

Relationship Power, Sociodemographics, and Their Relative Influence on Sexual Agreements Among Gay Male Couples

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Abstract Men who have sex with men (MSM) in primary relationships engage in condomless sex both within and outside their relationships and a majority of HIV transmission risk may actually occur within primary relationships. Sexual agreements regarding non-monogamy are a critical component to understanding HIV prevention in male couples. Relationship factors have been associated with how sexual agreements function and power is one dyadic construct likely to affect couple's maintenance of non-monogamy agreements. Multilevel modeling was used in a cross-sectional study of gay male couples ($N = 566$ couples) to examine associations between partners' demographic characteristics traditionally used to define relationship power, a scale of decision-making power, and outcomes related to sexual agreements, including investment, agreement breaks, and break disclosure. Results indicated that decision-making power relative to one's partner was not associated with any agreement outcome, contrary to hypotheses. However, controlling for decision-making power, demographic bases of power were variably associated with sexual agreements' functioning. Younger partners were less invested in and more frequently broke their agreements. Lower-earning partners broke their agreements more frequently, but also disclosed breaks more often. White men in white-minority relationships broke their agreement more often than their partners. Concordant HIV-positive couples were less invested in

their agreements and HIV-positive men disclosed breaks more frequently. HIV prevention efforts for same-sex couples must attend to the social, developmental, and cultural influences that affect their agreements around non-monogamy.

Keywords Gay male couples · Non-monogamy · Power · Men who have sex with men (MSM)

Introduction

HIV transmission among men who have sex with men (MSM) occurs almost exclusively through sexual behavior [1], and recent calls have suggested that focusing on the dyadic context of risk might enhance HIV prevention among MSM [2–4]. In particular, studies indicate that MSM in primary relationships are at high risk for HIV [5–8]. Further, mathematical modeling proposes that a substantial proportion of HIV transmission may actually occur between primary partners [9, 10].

Rates of negotiated non-monogamy among same-sex male couples are relatively high [11–13] and these dynamics likely contribute to HIV transmission (and prevention) within couples. Couples often choose to navigate sexually non-monogamous relationships by having explicit sexual agreements regarding acceptable extradyadic behaviors [13–16]. Although research on the potential for agreements to reduce sexual risk has previously been mixed [6, 15, 17], more recent evidence suggests that sexual agreements that are operating well for partners may reduce HIV transmission risk within the couple [18–23]. Such agreements, in turn, are likely to be shaped by aspects of a couple's relationship, such as levels of positive communication, trust, and intimacy [19, 20, 23]. Understanding

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the function of sexual agreements within couples is a critical component of incorporating a dyadic dimension to HIV prevention among MSM.

One untested dyadic construct that would likely impact the establishment and maintenance of such agreements is power. Within relationship science, power has been construed as an inherently dyadic process between two partners [24], characterized by the ability of one partner to influence the other toward a desired outcome. Power within and outside the relationship likely affects how sexual agreements are enacted and maintained. Thus, the aim of the current paper was to examine how power, measured in multiple ways, would affect key components of sexual agreements. We chose to focus on agreement investment, breaks to the agreement, and disclosure of agreement breaks as three key factors that have important implications for the sexual health of gay male couples.

Sexual Agreements and HIV Risk Among Gay Male Couples

Sexual agreements among MSM shape the rules around what behaviors are permissible with a sexual partner outside the relationship and therefore have strong significance for HIV risk. Moreover, a number of these agreement-related characteristics have been shown to influence HIV risk within and outside the relationship. However, sexual agreements take on varied forms in terms of which behaviors with outside partners are permissible and the circumstances under which they are allowed [13, 16, 25, 26]. Given this variety, their functioning is likely specific to each couple and the unique context of their relationship.

For example, investment in or commitment to the sexual agreement has been shown to be protective against condomless anal intercourse outside the relationship both contemporaneously [20–23] and longitudinally [18]. Positive relationship factors such as quality, stability, and intimacy have also all been associated with increased agreement investment [27, 28].

In contrast, facets of lower relationship functioning, such as reduced commitment to the relationship and lower social support, have been associated with breaking agreements [29]. Breaks in the agreement (i.e., incidents of non-adherence to rules of the agreement) constitute a kind of infidelity and may threaten relationship health [30]. If breaks in the agreement involve HIV risk and then are not disclosed between partners, this occurrence also greatly increases the potential for partners to unknowingly acquire HIV in the context of their primary relationship. Under-scoring this risk among same-sex couples, recent studies have documented very low rates of HIV testing among MSM in primary relationships, even following condomless sex with an outside partner [31, 32]. This literature

suggests consistent associations between relationship factors and sexual agreements. Given this evidence, the field would benefit from extending these efforts to other facets of intimate relationships.

Power and its Influence on Sexual Agreements

One dyadic concept that is likely to determine the formation, function, and maintenance of sexual agreements is power. Power has been broadly defined as the ability to influence or control others' behavior [24]. In the context of romantic relationships, this type of influence is partly derived based on the characteristics of the dyad (e.g., who is more dominant). However, it is also partly shaped by the level of power individual partners hold generally in society (e.g., white versus minority men, higher-earning vs. lower-earning men). This conceptualization of power is consistent with resource-based theories of power, which suggest that relative power between partners is derived based on individual's social standing [33, 35]. This is particularly the case in couples where differences in these demographic bases of power are evident. For example, within heterosexual couples, men are typically afforded higher social status and, consequently, a certain amount of power within their relationships. Among same-sex couples, other demographic bases might operate similarly, such as age, race, HIV status, or income level. Based on this reasoning, we would anticipate that differences between partners in demographic bases of power, such as what might occur between an older and a younger partner, would in turn influence other dynamics within their relationship. This might be in the form of directly affecting which partner controls decision-making (a specific form of power) or could be expressed in other ways; for example by allowing an individual to act more independently from his partner if he holds more social capital.

A challenge in extending theories of power to gay couples is that relatively few studies have evaluated its role in same-sex couples [36, 37]. There is some evidence for the role of demographic characteristics in determining which partner holds power in gay couples, as a function of an individual partner's resources. Harry and colleagues [38, 39] showed that older men and men with greater income tended to have more power in their relationships. Blumstein and Schwartz [40] also reported financial income as a significant determinant of power for gay male couples. However, we know far less about the role of other indicators of social resources, such as HIV status or race. This is despite some qualitative [41] and quantitative [42] evidence that they are likely salient to the construction of power for gay men.

In recent research on gay male couples, these demographic characteristics, such as age, race, and HIV status,

are commonly included as covariates to be controlled for [8, 21, 28, 43, 44]. In some instances these demographic variables are significant predictors of condomless anal sex [8, 21, 43], sexual decision-making [43], and sexual satisfaction [44]. However, in their role as atheoretical covariates, their impact is underemphasized. By conceptualizing these effects as bases of power in the dyadic context, we might begin to better understand their influence.

The effects that these different components of power have on larger relationship functioning suggest power would also have an effect on maintenance of sexual agreements (e.g., investment in the agreement, breaking the agreement, or disclosing those agreement violations to a partner). For example, men who hold higher social status based on their own demographic characteristics could then have easier access to outside partners, facilitating breaks to agreements. These men might also be less vulnerable to negative repercussions of violating their agreements within their relationship, making them less concerned with the ramifications of disclosing a break. Similarly, men with greater decision-making power within the relationship might be more likely to obtain the kind of sexual agreement that they want, and therefore be less likely to need or want to violate that agreement. We suggest that both decision-making power and demographic bases of power likely impact multiple components of how gay male couples enact their sexual agreements.

Some evidence on sexuality and power among heterosexual couples supports this idea. Cross-sectional research on heterosexual men and women has linked power, measured by self-reported ability to influence others, to both intentions to engage in infidelity from one's spouse and actual past engagement in infidelity [45]. These effects were partially mediated through increased confidence and through emotional distance from one's partner (for infidelity intentions only). Other research has demonstrated that power, operationalized as dependency on the relationship, relative to one's romantic partner differentiated distress in reaction to sexual or emotional infidelity [46], such that lower power (i.e., more dependent) partners were more distressed by emotional unfaithfulness, whereas higher power (i.e., less dependent) partners were affected by sexual infidelity. Although these studies were conducted with heterosexual couples, this literature suggests that power may be generally associated with sexual dynamics within romantic relationships.

Studies have already documented that sexual agreements within gay male couples are influenced by aspects of the dyadic context, including intimacy, trust, positive communication, and overall quality [12, 19, 22, 28]. Separately, associations between intimate relationship power and other relationship factors suggest that imbalances in power may be associated with relationships that

are less satisfied and committed and relationships in which communication follows a distinctive pattern [47]. These correlates, in addition to the function of relationship power being to achieve a desired end from one's partner [24], indicate that intimate relationship power likely influences the sexual agreements of male couples.

Current Study and Hypotheses

The current study aims to expand on previous effort to understand dyadic influences on sexual agreement function among same-sex male couples. One untested construct that is likely to be influential on sexual agreements is power—both within and outside the relationship—in part because power is generally defined as the ability to exert influence on a partner [24]. The current study includes multiple conceptualizations of power and clearly outlines their connection to acknowledge the variable definitions of power within the literature. The selected power-relevant characteristics are informed by resource models of power (e.g., age, income; [35]), as well as specific understudied variables that are likely relevant to gay male couples (e.g., HIV-status, race).

Because the literature on relationship power has used such broad definitions and empirical studies have not yet examined its relation to sexual agreements, we intended the current study to explore how different conceptualizations of power might be associated with non-monogamy agreements among gay male couples. We anticipated that the majority of our results would operate between partners (at the level of the partner), given the theoretical literature on the function of relationship power within a dyad, but we also aimed to document any evidence of related, dyad-level associations as a way to guide future research in this area.

We anticipated that differences in these demographic bases of power between partners would be associated with decision-making power, as a function of discrepancies in resources or social status. We also expected these demographic power differences would be independently associated with important outcomes relevant to the maintenance of sexual agreements (i.e., investment, breaks, and disclosure of breaks).

We hypothesized that partners with lower social status and lower decision-making power relative to their partner would be more invested in their agreement. Specifically, individuals who are younger, report lower income, or report less decision-making power than their partner would have higher levels of agreement investment, as will HIV-positive and non-white men.

We hypothesized that partners with higher social status and greater decision-making power would self-report breaking their agreements more often, whereas partners with less social status and less decision-making power would be less likely to break their agreements.

We also expected that partners with higher social status and greater decision-making power would disclose breaks in their agreements to their partners more often, whereas partners lower in status and with less decision-making power would be less likely to disclose to their partners.

Finally, given literature conceptualizing our selected demographic characteristics as bases of power, we anticipated that multivariable models for each of our outcomes that included all demographic predictors and decision-making power would show that associations between demographics and agreement outcomes were partially explained by decision-making power. We expected that a portion of the associations between differences in demographic bases of power and our outcomes would remain, as there are aspects of power that these demographics confer that are untapped by a measure of decision-making power.

Method

Procedure

Data for the current study come from a larger study of HIV risk among sexual minority men in primary relationships. Couples were recruited in the San Francisco Bay Area between 2005 and 2007. Research staff used both active (e.g., community outreach at MSM-identified social venues and health centers) and passive (e.g., advertisements in gay newspapers and websites) recruitment strategies.

Eligibility criteria included each partner being over 18 years old, having been in a primary relationship together for at least 3 months, being fluent in English, and being a resident of the San Francisco Bay Area. ‘Primary partner’ was defined for eligible participants as a man one is “committed to above anyone else and with whom he has had sex”. Each partner also needed to have knowledge of his own and his partner’s self-reported HIV status, however HIV status was not independently confirmed through testing.

Eligible couples were then scheduled to complete self-report batteries at the local research offices in San Francisco. Both partners provided written informed consent and then completed self-report questionnaires via audio computer-assisted interview independently, but simultaneously. Each partner received \$40 for completing the self-report battery. Questionnaires took approximately 70 min to complete. An institutional review board at the institution where the data were collected approved study procedures.

Participants

One thousand one hundred and thirty-two men (566 couples) completed study procedures. The sample was racially and economically diverse: 47 % of couples identified as

interracial, 45 % as white, 5 % as African-American, 2 % as Latino, 1 % as Asian-American/Pacific Islander, and less than 1 % Native-American. 65.5 % of men identified as white, 11.3 % as Hispanic/Latino, 9.5 % as Black, 6.7 % as Asian/Pacific Islander, 4.8 % as mixed race, 1 % as Native American/Alaskan Native, and <1 % as other race. For individual partners, 45 % reported earning less than \$30,000 per year, 30 % earned \$30,000–59,999, 16 % earned \$60,000–99,999, and 9 % earned \$100,000 or more.

With regards to HIV-status, 310 couples identified as concordant HIV-negative, 124 couples identified as concordant HIV-positive, and 132 couples identified as HIV serodiscordant. The average length of relationship was 6.9 years ($SD = 8.5$; median 4 years), with 77 % of couples reporting they were living together at the time of the study. 45 % of the couples identified their relationship as open and 55 % identified their relationship as closed or monogamous.

Measures

Demographics

Single items assessed participants’ self-reported age, income, racial identity, and HIV-status. Age was a continuous variable, and income, HIV-status, and race were categorical variables. Individual’s reported on their annual income by selecting the appropriate income bracket between <\$10,000 and >\$200,000. HIV-status was reported as HIV-positive or negative.

Race was reported as American Indian/Alaskan native, Asian/Pacific Islander, black, white (non-hispanic), hispanic, mixed race, or other race. Because of small cell sizes in some of the racial categories (e.g., American Indian/Alaskan Native, $n = 15$) and the theoretical reasoning that non-white men are generally socially disadvantaged compared to white men, participants were categorized as 0 (“Non-white”) or 1 (“White”).

Decision-Making Power Scale

A psychometrically sound scale developed to measure sexual relationship power in heterosexual women [47] was adapted for the larger study. Several items relevant to MSM were added (e.g., regarding condomless anal sex) and some of the original scale items were removed to reduce participant burden (e.g., those that loaded less strongly onto their respective factor in the original factor analysis, [48]). Item responses on the measure use a 5-point Likert scale ranging from “*Strongly Disagree*” to “*Strongly Agree*”. Items within the scale are worded relative to one’s partner, such that higher endorsements on an

item suggest the respondent perceives he holds greater control over an outcome. An example item is, “I make most of the important decisions that affect us.”

In preliminary factor analyses of the adapted 12-item scale, three subscales emerged: ‘Lack of power about barebacking’, ‘Power in condom negotiation’ and ‘Power in decision-making’ [49]. Given the theoretical basis for the current study and the proposed outcomes (i.e., sexual agreement investment and maintenance), only the ‘Power in decision-making’ subscale was used. This resulted in a final 7-item scale, showing good internal consistency (Cronbach’s $\alpha = 0.80$).

Sexual Agreement Investment

Investment in the sexual agreement was measured with the Sexual Agreement Investment Scale [50]. The original exploratory factor analyses indicated that the three subscales (Satisfaction, Commitment, and Value subscales) loaded onto one factor, ‘Sexual Agreement Investment’. The measure consisted of 13 items scored on a 5-point Likert scale from ‘Not at all’ to ‘Extremely’. The scale showed excellent internal consistency in the current sample (Cronbach’s $\alpha = 0.97$).

Sexual Agreement Breaks

Breaks to participants’ current sexual agreements were assessed with a single-item count of the number of times participants reported violating their current agreement in the past 12 months.

Disclosure of Sexual Agreement Breaks

Disclosure of breaks was measured with a single-item count of the number of reported breaks to their current agreement in the past year that participants informed their primary partner about.

Analysis Plan

The current study used multilevel modeling to account for the interdependence in the data set, introduced by having data from both partners [51].

Demographic Predictors

Within our multilevel models, we included the couples’ average on the variable across partners at Level 2 for continuous demographic variables (e.g., age, income, decision-making power). These variables were centered on

the average for all couples (i.e., grand mean centered). For individual partners, we included each partner’s difference from the couple’s average (or delta) at Level 1 (i.e., group mean centered). By doing so, partners who are older or make more money had a positive delta, whereas younger partners or partners who make less money had a negative delta.

For dichotomous variables (HIV-status, race), we included a couple-level variable (Level 2) denoting whether couples are the same or different on the variable of interest. HIV-concordant couples were coded 0 and HIV-serodiscordant couples were coded 1. Similarly, couples were coded as both partners being white or both being non-white or as couple with a white male partner and a non-white partner. We also included a participant’s HIV-status or race at Level 1. Participants’ HIV-status and race were coded as 0 (HIV-negative; non-white) and 1 (HIV-positive; white).

Finally, we also explored cross-level interactions between HIV status concordance and the individual partner’s HIV status in relation to each agreement outcome. For example, with respect to agreement investment this addressed whether the association between partner’s HIV status and agreement investment differ between couples who are seroconcordant and serodiscordant. We ran similar interactions for race (i.e., do associations with agreement outcomes differ on the basis of a couple being white-non-white versus white/white or non-white/non-white?). For our continuous predictors, these interactions tested whether the effects of differences in age or income between members of the couple differed as a function of the couple’s average age or income-level (e.g., is an age difference of 5 years more important to the functioning of a younger couple than an older couple?). However, we did not hypothesize a priori about significant effects for these cross-level interactions.

Testing the Effects of Demographics and Decision-Making Power

To assess the associations between demographic bases of power, decision-making power, and agreement outcome, we used a series of multilevel equations for each outcome. An example set of our multilevel equations for Hypothesis 1 with income as the predictor is:

Level 1 Sexual agreement investment_{ij} = β_{0j} + β_{1j} * couple mean-centered individual income + r_{ij}

Level 2 β_{0j} = γ_{00} + γ_{01} * couple grand mean-centered average income + u_{0j}

β_{1j} = γ_{10} + γ_{11} * couple grand mean-centered average income

We first tested each agreement outcome by running individual models that predicted each outcome from each individual demographic base of power (or decision-making power) at both levels. Next, for our hypothesis that decision-making power would explain some of the association between agreement outcomes and demographic bases of power, we carried forward all the power variables (demographic bases of power and decision-making power) that were significant in independent models into a full, multivariable model for that outcome.

Our final analysis included the cross-level interactions (dyad-level \times partner-level) of the demographic predictors. Cross-level interactions were first examined in independent models and, if significant, were then tested in the multivariable model for that outcome.

For count outcomes (i.e., breaks in agreements, break disclosure), we used an inflated Poisson distribution to avoid violating assumptions of the distribution of the outcome [52]. Results for these models are reported in event rate ratios (ERR), which is an estimation of the change in the event-rate of the outcome based on a 1-unit change in the predictor. An $ERR > 1$ indicates an increase in the event-rate of the outcome, whereas an $ERR < 1$ would indicate a decrease in the event-rate.

We ran all multilevel models in HLM 7.0 [53]. All results are reported with robust standard errors and from population-average models (where appropriate). All results were considered significant at $p < 0.05$.

Results

Descriptive statistics and intercorrelations among study variables are reported in Table 1. We first describe the results of the independent multilevel models for each outcome. We then report the results of the multivariable multilevel model for each outcome, which included all predictors significantly associated with the respective outcome in independent models.¹

Agreement Investment

We hypothesized that partners with lower social status and less decision-making power relative to their partner would

be more invested in their agreement. Specifically, individuals who are younger, report lower income, or report less decision-making power than their partner would have higher levels of agreement investment, as will HIV-positive and non-white men.

Both the independent and full multivariable models for sexual agreement investment are reported in Table 2. With respect to investment in the sexual agreement, results from the independent multilevel models indicated that, at the dyad-level level, men in couples with higher average decision-making power were significantly less invested in their agreements. Between partners, older partners reported greater investment than younger partners.² The cross-level interaction between couples' HIV status composition and respondent's HIV status was also significant. Simple slopes analysis of this effect demonstrated that men in concordant HIV-negative relationships were significantly more invested than men in concordant HIV-positive relationships ($B = -4.169$, $SE = 0.836$, $p < 0.0001$). However, within HIV serodiscordant relationships, partners were not significantly different in terms of their investment ($B = -0.757$, $SE = 1.22$, $p = 0.538$). Neither couple-level nor partner-level race nor income was associated with agreement investment. Additionally, no other cross-level interactions were significant in the independent models.

Results from the full, multivariable model indicated that significant predictors remained largely unchanged from the independent models (see Table 2). The cross-level interaction for HIV status remained significant and the pattern of simple slopes remained the same. Men in concordant HIV-negative relationships were significantly more invested than men in concordant HIV-positive relationships ($B = -4.169$, $SE = 0.836$, $p < 0.0001$). In contrast, within HIV serodiscordant relationships, partners were not significantly different in terms of their investment ($B = -0.757$, $SE = 1.22$, $p = 0.538$).

Breaks in Agreements

We hypothesized that partners with higher social status and decision-making power would self-report breaking their agreements more often, whereas partners with less social status and decision-making power relative to their partner would be less likely to break their agreements.

The independent and full multivariable models of agreement breaks are reported in Table 3. Results from the independent multilevel models for breaks to the agreement demonstrated that as couples' average income increased, so

¹ We note that other published papers have reported on breaks to agreements by couple's HIV serostatus elsewhere [26, 29], as well as on agreement investment [19, 26], using subsets of the current dataset. However, the current paper is the first to publish these results using the full dataset of all participants, to examine the interaction of individual and couple-level serostatus, and to examine these effects in multivariable models controlling for other relevant demographic bases of power.

² Models including age were also run controlling for relationship length. However, the significance and pattern of our results remained largely unchanged, so we chose to present the results for models without relationship length included.

Table 1 Means and individual and dyad-level correlations of study variables (N = 566 couples; 1132 men)

Variable	Mean (SD)	Power	Income	Age	Race	HIV status	Agreement investment	Agreement breaks	Break disclosure
Power	16.69 (4.42)	–	–0.187**	–0.067*	0.053	0.031	–0.142*	0.126*	0.086
Income	4.02 (2.28)	0.138**	–	0.101**	–0.039	–0.037	0.040	–0.002	–0.036
Age	41.74 (11.44)	0.016	0.147**	–	–0.211**	0.110**	–0.047	–0.119*	0.029
Race	0.66 (.48)	–0.053	0.017	0.134**	–	–0.071*	0.026	–0.005	–0.072
HIV status	0.34 (.47)	0.012	–0.063*	0.029	–0.063*	–	–0.004	0.003	–0.016
Agreement investment	40.78 (9.09)	–0.049	–0.025	–0.079*	–0.063*	–0.159**	–	–0.244**	–0.075
Agreement breaks	3.15 (7.38)	–0.026	–0.094	–0.132**	0.037	0.095	–0.244**	–	0.374**
Break disclosure	1.00 (3.58)	0.053	–0.081	–0.007	0.047	0.151*	–0.075	0.374**	–

Individual-level correlations are reported below the diagonal and dyad-level correlations are reported above the diagonal

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

Table 2 Independent and multivariable multilevel results of demographic and power predictors of sexual agreement investment (N = 566 couples)

	Independent models		Multivariable model	
	B	SE of B	B	SE of B
Level 2 (between-couple)				
Income	0.143	0.176	–	–
Age	–0.040	0.030	–0.034	0.030
Race	–0.048	0.699	–	–
HIV-status	–0.704	0.921	–0.335	0.946
Power	–0.398***	0.101	–0.337***	0.101
Level 1 (within-couple)				
Income	–0.173	0.204	–	–
Age	0.139*	0.055	0.139*	0.055
Race	–1.05	0.686	–	–
HIV-status	–4.103	0.874	–3.52	0.904
Power	–0.135	0.086	–0.140	0.087
Cross-level interactions (L2 × L1)				
Income	0.012	0.160	–	–
Age	0.008	0.006	–	–
Race	–0.420	1.47	–	–
HIV-status	3.71*	1.47	3.02*	1.49
Power	0.038	0.027	–	–

When cross-level interactions were not significant, they were removed from the model and independent effects at Level 1 and Level 2 are reported instead

– Indicates predictors that were not significant in independent models and therefore not carried forward

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

did breaks to their agreements. Additionally, couples whose average age was older reported fewer breaks to their agreements. Between partners, men who earned more than their partner reported fewer breaks to the agreement. Older men also reported breaking their agreement less than their partner. Lastly, couples' racial composition (white or

minority couples vs. white-non white couples) significantly interacted with men's own race. Simple slopes analysis of the interaction effect revealed that non-white men in minority couples and white men in white couples did not significantly differ in their number of breaks ($B = -0.581$, $SE = 0.342$, $p = 0.090$). However, in white-minority

Table 3 Independent and multivariable multilevel results of demographic and power predictors of breaks to the sexual agreement (N = 566 couples)

	Independent models			Multivariable model		
	B	ERR	95 % CI	B	Adj. ERR	95 % CI
Level 2 (between-couple)						
Income	0.108*	1.11	(1.02, 1.22)	0.143**	1.15	(1.06, 1.26)
Age	−0.047***	0.95	(0.94, .97)	−0.047***	0.95	(0.94, .97)
Race	−0.716	0.49	(0.23, 1.05)	−0.758	0.47	(0.24, .91)
HIV-status	−0.298	0.74	(0.43, 1.27)	–	–	–
Power	0.101	1.11	(1.00, 1.23)	–	–	–
Level 1 (within-couple)						
Income	−0.204*	0.82	(0.68, .97)	−0.128*	0.880	(0.78, 1.00)
Age	−0.090***	0.91	(0.87, .96)	−0.087***	0.92	(0.88, .95)
Race	−0.412	0.66	(0.27, 1.60)	−0.373	0.69	(0.33, 1.44)
HIV-status	0.533	1.70	(0.95, 3.07)	–	–	–
Power	−0.015	0.98	(0.90, 1.07)	–	–	–
Cross-level interactions (L2 × L1)						
Income	−0.046	0.95	(0.86, 1.06)	–	–	–
Age	0.003	1.00	(1.00, 1.01)	–	–	–
Race	1.049*	2.86	(1.01, 8.05)	1.04*	2.84	(1.23, 6.57)
HIV-status	0.139	1.15	(0.37, 3.56)	–	–	–
Power	−0.018	0.98	(0.95, 1.01)	–	–	–

When cross-level interactions were not significant, they were removed from the model and independent effects at Level 1 and Level 2 are reported instead

– Indicates predictors that were not significant in independent models and therefore not carried forward

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

relationships, white men broke their agreements significantly more often than non-white men ($B = 0.674$, $SE = 0.102$, $p < 0.001$). Between-partner decision-making power was not significantly associated with breaks. Additionally, neither couple-level nor partner-level HIV status was significantly associated with breaks to the agreement. Last, no other cross-level interactions were significant.

Results from the full, multivariable model indicated that significant predictors remained largely unchanged from the independent models (see Table 3). The cross-level interaction for race continued to be significant and the pattern of results for simple slopes remained the same. White men in relationships with other white men and minority men partnered with minority men (i.e., white and minority couples) did not significantly differ from one another in the number of breaks ($B = -0.581$, $SE = 0.342$, $p = 0.090$). However, in white-minority relationships, white men broke their agreements significantly more often in the past year than non-white men ($B = 0.674$, $SE = 0.102$, $p < 0.001$).

Break Disclosure

We hypothesized that men with higher social status or decision-making power relative to their partner would disclose breaks in their agreements to their partners more often, whereas partners lower in status or decision-making

power would be less likely to disclose to their partners. Results from both the independent and full, multivariable multilevel models for disclosure of breaks to the agreement are reported in Table 4. The models for break disclosure excluded couples where both partners had either not broken their agreement in the past year or had never broken their agreement since these couples would not have a recent break to report and would therefore not be able to contribute any variance to the disclosure outcome. These models also controlled for the number of recent agreement breaks to exclude the potential for the number of opportunities to disclose a break to confound our results.

Independent models indicated that couple-level income was significantly negatively associated with disclosure of breaks. Additionally, couples whose average decision-making power was higher reported more frequent disclosure of breaks to their agreements. Between partners, men who earned more than their partner reported disclosing breaks less often. HIV-positive men were significantly more likely to disclose breaks to their agreements. Couples' average age, as well as the couples' racial and HIV status composition, were not significantly related to disclosure. Further, men's age and decision-making power relative to their partner, and their own race were not significantly associated with disclosure. Additionally, no cross-level interactions were significant in independent models.

Table 4 Independent and multivariable multilevel results of demographic and power predictors of sexual agreement break disclosure (N = 175 couples)

	Independent models			Multivariable model		
	B	ERR	95 % CI	B	Adj. ERR	95 % CI
Level 2 (between-couple)						
Income	−0.139*	0.87	(0.77, 0.98)	−0.098	0.91	(0.91, 1.02)
Age	0.012	1.01	(0.99, 1.03)	–	–	–
Race	−0.116	0.89	(0.55, 1.44)	–	–	–
HIV-status	−0.196	0.82	(0.49, 1.38)	−0.166	0.85	(0.54, 1.34)
Power	0.074**	1.08	(1.02, 1.14)	.059*	1.06	(1.01, 1.12)
Level 1 (within-couple)						
Income	−0.135*	0.87	(0.77, 1.00)	−0.159*	0.85	(0.74, .99)
Age	0.003	1.00	(0.96, 1.05)	–	–	–
Race	0.060	1.06	(0.74, 1.53)	–	–	–
HIV-status	0.737**	2.09	(1.32, 3.32)	0.598**	1.82	(1.18, 2.81)
Power	0.056	1.06	(.98, 1.14)	0.063	1.06	(0.99, 1.15)
Cross-level interactions (L2 × L1)						
Income	0.013	1.01	(0.90, 1.14)	–	–	–
Age	−0.001	1.00	(1.00, 1.00)	–	–	–
Race	−0.228	0.80	(0.24, 2.63)	–	–	–
HIV-status	−0.568	0.57	(0.17, 1.89)	–	–	–
Power	−0.001	1.00	(0.98, 1.02)	–	–	–

When cross-level interactions were not significant, they were removed from the model and independent effects at Level 1 and Level 2 are reported instead

All models controlled for number of breaks in the past year

– Indicates predictors that were not significant in independent models and therefore not carried forward

Models restricted to couples where at least one partner had broken their agreement within the past year

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Results from the full, multivariable model indicated that significant predictors remained largely unchanged (see Table 4), with the exception of couples' average income, which was no longer significantly associated with disclosure.

Discussion

Findings from the current study suggest that, contrary to hypotheses, relative decision-making power within the relationship was not predictive of sexual agreement functioning in gay male couples. However, differences in demographic bases of power (i.e., age, race, income, HIV status) between partners had significant associations with agreement investment and maintenance above and beyond associations with decision-making control. Specifically, older partners were more invested in their agreements. Younger partners and men who earned less than their partner reported greater numbers of breaks to their agreement. White men in white-minority relationships also broke their agreements more often, although men in white couples and non-white men in minority relationships did not significantly differ from one

another. Lastly, men who earned less than their partner were more likely to disclose having broken their agreement, as were HIV-positive men compared to HIV-negative men.

The demographics we explored in the current study are often assumed to create power differentials within couples (e.g., [41, 43]). Our findings demonstrated that demographic bases of power displayed significant associations with agreement outcomes, independent of decision-making power (which was unrelated to agreements), and thus their effects on sexual agreement outcomes could not be attributed to this dimension of power. Moreover, the overall pattern of associations we observed was also inconsistent with what would be expected based on the heterosexually-focused literature on how demographic bases of power operate (e.g., the idea that an older partner always has more power). We suggest that the effects we observed for demographics might reflect unique ways in which power or social status is derived from demographic characteristics in the cultural context of the gay community. For example, having an older male partner has different cultural meaning in the context of a heterosexual couple versus a gay male couple, resulting in different kinds of power that gets conferred to the older or younger partner in the gay male

community relative to the heterosexual community. This could explain the divergence of our findings from expectations based on heterosexual couples.

Given the specificity of the self-report scale of decision-making power, our results cannot speak to other types of power that could influence sexual agreement maintenance. It is likely that other specific kinds of interpersonal influence that are more proximal to the behaviors that sexual agreements govern, such as sexual power, have unique influences on sexual agreements. Indeed, exploratory factor analyses of the full power scale within our sample had suggested two additional factors related to power and sexual behavior: lack of power in barebacking and power in condom negotiation. These factors were unstable (i.e., comprised of too few items to be considered reliable), which precluded further analysis with them in the current study. However, these preliminary results could suggest that among gay men power related to sex is distinct from other forms of influence on one's partner within relationships and likely has effects on sexual agreements distinct from other decision-making power.

In addition, the pattern of results across agreement-related outcomes was not always consistent. For example, HIV status was associated with agreement investment and break disclosure, but not specifically breaks to the agreement. The agreement outcomes we selected were chosen for their collective relevance to condomless sex, but this does not imply that the social and psychological processes that lead to each agreement outcome are necessarily related or even similar. For example, the processes that lead someone in a closed relationship to have sex with an outside partner (e.g., opportunity, dissatisfaction, arousal) may be very different than those that influence his decision whether to communicate honestly about that transgression with one's partner (e.g., safety, trust, importance of honesty). Thus, it might have been unrealistic for us to expect that power would influence each agreement outcome in a uniform manner. Certainly, future research is needed to better understand how different components of sexual agreements among gay couples interrelate.

Nevertheless, the significant associations we found between demographic characteristics and sexual agreement investment, breaks, and break disclosure are still important for couples' successful management of their non-monogamy. We offer some possible explanations for these findings as a means of offering testable hypotheses for future research efforts. Specific to the effect of HIV status, although we observed differences in HIV-positive and HIV-negative men in their agreement investment when they were in seroconcordant relationships (HIV-negative men were more invested in their agreements), there was not a statistically significant difference between HIV-positive and

HIV-negative partners' investment within serodiscordant couples. Although the sexual health needs of each partner differs within serodiscordant relationships, HIV-positive men may still value the protective health benefits the agreement affords their partner. Further, qualitative research among gay men has found that both HIV-negative and HIV-positive partners in serodiscordant relationships were committed to components of their agreements that helped their partner use safer sex strategies outside the relationship [13]. It is possible that these multiple functions of agreements operate to keep both partners in serodiscordant relationships equally invested in its maintenance.

HIV-positive men in general (irrespective of couples' HIV status concordance) were also more likely to disclose breaks in an agreement when they occurred. HIV-positive men may have more experience than negative men with discussing difficult sexual topics, such as disclosure of HIV status. These skills might generalize to disclosure of breaks, facilitating those conversations. Specific to our sample, individuals were required to be aware of their partner's HIV status, suggesting that at least one such conversation had already taken place.

Our findings on the effects of HIV-status diverge somewhat from other studies of gay male couples. Mitchell and Horvath [54] did not find an effect for couples' HIV status on agreement investment. However, their sample had relatively few serodiscordant or concordant positive couples and these serostatus types were combined in analyses. In another study of partnered MSM surveyed online [12], no effect was found for an individual's HIV status on agreement investment, but participants did not report on their partner's HIV status. Thus, our results, in conjunction with these other empirical findings, emphasize the importance of understanding how an individual's HIV status affects the sexual agreements of a couple as a function of the couple's HIV concordance.

Age differences between partners were significantly associated with investment in the sexual agreement and episodes of breaking that agreement, with older partners being more invested in and less likely to break their agreements. These results might indicate specific developmental differences that influence perceptions of the agreement. For example, older men may have had more romantic relationship experience and as a result differently appreciate the value of having such an agreement in place to protect the relationship. Alternatively, older partners may feel that investment in their agreement is a way of strengthening and maintaining their relationship, particularly within the gay community, where youth confers significant social status and younger partners may have greater sexual opportunities [55]. Similar processes may explain the finding that older partners break agreements less frequently.

Income differences between partners were predictive of breaks to the agreement, as well as disclosure of breaks, such that lower-earning men were more likely to break their agreement and more likely to disclose such breaks. Multiple theories of close relationships, including self-expansion [56] and social exchange theory [57], suggest that individuals are attracted to and seek out romantic partners with complementary social resources. These theories might expect that men with higher incomes would partner with lower-earning men because of some other attractive quality of that partner (e.g., physical appearance or interpersonal charm). This attractive quality could provide the lower-earning partner with appeal to others outside the relationship and could consequently facilitate breaking their sexual agreement. Following the same reasoning for disclosure of breaks, the lower earning partner may feel more empowered to disclose their breaks in the agreement as a function of their own social resources independent of income.

Alternatively, higher earning partners may make their agreement more permissive, or lower earning partners may break and disclose breaks more often, as a way of correcting the imbalance of power within the relationship created by their income disparity. However, these suggested explanations could not be tested using our current data and merely provide ideas that could be explored in future research.

Lastly, individual's race was only predictive of breaks to the agreement, such that, in white-minority relationships, white men broke their agreements more often than their non-white partners. Non-white men often face various forms of discrimination in the gay community, explicitly establishing their perceived lower social status [56]. This discrimination, and associated low status, may then serve as a barrier to non-white sexual minority men meeting as many outside sexual partners as their white primary partner. Alternatively, if white men have more permissive cultural views regarding non-monogamy and thus view committed relationships as more flexible with respect to sex with outside partners, they may commit breaks more easily. Indeed, within our sample a higher proportion of white men (50.4 %) than non-white men (35.3 %) reported having a sexually open agreement, which may reflect different cultural views regarding monogamy. However, there is limited research to date on cultural norms regarding monogamy among sexual minority men.

Limitations

While the current study has identified several characteristics of gay male couples relevant to the management of their sexual agreements, these findings are best understood within the context of the study's limitations. Although these demographic characteristics have significant associations with sexual agreement outcomes, we did not have

data available to test some of the cultural and developmental mediators of these effects that we proposed in discussion of our findings. The cross-sectional nature of the data also precludes any kind of causal inference. Therefore, we can only suggest possible causal mechanisms (e.g., that different perceptions of sexual attractiveness within the gay community explain associations between age differences and agreement breaks). We raise these possible explanations cautiously, given we did not have data to empirically test them. However, given that the field currently has a limited understanding of how demographic differences might affect non-monogamy and HIV risk, we include these possibilities as a means of generating scientific interest in better explicating the associations we found. Examining potential mediating variables for our findings certainly deserves study in future research.

Our variable regarding breaks to the agreement only captured whether men had broken any rule of their agreement in the past year, not which rule they broke. Although many agreements include rules about condomless sex, and breaks to these rules likely comprise some portion of the breaks reported by men in our study, agreements also include rules unrelated to sexual health (e.g., no overnights with a partner). Some of the breaks reported could have been violations of those rules, and thereby had fewer implications for HIV risk. This limitation is shared with other related studies (e.g., 16, 30) and suggests that future research should more explicitly assess which rules are broken and by which partner.

Although models for disclosure of breaks to the sexual agreement included a substantial number of couples ($N = 175$), they were less statistically powered than other models in the study because they included only a subsample of couples (i.e., those who had a break to disclose). Thus, results for those models should be treated with some caution and require replication in larger samples.

Measurement within the study relied strictly on self-report and so common method variance, as well as other social desirability biases, may have affected the results. The current study also employed a convenience sample that was recruited in a relatively small geographic area with a strong liberal political atmosphere. Further, the sample was collected approximately 10 years ago and attitudes towards gay male couples have become increasingly more accepting since the time of data collection. Thus, our findings might not extend to all same-sex male couples.

Conclusion

Despite these limitations, the current study offers important information about the function of sexual agreements among diverse, same-sex male couples and has implications for

their HIV acquisition and transmission. Couples whose demographic background suggests they may experience difficulty in maintaining investment in their sexual agreements would likely benefit from HIV prevention interventions that incorporate a relationship focus and explicitly address dynamics around non-monogamy. Similarly, interracial couples and those couples who have large age or income discrepancies may be particularly important to include in HIV prevention efforts given that we found associations between these demographics and breaks to their agreements.

Increasing disclosure of breaks could also be used as a means of promoting HIV testing for same-sex male couples. Recent research has documented that partnered MSM are tested for HIV at very low rates, even following their own engagement in condomless sex [31, 32]. However, such research has not examined whether discussion between partners about one's own or their partner's sexual risk behavior is related to HIV testing. Prevention efforts could promote discussion between partners about agreement breaks, specifically breaks involving condomless sex with outside partners, to motivate couples to seek out testing together. Our findings suggest that income discrepancies and HIV status, in particular, may play important roles in the process of break disclosure. Testing promotion strategies that specifically target HIV-negative men and income-discrepant couples, who we found disclose less often, may be especially valuable as the rollout of voluntary couples HIV counseling and testing expands (CVCT; [59]).

Results from this study suggest that, beyond certain relationship factors, various social, cultural, and developmental processes might influence how same-sex male couples navigate non-monogamy. HIV prevention strategies designed for partnered MSM must attend to their sexual agreements regarding non-monogamy, and better understanding factors that influence agreements may guide adaptations to existing prevention efforts. The current study has highlighted characteristics that may help identify couples at risk for experiencing challenges in their agreements and, subsequently, be at increased risk for HIV transmission. Future research is needed to expand on our findings and identify processes explaining these associations that can be usefully addressed in HIV prevention interventions for same-sex couples.

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