analysis, and structural equation modeling to analyze the quantitative data. Latent variable models that contain multiple observed survey items linked with latent variables allow the analysis to partition the shared variance among the survey items separately from the unique or residual variance associated with each item. The shared variance components are referred to as latent factors. An advantage of this approach is that relationships among latent factors are purged of measurement error (Loehlin, 1998).

Mplus version 5 (Muthén & Muthén, 2007) was used to analyze all models involving latent variables. First, the construct validity and the internal reliability of the data arising from the SAIS were evaluated. Subsequent analyses assessed whether the level of investment in one's sexual agreement was associated with self-reported sexual behavior and broken agreements by regressing these binary outcomes onto the SAIS latent factor structure. Finally, convergent and discriminant validity analyses illuminated the associations between investment in sexual agreement and a variety of relationship constructs measured by scales commonly used in the literature.

Individual respondents comprised the unit of analysis for all data analyses even though we had data from intact dyads. Our primary goal here was to develop an instrument that can be administered to individual gay men who are in committed relationships, since researchers, clinicians, and prevention practitioners typically have access to only one member of a couple rather than both members simultaneously. However, individual members of dyads are likely to have correlated responses to survey questions due to their shared life experiences and similarity of views (Kenny, Kashy, & Cook, 2006). Standard analysis methods compute confidence intervals and *p*-values under the assumption that each observation is independent from other observations, but dyadic data often violate this assumption. A robust variance estimator for confidence intervals and *p*-values relaxes this independence assumption and requires only that between-dyads data be independent while within-dyad responses may be correlated (White, 1980). Therefore, all inferential analyses reported below make use of this robust variance estimation approach to obtain appropriate confidence intervals and *p*-values.

Construct Validity Assessment: Construct validity of the SAIS was assessed via exploratory factor analysis. During the development of the instrument, we posited that the instrument would assess investment in sexual agreement via three sub-domains: value, commitment, and satisfaction. Anticipating that the number of factors per sub-domain could vary, and that some items could be associated with factors across sub-domains, the 13 items were subjected to exploratory factor analysis. In view of the ordered categorical nature of the Likert-scaled agreement items, the factor analysis employed robust weighted least-squares estimation with a mean adjustment and geomin rotation of factor loadings. Geomin rotation was chosen over other rotation methods because statistical literature demonstrates that it outperforms many other rotation methods when complex loading patterns are present (Browne, 2001). The number of eigenvalues greater than 1.00, the scree plot, and the following descriptive latent variable model fit statistics were used to select the number of factors to retain from the factor analysis: the Tucker-Lewis Index (TLI) (Tucker & Lewis, 1973), the Root Mean Square Error of Approximation (RMSEA) (Browne & Cudek, 1993), and the Standardized Root Mean Square

Residual (SRMR) (Bollen, 1989). Hu and Bentler (1999) recommend that at least two of the following fit criteria be met to indicate satisfactory model-data fit: RMSEA $\leq$.06, TLI $\geq$.95, and SRMR $\leq$.08.

Subscale Reliability Assessment: Internal reliability values for agreement investment subscales were computed by Raykov's latent variable-based method (Raykov, 1997a). Coefficient alpha, the usual statistic used to assess internal reliability, is computed under the assumption that factor loadings for multiple items are all identical (Raykov, 1997b). If this assumption is not met, the resulting reliability estimate is biased. By contrast, Raykov's method relaxes this assumption, allowing the items to have different factor loadings. An additional benefit of Raykov's approach is that 95% confidence intervals for reliability estimates are readily available with this method.

Associations with Behavioral Variables: The association of an individual's investment in his sexual agreement with his self-reported behavior as measured by whether he reported breaking his agreement in the preceding 12 months (0 = No; 1 = Yes) and whether he had UAI with an outside partner who was of discordant or unknown serostatus in the preceding 3 months (0 = No; 1 = Yes) was assessed. Rather than creating an item composite of the SAIS items which would contain both true score variance and residual variance, SAIS was conceptualized as a latent variable measured by the 13 SAIS items. The above two binary outcomes were then regressed onto this latent factor structure using a logistic regression approach with maximum likelihood estimation to obtain odds ratios of the outcomes per unit change in the SAIS factor.

Convergent and Discriminant Validity Assessment: Next, the convergent and discriminant validity of SAIS was evaluated by correlating the latent investment in sexual agreement with the other available relationship measures. Assessment of convergent and discriminant validity can be performed in one of two ways: (a) item composites that are the sum or the means of items for each measure can be created and correlated, or (b) after measurement error has been removed from the model, the latent factors can be correlated. Although the former method has the virtue of simplicity, the latter method yields more accurate parameter estimates and hypothesis tests (Hayduk, 1987) in the presence of non-trivial levels of measurement error, so in this investigation SAIS was treated as a latent factor rather than an observed item composite. Other instruments used in convergent validity analyses were treated as observed item composites because their factor structures were known and the finite sample size could not support the simultaneous modeling of all these instruments as latent variables.

In a typical convergent and discriminant validity analysis, separate instruments are chosen a priori with which the new instrument's latent factors should be correlated and uncorrelated, respectively. However, in the current study, all available previously-validated relationship scales from the parent study were used for convergent and discriminant validity analyses. In these analyses, previously-validated instruments that are significantly correlated with the SAIS's latent factor(s) represent convergent validity with the magnitude of the correlation indicating the degree of instrument convergence. If one or more of the previously-validated instruments are uncorrelated with the SAIS's factor(s), or weakly correlated with those factors, the conclusion is that the SAIS exhibits discriminant validity.

Greater investment in the agreement was expected to be positively associated with relationship satisfaction, consensus, intimacy, commitment, autonomy, equality, trust, honesty, and social support, all of which are positive relationship attributes. By contrast, greater investment in the agreement was expected to be negatively associated with depression, anxiety, hostility, and loneliness, all of which are markers of poor relationship functioning. The degree of correlation between the SAIS and these other measures would elucidate the relationships between this new measure of investment in sexual agreement and other contextual relationship factors.

Results

Sample Characteristics: The average age of participants was 39 years (SD: 9.6 years) (see Table 2). The sample was comprised of White (64.2%), African-American (13.7%), Hispanic (11.8%), and Asian/Pacific Islander (4.2%) gay men. A majority of participants had a college education (84.2%) and were employed (65%). Their reported annual income was heterogeneous, with close to half of the sample (48.7%) having earned less than \$30,000 annually. The average reported relationship length was 5.1 years (SD: 5.8 years). The HIV status of 58% of participants was negative and 42% were HIV-positive.

All participants reported on the characteristics of their sexual agreements. Almost half of the participants (48.7%) were monogamous, slightly fewer (42.1%) reported non-monogamous sexual agreements with some conditions or restrictions, and a relatively small number (9.2%) reported sexual agreements with absolutely no restrictions on sex with outside partners. A third of the participants (32.4%) reported breaking their agreement in the preceding 12 months and 14.8% reported having UAI in the preceding 3 months with an outside partner of discordant or unknown serostatus.

Exploratory Factor Analysis: Exploratory factor analysis of the 13 SAIS items yielded a single dominant factor (eigenvalue = 9.22) that accounted for more than 70% of the shared variance in responses to the SAIS items. Eigenvalues for all subsequent factors were less than 1.00, suggesting that a single factor was sufficient to explain the shared variance among the SAIS items. Latent variable model fit statistics corroborated this view: TLI = .97, RMSEA = .26, and SRMR = .08. All factor loadings were large in magnitude (see Table 3).

Internal Reliability Analyses: Reliability for the 13 item SAIS was high and estimated with very high precision (Raykov's coefficient $\rho = .954$; 95% CI = .945, .964).

Associations with Behavioral Variables: The final factor structure of the SAIS was extended to include logistic regressions of the two binary behavior variables onto the general sexual agreement investment factor. One's level of investment was inversely related to both breaking an agreement (OR = 0.78; 95% CI = .71, .86) and to UAI with outside partners of discordant or unknown serostatus (OR = 0.86; 95% CI = 0.79, 0.93), such that participants with greater investment in their sexual agreement were less likely to break their agreement and less likely to engage in UAI with outside partners of discordant or unknown serostatus.

Convergent and Discriminant Validity: The correlations of the latent factor structure of the SAIS with other available measures were in the directions expected (see Table 4). Sexual agreement investment had moderate positive correlations with all of the measures of positive relationship traits except relationship autonomy, with which it showed no correlation. Sexual agreement investment had moderate negative correlations with loneliness, depression, anxiety and hostility.

Study 3

Procedures—We used data from 1001 gay men who were recruited from June 2005 to February 2007 in the San Francisco Bay Area as part of the baseline sample for a longitudinal study to examine relational and contextual issues associated with changes in sexual risk-taking over time. Recruitment was conducted exactly as it was done for Study 2 and followed the same eligibility criteria with the addition of the criterion that couples who participated in Study 2 were not eligible, thus assuring distinct samples. Couples who participated in Study 1, however, were eligible.

Measures—All measures for Study 3 were the same as described above for Study 2.

Data Analysis—Statistical analyses for this sample followed the same approach as outlined above for Study 2. Initial analyses employed SAS 9.1 to produce the sample characteristics. The construct validity of the SAIS was evaluated via confirmatory factor analysis in *Mplus* version 5 using a weighted least-squares estimator with a mean and variance adjustment. This estimator has been shown to perform well for confirmatory factor analyses involving categorical scale items (Flora & Curran, 2004). All other analyses of internal reliability, assessment of associations with self-reported sexual behavior and broken agreements, and convergent and discriminant validity were performed using the same process as explained above for Study 2.

Results

Sample Characteristics: The data from 1001 respondents who reported having an agreement about sex with outside partners, were used for the present analyses. With a sample size that was more than two and a half times larger than that of Study 2, the sample characteristics for this study still resembled those from Study 2 very closely (see Table 2). The average age of participants was 41 years (SD: 11.2 years). In addition to the 65.4% White participants, the sample comprised of 11.5% Hispanic, 9.4 % African-American, and 6.6% Asian/Pacific Islander men. As was the case in Study 2, a majority of participants reported having had a college education (83.1%) and were employed (66%). About 43.4% of the participants reported earning less than \$30,000 annually. The average reported relationship length was 6.6 years (SD: 8 years).

Two-thirds (67.8%) of the participants were HIV-negative and one-third (32.2%) were HIV-positive. Consistent with Study 2, close to half of the participants (48.8%) were monogamous, slightly less (41.3%) had sexual agreements with some conditions or restrictions, and 10% had open agreements with no restrictions on sex with outside partners. A fifth of participants (21.9%) reported breaking their agreement in the preceding 12 months and 13.2% reported having UAI in the preceding 3 months with an outside partner of unknown or discordant serostatus.

Confirmatory Factor Analysis: Since exploratory factor analysis of the Study 2 data identified a single latent factor that satisfactorily explained the shared variance among the 13 SAIS items, we initially fit a confirmatory factor analysis consisting of a single factor to the Study 3 data. Results from this confirmatory factor analysis suggested that the fit of the single-factor model was very good: $\chi^2(24) = 1302.73$, $p < .001$; TLI = .97, RMSEA = .23 and SRMR = .07. Standardized factor loadings and 95% confidence intervals were large in magnitude and comparable with those from the Study 2 data (see Table 3).

Internal Reliability Analyses: Reliability for the SAIS in Study 3 was very strong, estimated with very high precision, and highly comparable with the reliability results reported above for Study 2 (Raykov's coefficient $\rho = .950$; 95% CI = .944, .956).

Associations with Self-Reported Behaviors: Logistic regression of any broken agreements in the past 12 months and UAI with outside partners of discordant or unknown serostatus onto sexual agreement investment revealed an inverse relationship in both cases. Greater investment in one's sexual agreement was associated with lower odds of breaking the agreement (OR = 0.81; 95% CI = .76, .87) and lower odds of engaging in UAI with outside partners of discordant or unknown serostatus (OR = 0.83; 95% CI = 0.76, 0.89). These results are highly similar to those reported above for the same analyses conducted with the Study 2 data.

Convergent and Discriminant Validity: The correlations of the latent factor structure of the SAIS with other available measures in Study 3 appear in Table 4. As was the case in Study 2,

sexual agreement investment had moderate positive correlations with most of the measures of positive relationship traits and mild to moderate negative correlations with the markers of negative relationship traits (e.g., anxiety, depression). All correlations were in the directions expected and very similar to those reported for the Study 2 data, except that the correlation values for sexual agreement investment with hostility, and sexual agreement investment with loneliness, were halved in Study 3 relative to Study 2.

DISCUSSION

The current investigation found initial support for the reliability and validity of data collected from the SAIS among two independent samples of gay men living in the San Francisco Bay Area. Both samples were ethnically and racially diverse and closely resembled the best available estimates of the ethnic and racial composition of gay men in San Francisco (Pollack, Osmond, Paul, & Cantania, 2005). Factor analysis results from both samples supported the presence of a single latent agreement factor that encapsulated participants' investment in their sexual agreement as measured by the value they placed on it, their satisfaction with it, and their commitment to it. Analyses to assess scale reliability found that the internal consistency of the participants' responses to the SAIS items was very high. Our analyses investigating the associations of investment in one's sexual agreement, with broken agreements and with self-reported UAI with outside partners of discordant or unknown serostatus, suggest that as investment in one's agreement increases, the agreements are less likely to be broken and men are less likely to engage in UAI with outside partners.

Convergent and discriminant validity findings were generally consistent across both samples and indicated that greater investment in one's agreement was associated with positive relationship markers such as intimacy, satisfaction, trust, and social support. Similarly, greater investment in one's agreement was negatively related to measures of psychological distress such as depression, loneliness, anxiety, and hostility. However, relationship autonomy was unrelated to agreement investment. It has been reported elsewhere (Blumstein & Schwartz, 1983; Mattison & McWhirter, 1987) that there is a developmental trend in gay male relationships where, as time goes on, couples move from being fairly enmeshed in the early stages of the relationship to becoming more autonomous, yet they sustain high relationship quality. With the average length of relationship for these samples exceeding five years, our samples may represent longer term and more established relationships where partners are relatively independent of each other.

Previous research examining negotiated safety agreements focused on individual gay men in concordant negative relationships and did not study how *invested* they were in their agreements. The SAIS allows the measurement of an individual's investment in his sexual agreement within concordant negative, concordant positive, and discordant relationships. Our finding, that greater investment in the agreement is associated with adhering to the agreement, and with the decreased likelihood of engaging in UAI with outside partners of discordant or unknown serostatus, illustrates the importance of understanding the context in which sexual decisions are made by gay men when they are in committed relationships.

Strengths of this study include having ethnically and racially diverse samples which enhances the applicability of our findings to non-white gay men, moderate to large sample sizes of men in concordant negative, concordant positive, and serodiscordant relationships, the inclusion of different types of sexual agreement, the use of principled methods of cognitive item development, and internal cross-validation of psychometric analyses using independent samples. To our knowledge, the SAIS is the first scale to assess the level of investment in sexual agreements among gay men in committed relationships and its accompanying links to self-reported sex behavior involving outside partners.

The primary limitation is that the generalizability of the findings is restricted due to the non-probability nature of the samples. An additional limitation is that separate sets of instruments were not available to assess convergent and discriminant validity. Also, the cross-sectional nature of the data prevents causal inferences about the effects of investment in one's sexual agreement on subsequent sexual behaviors. For instance, while it is possible that men who are less invested in their agreements were more likely to break them, or engage in UAI with an outside partner of discordant or unknown serostatus, it is equally possible that some men break their agreements, or engage in risky sexual behavior, only to then start viewing their agreements less favorably in order to justify having broken them, thereby bringing their level of investment in line with their behaviors (Bem, 1967). In other words, men may retrospectively self-justify their level of investment when it does not fall in line with their behaviors. It is also worth noting that the data regarding broken agreements did not detail how the agreement was broken and what the consequences of the break were.

Our initial finding that investment in the agreement is inversely related to broken agreements and UAI with outside partners of discordant or unknown serostatus provides a starting point for collecting additional specific data on the nature of broken agreements and their relationships to sexual risk with outside partners. If the associations reported here can be replicated in a longitudinal setting, where investment in one's sexual agreement predicts subsequent broken agreements and UAI with outside partners of discordant or unknown serostatus, the SAIS could become a valuable tool like other psychosocial instruments that are routinely used in HIV-prevention efforts (e.g., sexual behavior assessments during voluntary counseling and testing for HIV (Branson et al., 2006)). Further, we anticipate that researchers who study relationship constructs and topics related to the sexual behavior of gay men in committed relationships will find this instrument worthy of being incorporated into their programs of research. Finally, sex therapists and psychotherapists could administer this scale to gay male couples, and individual gay men who are in committed relationships, in order to identify troubled areas in their sexual agreements and other risk factors which could, with intervention, be improved.

Prior to addressing these important questions, however, it was first necessary to develop a scale to quantitatively measure an individual's level of investment in his sexual agreement and establish its ability to yield valid and reliable response data. The findings reported here offer strong evidence that the SAIS provides a psychometrically sound measure of the self-rated level of investment in one's sexual agreement among gay men in committed relationships and thus sets the stage for additional investigations of the impact of investment in one's sexual agreement on sexual behavior in a wide variety of settings.

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Appendix. The Sexual Agreement Investment Scale (SAIS)

We are interested in attitudes about your current agreement about sex outside the relationship. By "current agreement" we mean the agreement you typed in earlier when we asked: "What is the current agreement you and your primary partner have about sexual encounters outside your relationship?"

Your response was: <Re-state respondent's earlier response>

When answering the following questions we want you to think of your agreement in general even though there may be several specific aspects to your agreement. Please choose the response that best describes your attitudes about your current agreement.

- 0 = Not at all
- 1 = A little
- 2 = Moderately
- 3 = Very Much
- 4 = Extremely

Value

1. How much do you appreciate having your current agreement?
2. How much do you value your current agreement?
3. How much do you respect your current agreement?
4. How important is your current agreement to you?
5. How much does your current agreement matter to you?
6. How much do you benefit from having your current agreement?

Commitment

7. How important is it for you to be committed to your current agreement?
8. How important is it to you that your primary partner is committed to your current agreement?
9. How important is it to you that both you and your primary partner are equally committed to your current agreement?
10. How committed are you to having your current agreement?

Satisfaction

11. How satisfied are you with your current agreement?
12. How much does satisfaction with your current agreement influence satisfaction with your relationship?
13. How important is it that you feel satisfied with your current agreement?

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Table 1

Standardized measures used in the presented studies

Measure	Reference	No. of items	Response Scale	Sample Item
Kansas Marital Satisfaction Scale (Modified)	Schumm et al., 1986	3	7-point: 'Extremely Dissatisfied' to 'Extremely Satisfied'	"How satisfied are you with your primary relationship?"
Dyadic Adjustment Scale:	Spanier, 1976			
Dyadic Consensus Subscale (modified) *		14	6-point: 'Always Agree' to 'Always Disagree'	"Handling family finances"
Dyadic Satisfaction Subscale		10	6-point: 'All of the time' to 'Never'	"How often do you and your partner quarrel?"
Miller Social Intimacy Scale	Miller & Lefcourt, 1982	17	10-point: 'Very Rarely' to 'Almost Always' OR 'Not Much' to 'A Great Deal', depending on the question	"When you have leisure time, how often do you choose to spend it alone with your partner?"
Commitment	Sternberg, 1988	8	9-point: 'Not at all true' to 'Extremely true'	"Because of my commitment to my partner, I would not let other people come between us."
Trust	Rempel, Holmes & Zanna, 1985	17	7-point: 'Strongly Disagree' to 'Strongly Agree'	"Though times may change and the future is uncertain, I know my partner will always be ready and willing to offer me strength and support."
Equality	Kurdek, 1995	8	9-point: 'Not at all true' to 'Extremely true'	"My partner shows as much affection to me as I think I show to him" and "My partner and I have equal power in the relationship."
Autonomy	Kurdek, 1995	8	9-point: 'Not at all true' to 'Extremely true'	"I make most decisions on my own."
Attachment	Kurdek, 1995	8	9-point: 'Not at all true' to 'Extremely true'	"I can never get too close to my partner."
Honesty	Williams & Payne, 2002	4	5-point: 'Completely Honest' to 'Completely Dishonest'	"How honest are you with your primary partner regarding risk relevant matters (such as sexual history)?"
Social Provisions Scale	Cutrona & Russell, 1987	24	4-point: 'Strongly Disagree' to 'Strongly Agree'	"I can talk to my partner about important decisions in my life."
HIV-Specific Social Provisions Scale	Darbes & Lewis, 2005	24	4-point: 'Strongly Disagree' to 'Strongly Agree'	"My partner depends on me for help when it comes to practicing safe sex."
Revised UCLA-Loneliness Scale	Russell, Peplau, & Cutrona, 1980	4	4-point: 'Never' to 'Often'	"I feel in tune with people around me."
Center for Epidemiologic Studies Depression Scale (CESD)	Radloff, 1977	20	4-point: 'Rarely or none of the time' to 'Most or all of the time'	"I felt hopeful about the future."
From the Brief Symptom Inventory:	Derogatis & Melisaratos, 1983			
Anxiety Subscale		6	5-point: 'Not at all' to 'Extremely'	"In the past week how much have you been bothered by nervousness and shakiness inside?"
Hostility Subscale		5	5-point: 'Not at all' to 'Extremely'	"In the past week how much have you been bothered by temper outbursts you cannot control?"

Note: For all scales above, higher scores represent higher levels of the characteristic under consideration. To achieve this, appropriate items within each scale were reverse scored prior to computing the composite score.

* Contains the following item in addition to the original 13 items - "Health care decisions"

Table 2

Sample Characteristics

	Study 1 N = 78		Study 2 N = 380		Study 3 N=1001	
Age - mean years (SD)	39.5	(9.4)	38.6	(9.6)	40.9	(11.2)
Relationship length - mean years (SD)	6.8	(7.1)	5.1	(5.8)	6.6	(8)
	n	(%)	n	(%)	n	(%)
Race						
American Indian or Alaskan Native	0	(0)	3	(0.8)	13	(1.3)
Asian/Pacific Islander	3	(3.9)	16	(4.2)	66	(6.6)
African-American	17	(21.8)	52	(13.7)	94	(9.4)
Hispanic	14	(17.9)	45	(11.8)	115	(11.5)
White	43	(55.1)	244	(64.2)	655	(65.4)
Other	1	(1.3)	20	(5.3)	58	(5.8)
Education						
High School Diploma or lower	-	-	60	(15.8)	170	(17)
Some College or Associate degree	-	-	124	(32.6)	318	(31.8)
Bachelors Degree	-	-	115	(30.3)	282	(28.2)
Masters, Doctoral, other professional degree	-	-	81	(21.3)	231	(23.1)
Employment						
Employed full-time	-	-	165	(43.4)	436	(43.6)
Employed part-time	-	-	48	(12.6)	105	(10.5)
Self-employed	-	-	34	(9)	120	(12)
Unemployed	-	-	133	(35)	340	(34)
Income						
Less than \$30,000	-	-	185	(48.7)	434	(43.4)
\$30,000 - \$59,999	-	-	106	(27.9)	311	(31.1)
\$60,000 and higher	-	-	89	(23.4)	256	(25.6)
HIV-negative	46	(59)	221	(58.2)	678	(67.7)
HIV-positive	32	(41)	159	(41.8)	323	(32.3)
Sexual agreement						
Monogamous	12*	(30.8)	185	(48.7)	488	(48.8)

	n	(%)	n	(%)	n	(%)
Open, with restrictions			160	(42.1)	413	(41.3)
Open, without restrictions	25 ^{*a}	(64.1)	35	(9.2)	100	(10)
Broke sexual agreement at least once in the past 12 months			123	(32.4)	219	(21.9)
Had UAI with outside partner of discordant or unknown HIV status in the past 3 months	22 ^{*b}	(56.4)	56	(14.8)	132	(13.2)

Notes: The blank cells represent data that are not available for Study 1.

* These represent the number of couples, not individuals.

^a The two types of open agreements were not demarcated. Also, 2 couples who gave discrepant reports (where one partner reported the agreement to be open while the other reported that they were monogamous) are not shown in the table.

^b The question asked ('Tell me about a time when the sex agreement you and your partner had about outside partners was broken.') was broader than that in Studies 2 and 3.

Table 3

Standardized factor loadings with 95% confidence intervals from factor analyses

Item	Study 2 N = 380	Study 3 N = 1001
<i>Value</i>		
How much do you appreciate having your current agreement?	.89 (.86, .91)	.87 (.85, .88)
How much do you value your current agreement?	.93 (.91, .94)	.90 (.89, .92)
How much do you respect your current agreement?	.89 (.87, .92)	.82 (.80, .84)
How important is your current agreement to you?	.89 (.86, .92)	.90 (.88, .91)
How much does your current agreement matter to you?	.88 (.86, .91)	.86 (.84, .88)
How much do you benefit from having your current agreement?	.83 (.79, .86)	.80 (.77, .82)
<i>Commitment</i>		
How important is it for you to be committed to your current agreement?	.86 (.84, .89)	.88 (.87, .90)
How important is it to you that your primary partner is committed to your current agreement?	.86 (.83, .89)	.86 (.84, .88)
How important is it to you that both you and your primary partner are equally committed to your current agreement?	.87 (.84, .90)	.88 (.86, .90)
How committed are you to having your current agreement?	.88 (.86, .91)	.88 (.87, .90)
<i>Satisfaction</i>		
How satisfied are you with your current agreement?	.85 (.82, .88)	.82 (.80, .85)
How much does satisfaction with your current agreement influence satisfaction with your relationship?	.67 (.61, .73)	.68 (.64, .71)
How important is it that you feel satisfied with your current agreement?	.71 (.65, .76)	.76 (.73, .79)

Notes: Confidence intervals were computed using a robust variance estimator to account for the non-independence of individual respondents nested within couples.

Table 4

Correlations of SAIS with known survey instruments used in dyadic research and their 95% confidence intervals

	Study 2 N = 380	Study 3 N = 1001
Miller Social Intimacy	.39 (.30, .48)	.42 (.38, .46)
Dyadic Consensus	.25 (.16, .34)	.35 (.30, .40)
Dyadic Satisfaction	.36 (.27, .45)	.36 (.31, .41)
Kansas Marital Satisfaction	.36 (.28, .44)	.37 (.32, .41)
Commitment	.38 (.30, .45)	.40 (.36, .45)
Attachment	.16 (.05, .26)	.33 (.27, .38)
Autonomy	.06 (-.05, .16)	-.04 (-.11, .02)
Equality	.35 (.27, .44)	.35 (.30, .40)
Trust	.37 (.28, .45)	.33 (.28, .38)
Honesty	.38 (.30, .46)	.42 (.37, .46)
General Social Provision Scale	.38 (.29, .47)	.37 (.31, .42)
HIV-Specific Social Provision Scale	.43 (.34, .52)	.41 (.36, .46)
UCLA Loneliness Scale	-.22 (-.32, -.13)	-.10 (-.16, -.04)
CESD	-.21 (-.30, -.11)	-.20 (-.26, -.13)
Anxiety Scale	-.19 (-.28, -.09)	-.14 (-.20, -.08)
Hostility Scale	-.24 (-.32, -.15)	-.11 (-.17, -.05)

Notes: Correlations displayed are those of the latent sexual agreement investment factor with each scale listed in the table. Confidence intervals were computed using a robust variance estimator to account for the non-independence of individual respondents nested within couples.