

Closeness Discrepancies and Intimacy Interference: Motivations for HIV Prevention Behavior in Primary Romantic Relationships

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Abstract

Relational closeness has been positively associated with relationship quality and mental health; however, desire for closeness and intimacy in a relationship may also motivate sexual risk-taking, that is, forgoing condom use. This study examined the impact of desiring more closeness with a primary partner (i.e., motivation for reducing closeness discrepancies) on HIV prevention behavior. Using pre-exposure prophylaxis (PrEP) as a case study, we examined the extent to which closeness discrepancies motivate behavioral intentions (Study 1) and actual behavior (Study 2). In both studies, desiring more closeness and believing that condoms interfere with intimacy were independently positively associated with PrEP adoption. Understanding the relational needs for closeness and intimacy in motivating prevention behavior is critical for social psychology, relationship science, and public health efforts to improve sexual health.

Keywords

closeness, discrepancies, relationships, HIV prevention, pre-exposure prophylaxis

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Relational Closeness and Closeness Discrepancies

Relational closeness has been found to play an important role in determining relationship quality, and can have significant beneficial impacts on mental health and psychological well-being. One of the most influential theoretical perspectives on relational closeness is self-expansion theory (Aron, Aron, & Smollan, 1992; Aron, Mashek, & Aron, 2004), which operationalizes relational closeness as the degree to which individuals “expand” their own self-concept to include relationship partners. In a close and expanded self, an individual includes their partners’ resources (e.g., knowledge or assets), perspectives (e.g., cognitive biases or world view), and identities (e.g., characteristics or memories) into their own sense of self (Aron, Mashek, & Aron, 2004). This conceptualization of relational closeness as self-expansion is rooted in the two core tenets of the theory: (a) self-expansion is a central human motive and (b) we fulfill self-expansion motives by forming close relationships that allow us to incorporate others’ resources, perspectives, and identities into our self-concept (Aron, Aron, & Norman, 2001).

The Inclusion of Other in Self (IOS) Scale is a pictorial representation of relational closeness in which individuals choose among increasingly overlapping Venn diagrams to

represent the degree of perceived overlap between themselves and their partner (Agnew, Loving, Le, & Goodfriend, 2004; Aron, Mashek, & Aron, 2004; Aron, McLaughlin-Volpe, et al., 2004). The IOS has demonstrated convergent validity with scale-based closeness and intimacy measures, convergent and construct validity with measures of relationship satisfaction and commitment, and predictive validity for relationship longevity (Aron et al., 1992; Tsapelas, Aron, & Orbach, 2009). Studies using the IOS have demonstrated that higher scores on this measure are associated with greater relationship commitment (Agnew, Van Lange, Rusbult, & Langston, 1998) and lower rates of relationship dissolution over time (Le, Dove, Agnew, Korn, & Mutso, 2010; Tsapelas et al., 2009).

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However, not every individual attains their ideal degree of relational closeness with a romantic partner. Drawing on Robins and Boldero (2003) application of self-discrepancy theory (Higgins, 1987) to close relationships, *closeness discrepancy* refers to a situation in which there is a mismatch between a person's actual and ideal level of closeness with a relationship partner. Similar to the ways in which individuals are motivated to reduce discrepancies between their actual and ideal selves, relationship partners are motivated to reduce closeness discrepancies in their relationship. Lower levels of closeness discrepancy—and reducing closeness discrepancies over time—are associated not only with better relational well-being, but also with greater individual mental health. In fact, lower closeness discrepancies are associated with positive relational and mental health outcomes regardless of the individual's overall degree of closeness with a romantic partner (Frost & Forrester, 2013). In this research, closeness discrepancies are measured in terms of distance from zero (i.e., no discrepancy), with negative effects on relationships observed for both those who feel too close to their partner (i.e., desiring less closeness) or not close enough (i.e., desiring more closeness).

Closeness Discrepancies and Sexual Intimacy

Although reducing closeness discrepancies is associated with positive relational and mental health outcomes, little research has been conducted on the specific strategies individuals use to reduce them. Sexual behavior is an integral part of most close romantic relationships, and sexual intimacy is a medium through which closeness can be achieved and/or maintained (Davis, Shaver, & Vernon, 2004). Sexual intimacy and satisfaction have been linked directly to love and commitment (Sprecher, 2002; Sprecher & Regan, 1998; Yela, 2000), as well as to greater relationship quality and stability (Hassebrauck & Fehr, 2002; Sprecher & Cate, 2004). Satisfying sexual encounters have been shown to produce positive emotions, which contribute to greater intimacy and relationship quality; dissatisfying sexual encounters can be a source of conflict that places strain on intimacy and relationship quality (Birnie-Porter & Lydon, 2013; Sprecher & Cate, 2004). These findings suggest that sexual intimacy may play an important role in reducing closeness discrepancies in romantic couples, especially for those who desire more closeness with a relational partner.

In support of this idea, data suggest that *sexual* self-expansion, that is, the relative degree of self–other overlap in the sexual domain, may be important for sexual relationships and sexual satisfaction (Birnie-Porter & Lydon, 2013; Ferreira, Narciso, Novo, & Pereira, 2014). Frost, McClelland, and Dettmann (2017) used both the standard IOS and an adapted sexual IOS Scale to assess general and sexual closeness discrepancies between romantic partners. There were significant positive associations between the two measures,

and smaller sexual closeness discrepancies were significantly associated with sexual satisfaction and well-being (Frost et al., 2017)

Sexual Intimacy, Closeness Discrepancies, and Condom Use

Both heterosexual and gay couples report that condom use can disrupt sexual intimacy, as condoms are perceived as a literal “barrier” between individuals (Adam, Sears, & Schellenberg, 2000; Jadack, Fresia, Rompalo, & Zenilman, 1997). Men report that condoms pose a major barrier to sexual satisfaction and sexual intimacy (Cusick & Rhodes, 2000; Frost, Stirratt, & Ouellette, 2008; McNeal, 1997), and desire for greater closeness and intimacy are among the most potent motivators for foregoing condoms with a partner (Malebranche, Fields, Bryant, & Harper, 2009). Intimacy interference beliefs, that is, assumptions that condoms necessarily reduce intimacy with a partner, have been identified as a significant barrier to condom use, and in some cases are an even stronger negative predictor of condom use than the belief that condoms disrupt sexual pleasure (Newcomb, Ryan, Garofalo, & Mustanski, 2014; Starks, Payton, Golub, Weinberger, & Parsons, 2014). Public health messaging has also created a strong association between condom use and partner mistrust; individuals are repeatedly told that the reason they must use condoms every time they have sex, even with primary romantic partners, is because you can never fully trust that another person is telling the truth about their outside sexual behavior.

As such, we might expect individuals who desire more closeness with a romantic partner to reduce or avoid condom use. In fact, many individuals report stopping condom use as soon as they consider themselves to be in a primary partnership (Purcell et al., 2014). In contrast to its positive impact on psychological well-being and relationship outcomes, reducing closeness disparities may be harmful to *physical* health if it is achieved through a strategy that increases HIV risk. Two large-scale studies indicate that between one third and two thirds of new HIV infections among gay men can be linked to a primary romantic partner (Goodreau et al., 2012; Sullivan, Salazar, Buckbinder, & Sanchez, 2009). In this context, closeness motives and prevention motives have been set up to directly contradict each other—in a type of HIV prevention paradox. Although the public health community is trying to encourage condom use by warning individuals that they cannot fully trust their sexual partners, this very message may actually discourage condom use among individuals who are motivated to build trust and intimacy within their relationship.

To date, the concept of closeness discrepancies and its potential association with condom use has not been well incorporated into theories of health behavior most commonly applied to HIV prevention. The Theory of Reasoned Action (Ajzen & Fishbein, 1977) and the Theory of Planned Behavior

(Ajzen, 1991) focus on individual-level attitudes and understanding of subjective norms, arguing that these combine with perceived behavioral control to form intentions to engage in a particular health behavior. Although subjective norms are understood to arise from the social context in which an individual operates, relational factors, including attitudes toward condom use directly related to their role in subverting or maintaining intimacy, have not been incorporated into research applying the model. The Information Motivation-Behavioral Skills (IMB) Model (Fisher & Fisher, 1992) includes both personal and social motivation for engaging in health behavior, and the authors developed a relationship-oriented IMB (Misovich, Fisher, & Fisher, 1997), which mentions both interdependence theory and self-expansion theory, acknowledging that relationship enhancement motives may directly contradict prevention motives. However, tests of the model have been limited, and have focused on partner attitudes toward condoms (Harman & Amico, 2009) or incorporating measures of relationship satisfaction (Macapagal, Greene, Andrews, & Mustanski, 2016). More research is needed to better utilize relationship theories—and closeness discrepancies in particular—to inform theories of health behavior, especially those related to sexual health and HIV prevention.

Closeness Discrepancies and Pre-Exposure Prophylaxis (PrEP)

HIV PrEP is an emerging HIV prevention technology that can serve as strategy for circumventing this HIV prevention paradox. PrEP is a Food and Drug Administration (FDA)-approved once-daily pill that, when taken consistently, lowers the risk of HIV infection by over 98% (Volk et al., 2015). PrEP separates the act of HIV prevention from the act of sexual intimacy, allowing for barrier-free sexual closeness, while still protecting individuals against HIV infection. In this context, closeness and prevention motives can remain aligned. Condomless sex can be used as a strategy for increasing intimacy and decreasing closeness discrepancy without sacrificing sexual health. To the extent that individuals are motivated to adopt PrEP to overcome the HIV prevention paradox, then intimacy interference barriers to condom use and desires for more closeness should be important factors in PrEP decision making and uptake. Self-expansion theory has not previously been directly applied to understand sexual behavior and motivations for condomless sex within romantic relationships. However, the theory has tremendous utility for understanding how reducing closeness discrepancies may motivate sexual behavior patterns that increase—or decrease—HIV-related risk.

The Current Study: Aims and Hypotheses

The current study extends the research on closeness discrepancies by focusing on its potential impact on behavior. Understanding the specific strategies that relationship partners

use to decrease closeness discrepancies is an important next step for the application of self-expansion theory to behavioral outcomes. The current study focuses on sexual behavior, because of its importance and value for intimacy in romantic relationships and the need for theoretical frameworks, which address relationship motives that may be critical for promoting the uptake of HIV prevention strategies. Individuals with negative closeness discrepancies, that is, those who desire more closeness with a romantic partner, should be motivated to avoid condom use, especially to the extent that they believe that condoms interfere with intimacy. However, these same individuals should also be motivated to adopt PrEP, because it is a risk reduction strategy that protects them from HIV infection even during condomless sex. Past research has underscored the positive effects of reducing closeness discrepancies on psychological health and relational well-being; this would be the first study to examine its potential benefits as a motivator of positive health behavior.

The current study hypothesized that desiring more closeness with a romantic partner would be positively associated with both PrEP adoption intentions (Study 1) and actual PrEP uptake (Study 2). We further hypothesized that intimacy interference beliefs about condom use would be positively associated both PrEP adoption intentions and behavior, and that these beliefs would intensify (i.e., moderate) the association between desiring more closeness and PrEP uptake.

Study 1

Method

Participants and procedures. A convenience sample of HIV-negative gay and bisexual men in same-sex relationships ($n = 51$) completed interviews using computer-assisted self-interviewing technology at a research center as part of a larger project on PrEP messaging. The detailed methods of this study have been published previously (Golub, Gamarel, Rendina, Surace, & Lelutiu-Weinberger, 2013; Golub, Gamarel, & Surace, 2017). Participants were recruited in the New York City area using a combination of passive recruitment methods, active recruitment methods, and participant referral. Eligible individuals for this substudy were born male and identified as male, aged 18 years or above, self-reported an HIV-negative serostatus, reported that they had a primary male partner, and reported at least one act of condomless sex with a male partner in the last 30 days. Data for this article were collected between April 2013 and October 2013. All procedures were reviewed and approved by the Human Research Protections Program at the City University of New York.

Measures

Closeness discrepancy. The Inclusion of IOS Scale was used to measure how individuals conceptualized their own experiences

of relational closeness (Aron et al., 1992). The IOS is comprised of seven Venn diagrams with circles representing varying degrees of overlap; one circle is labeled as the self, and another circle is labeled as the partner. Participants are asked to select the diagram which best describes their relationship. Responses range from completely separate, nonoverlapping circles (1) to completely overlapping circles (7). The current study used a two-item approach, where one version of the scale assessed participants' actual (i.e., "current") levels of IOS and a second version assessed participants' *ideal* levels of IOS (Frost & Forrester, 2013). We then created a discrepancy score for each participant by subtracting their current level of IOS from their desired level. The discrepancy score ranged from -5.00 to 3.00 ($M = 1.22$, $SD = 1.40$). Higher scores indicate that the participant desired more closeness with their partner than they perceived actually experiencing; whereas, lower negative values indicate that the participant desired less closeness with their partner than they perceived actually experience. A value of 0 indicates that the participant reported that their actual and ideal levels of closeness matched.

Demographics. Participants were asked to report age, education, income, race/ethnicity, sexual identity, relationship length, and whether they were in a monogamous sexual agreement or one which permitted sex with outside partner. Participants also reported their partner's HIV status. Given the small number of participants who reported that they did not know their partner's HIV status, we collapsed those who reported that their partner was HIV-negative and unknown because PrEP may be a more viable option for men who are in a serodiscordant relationship in which there is a known threat of transmitting the virus from their HIV-positive partner if that partner does not have a detectable viral load (World Health Organization, 2015).

Perceptions that condoms interfere with intimacy (intimacy interference). Participants completed the four-item intimacy interference subscale of the Condom Barrier and Motivations Scale (Golub & Gamarel, 2016). The subscale measures the extent to which participants believe that condoms reduce intimacy and consider this intimacy interference to be a barrier to condom use. Response options ranged from 1 = *never feel* to 5 = *always feel* (example item: "Not using a condom with a partner shows him that I trust him," "A guy cumming inside of you is an expression of love"). The subscale demonstrated good psychometric properties in the current sample ($\alpha = .84$).

Perceived HIV risk. Participants were asked, "How likely do you think you are to get HIV in your lifetime?" Partners were asked to respond on a visual analog scale ranging from 0 (*not at all*) to 100 (*I will definitely get HIV in my lifetime*).

Sexual risk behavior. The timeline followback (TLFB) semistructured interview (Sobell & Sobell, 1993) modified for the

assessment of sexual risk behavior (Carey, Carey, Maisto, Gordon, & Weinhardt, 2001) was used to collect data for the previous 30 days. Using a calendar, interviewers asked participants to report alcohol use and sexual activity (anal intercourse; with or without a condom) by partner type (primary or casual) on each day of the preceding 30 days. An open sexual agreement does not in itself confer HIV transmission risk; HIV transmission risk occurs when one or both couple members engage in condomless anal sex with a casual partner and with each other (Hoff, Beougher, Chakravarty, Darbes, & Neilands, 2010; Hoff et al., 2009; Parsons, Starks, Gamarel, & Grov, 2012). Therefore, we created two dichotomous variables: (a) whether or not the participant engaged in condomless anal sex in the past 30 days with any casual partners and (b) whether or not the participant engaged in condomless anal sex in the past 30 days with their primary partner.

PrEP adoption intentions. Participants were asked how likely they would be to take PrEP if it were available for free. Consistent with prior research (Gamarel & Golub, 2015; Golub et al., 2013), responses were gathered on a 5-point scale. The item was highly positively skewed; therefore, we dichotomized the variable at the median, such that responses were classified into "likely to take PrEP" (i.e., those who responded with a 4 or higher, indicating that they would "probably" or "definitely" take PrEP) and "not likely to take PrEP" (i.e., those who responded with a 3 or below on the scale, indicating that they "might," "probably would not" or "definitely would not" take PrEP).

Data Analysis

Descriptive statistics were obtained for all variables included in the analyses, including the distribution of scale scores, with appropriate tests for normality. We then conducted correlation analyses using Pearson's correlation and Spearman's rank correlations to examine associations between desiring more closeness and covariates. Next bivariate analyses were conducted by fitting a series of logistic regression models to assess differences in PrEP adoption intentions. Finally, we fit a multivariable logistic regression to assess whether higher levels of closeness discrepancies and intimacy interference were associated with PrEP adoption intentions, over and above covariates.

Results and Discussion

The sample ranged in age from 19 years to 61 years ($M = 32.14$; $SD = 10.89$). As shown in Table 1, over half of the sample identified as a person of color: 35.5% Black, 21.6% Latino, and 3.9% Other. In total, 84.1% of the sample self-identified as gay and 11.8% self-identified as bisexual. The sample was relatively diverse in regard to socioeconomic status, with 34.0% reporting less than a bachelor's degree

Table 1. Sample Characteristics.

	Study 1 (n = 51)	Study 2 (n = 145)
	n (%)	n (%)
Partner HIV status		
HIV negative	37 (72.5)	84 (57.9)
HIV positive	12 (23.5)	48 (33.1)
Unknown	2 (3.9)	13 (9.0)
Race/ethnicity		
Black	18 (35.3)	16 (11.0)
Latino	11 (21.6)	29 (20.0)
White	20 (39.2)	77 (53.1)
Other	2 (3.9)	23 (15.9)
Education		
Less than bachelor's degree	34 (66.0)	50 (34.5)
Bachelor's degree or higher	17 (34.0)	95 (65.6)
Income		
Less than US\$ 20,000 annually	32 (62.7)	47 (32.4)
US\$ 20,000 or more annually	19 (37.3)	96 (66.2)
Sexual identity		
Gay	43 (84.3)	110 (75.8)
Bisexual	6 (11.8)	19 (13.1)
Other	2 (3.9)	16 (11.1)
Sexual agreement		
Monogamous	15 (39.4)	45 (31.0)
Open	36 (70.6)	100 (69.0)
One or more CAS acts with CP	18 (35.3)	102 (70.3)
One or more CAS acts with PP	36 (69.2)	74 (51.0)
PrEP adoption intentions	27 (52.9)	—
PrEP actual adoption	—	97 (66.9)
	M (SD)	M (SD)
Age	32.14 (10.89)	34.30 (8.96)
Relationship length, months	40.63 (69.11)	—
HIV risk perception	32.29 (23.95)	25.82 (25.18)
Actual closeness	4.45 (1.77)	4.13 (1.36)
Ideal closeness	5.51 (1.62)	5.23 (1.17)
Closeness discrepancy	1.22 (1.40)	1.10 (1.57)
Relationship commitment	—	19.95 (4.37)
Relationship satisfaction	—	20.59 (5.37)
Sexual satisfaction	—	2.51 (1.00)
Intimacy interference	2.53 (0.97)	2.41 (0.25)

Note. CAS = condomless anal sex; CP = casual partner; PP = primary partner; PrEP = pre-exposure prophylaxis.

and 62.7% reporting an annual income of less than US\$ 20,000 per year. Relationship length ranged from 1 to 267 months ($M = 40.63$, $SD = 69.11$). Nearly three quarters of the sample reported that their primary partner was HIV negative (72.5%) and 70.6% of the participants reported that they were not in a monogamous relationship. Over one third of the sample reported that they had engaged in condomless sex with casual partner and over two thirds reported that they had engaged in condomless sex with primary partner.

In addition, a little over half of the sample reported PrEP adoption intentions.

Bivariate Pearson's correlation coefficients and Spearman's rank correlations, which examine bivariate associations between closeness discrepancies, intimacy interference, and covariates are presented in Table 2. Greater closeness discrepancy scores were negatively correlated with greater actual closeness scores. Greater closeness discrepancy scores were positively associated with a reporting that a partner was HIV positive compared with HIV negative or unknown status. There were no significant bivariate correlations between closeness discrepancy and intimacy interference scores.

Bivariate and multivariable associations between closeness discrepancies, intimacy interference, covariates, and PrEP adoption intentions are presented in Table 3. In bivariate analyses, only greater closeness discrepancy scores, odds ratio (OR) = 3.60, 95% confidence interval (CI) = [1.01, 4.58], $p < .05$, and intimacy interference, OR = 1.32, 95% CI = [1.32, 2.37], $p < .05$, were significantly and positively associated with PrEP adoption intentions. Our final step was to examine whether closeness discrepancy scores and intimacy interference scores were significantly associated with PrEP adoption intentions, after statistically adjusting for sociodemographic (i.e., income and age) and potential covariates (i.e., relationship length, actual closeness scores). Results of the multivariable logistic regression model are also presented in Table 3. Closeness discrepancy scores remained significant such that for every one unit change in desiring more closeness, there was over a threefold increase in odds of positive PrEP adoption intentions, adjusted odds ratio (AOR) = 3.13, 95% CI = [1.08, 4.22], $p < .05$. In addition, higher levels of intimacy interference beliefs about condom use were associated with increased odds of PrEP adoption intentions, AOR = 1.24, 95% CI = [1.02, 2.05], $p < .05$. These results suggest that desiring more closeness and perceiving that condoms are a barrier to intimacy may play a role in men's decisions to take PrEP.

Study 2

In Study 1, we observed that greater closeness discrepancy scores (i.e., desiring more closeness) and intimacy interference beliefs about condoms were each associated with an increased odds of PrEP adoption intentions in *hypothetical* PrEP adoption scenarios. However, intentions do not always translate into behavior (Sheeran, 2002); thus, Study 2 was designed to examine whether a similar effect would be observed in the context of making real-life decisions about whether or not take PrEP. In addition, we were interested in the extent to which closeness discrepancies was uniquely associated with PrEP uptake beyond other relationship dynamics, such as commitment, relationship satisfaction, and sexual satisfaction. We hypothesized that regardless of the baseline level of perceived closeness or relationship

Table 2. Bivariate Correlations (Study 1, $n = 51$).

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Closeness discrepancy	—													
2. Actual closeness	-.59**	—												
3. Ideal closeness	.16	.55**	—											
4. Intimacy interference	.04	-.13	-.26	—										
5. Relationship length	-.20	.15	.02	.14	—									
6. HIV risk perception	-.11	.03	.04	.02	-.06	—								
7. Age	-.10	.03	-.01	-.02	.39**	.07	—							
8. HIV-positive partner	.28*	-.15	.07	.21	.06	-.28*	-.24	—						
9. Race/ethnicity	.15	-.05	-.13	.43**	.23	.00	.18	.23	—					
10. Less than bachelor's degree	.15	.13	.46**	-.11	-.16	.05	-.32*	.17	-.28*	—				
11. Less than US\$ 20,000	.24	.04	.43**	.12	-.24	.20	-.24	.08	-.14	.57**	—			
12. Monogamous agreement	-.09	-.02	-.14	.17	-.25	.03	-.13	-.06	.10	-.18	-.04	—		
13. Any CAS with CP	.19	-.10	.03	.22	.32*	.06	.16	.19	.16	.00	.060	-.39**	—	
14. Any CAS with PP	-.04	.04	-.13	.08	.00	-.04	-.08	-.03	.15	.00	-.230	.04	-.42**	—

Note. CAS = condomless anal sex; CP = casual partner; PP = primary partner.

* $p < .05$. ** $p < .01$.

satisfaction, desiring more closeness should motivate PrEP uptake. We were also interested in examining the interaction between closeness discrepancies and intimacy interference, hypothesizing that association between desiring more closeness and PrEP uptake would be greater among those with higher intimacy interference beliefs about condom use, because they would be the most motivated to replace condom use with PrEP. Finally, we examined the interaction between closeness discrepancies and sexual agreements to understand whether the magnitude of the effect of closeness discrepancies on PrEP adoption was stronger among participants in open sexual agreements (who might be interested in PrEP to reduce condom use with casual partners) compared with those in monogamous sexual agreements.

Method

Participants and procedures. Participants were part of the SPARK project, which is a PrEP demonstration-implementation project that was conducted in collaboration with Callen-Lorde Community Health Center in New York City. SPARK participants were recruited through medical provider or counselor referral at the health center. Eligible participants (a) were patients of the health center, (b) were assigned male sex at birth, (3c) were at least 18 years old, (d) tested HIV negative, and (e) met Centers for Disease Control and Prevention (CDC) criteria for PrEP eligibility (CDC, 2014). Between January 2014 and October 2015, participants completed a screening visit in which they were screened for eligibility and then self-selected into either the PrEP cohort (in which they would receive a PrEP prescription at a subsequent enrollment visit) or into the comparison cohort (in which they would not receive a prescription). Baseline survey data were collected after this screening visit (i.e., after participants had decided

whether or not to adopt PrEP) but prior to the enrollment visit (i.e., before the participants in the PrEP cohort received their first PrEP prescription). As such, all participants were PrEP naïve when they completed the baseline survey, but had already made a decision about PrEP uptake. Participants completed baseline measures an average of 10 days after screening ($M = 7$, interquartile range [IQR] = 3-13). Seven participants screened eligible and scheduled an enrollment visit but did not show for their enrollment visit and were, therefore, not enrolled in the study. These analyses were restricted to the 145 enrolled participants who self-reported a male gender identity and reported having a primary partner for at least 3 months prior to their baseline visit.

Measures

Closeness discrepancy. We used the same two-item approach as in Study 1, where one version of the IOS Scale assessed participants' actual (i.e., "current") levels of IOS and a second version assessed participants' ideal levels of IOS (Frost & Forrester, 2013). We then created a discrepancy score for each participant by subtracting their current level of IOS from their desired level; higher scores indicate greater current-ideal discrepancy, such that participants desired more closeness with their partner than they perceived actually experiencing. The discrepancy score ranged from -6.00 to 3.00 ($M = 1.00$, $SD = 1.57$). As described in Study 1, higher scores indicate greater positive values, which indicate the participant desired more closeness with their partner than they perceived actually experiencing; whereas, lower negative values indicate that the participant desired less closeness with their partner than they perceived actually experience. A value of 0 indicates that the participant reported that their actual and ideal levels of closeness matched.

Table 3. Bivariate and Multivariable Logistic Regression Models Predicting PrEP Adoption Intentions Among Men in Primary Partnerships (Study 1, $n = 51$).

	Bivariate		Multivariable	
	OR	95% CI	AOR	95% CI
Partner HIV status			—	—
HIV-positive partner	0.38	[0.15, 2.05]	0.63	[0.16, 2.15]
HIV-negative/unknown	—	—	—	—
Race/ethnicity				
Black	0.50	[0.16, 1.53]	—	—
Latino	1.75	[0.44, 6.93]	—	—
White	1.44	[0.43, 4.10]	—	—
Other	—	—	—	—
Education				
Less than bachelor's degree	2.04	[0.63, 6.66]	—	—
Bachelor's degree or higher	—	—	—	—
Income				
Less than US\$ 20,000 annually	1.02	[0.33, 3.18]	0.63	[0.16, 2.15]
US\$ 20,000 or more annually	—	—	—	—
Sexual agreement				
Monogamous	0.70	[0.21, 2.35]	—	—
Open	—	—	—	—
Any CAS with CP	2.40	[0.73, 7.94]	—	—
Any CAS with PP	2.10	[0.62, 7.17]	—	—
Sexual identity				
Gay	0.63	[0.13, 2.97]	—	—
Bisexual	0.23	[0.10, 4.02]	—	—
Other	—	—	—	—
Age	1.05	[0.99, 1.11]	1.02	[0.99, 1.10]
Relationship length, months	1.00	[0.99, 1.01]	1.00	[0.99, 1.01]
HIV risk perception	1.02	[0.99, 1.04]	—	—
Actual closeness	0.95	[0.69, 1.30]	1.36	[0.85, 2.15]
Closeness discrepancy	3.60*	[1.01, 4.58]	3.13*	[1.08, 4.22]
Intimacy interference	1.32*	[1.04, 2.37]	1.24*	[1.02, 2.50]

Note. PrEP = pre-exposure prophylaxis; OR = odds ratio; CI = confidence interval; CAS = condomless anal sex; CP = casual partner; PP = primary partner; AOR = adjusted odds ratio.

* $p < .05$.

Demographics. Participants reported their age, race/ethnicity, gender, sexual orientation, education, and income, partner's HIV status, and whether they were in a monogamous sexual agreement or one which permitted sex with outside partner.

Perceptions that condoms interfere with intimacy (intimacy interference). Study 2 participants also completed the four-item intimacy interference subscale of the Condom Barrier and Motivations Scale (Golub & Gamarel, 2016). The subscale demonstrated adequate psychometric properties in the current sample ($\alpha = .74$).

Relationship quality. Participants completed two subscales of relationship commitment and satisfaction (Agnew et al., 1998). Commitment level was assessed with three items assessing their commitment to their current partner (example item: "For how much longer do you want your relationship

to last?"), with response options ranging from 0 = *not all committed* to 8 = *completely committed*. Participants also completed three items from the satisfaction subscale (example item: "All things considered, to what degree do you feel satisfied with your relationship?"), with response options ranging from 0 = *not at all satisfied* to 8 = *completely satisfied*. Both the commitment-level and satisfaction-level subscales demonstrated good psychometric properties in the current sample ($\alpha = .76$ for commitment level; $\alpha = .93$ for satisfaction level).

Sexual satisfaction. Participants completed the five-item sexual satisfaction subscale from the Multidimensional Sexuality Questionnaire (Snell, Fisher, & Walters, 1993), which assesses the extent to which individuals feel that they have a satisfying sex life (example item: "I am satisfied with the sexual aspects of my life"), with response options ranging

from 0 = *not all characteristic of me* to 4 = *very characteristic of me*. The sexual satisfaction subscale demonstrated good psychometric properties in the current sample ($\alpha = .90$).

Sexual risk behavior. Participants were asked to report their number of sexual partners in the past three months. In addition, participants were asked to report the number of anal sex acts with and without a condom with a main or casual partner in the past 3 months. Consistent with Study 1, we created two dichotomous variables to assess whether the participant (a) engaged in condomless anal sex with a casual partner in the past 3 months and (b) engaged in condomless anal sex with their primary partner in the past 3 months.

PrEP uptake. All participants met PrEP eligibility criteria at the health center and were offered a PrEP prescription. PrEP uptake was operationalized as the individual's decision whether or not to begin PrEP.

Data Analysis

Descriptive statistics were obtained for all variables included in the analyses, including the distribution of scale scores, with appropriate tests for normality. Similar to Study 1, we conducted correlation analyses using Pearson's correlation and Spearman's rank correlations to examine associations between closeness discrepancies, intimacy interference, and other key covariates. Next bivariate analyses were conducted by fitting a series of logistic regression models to assess differences in actual PrEP uptake. Finally, we fit a multivariable logistic regression to assess whether closeness discrepancies and intimacy interference were associated with PrEP uptake, and whether there was a significant interaction between closeness discrepancies and intimacy interference on actual PrEP uptake, over and above covariates. We fit an additional multivariable model that examined whether there was a significant interaction between closeness discrepancies and sexual agreement on PrEP uptake, over and above covariates.

Results and Discussion

The sample ranged in age from 21 to 63 years ($M = 34.30$; $SD = 8.96$). As shown in Table 1, a little less than half of the sample identified as a person of color: 11.0% Black, 20.0% Latino, and 15.9% Other. In total, 75.8% of the sample self-identified as gay and 13.1% self-identified as bisexual. The sample was relatively diverse in regard to socioeconomic status, with 34.5% reporting less than a bachelor's degree and 32.4% reporting an annual income of less than US\$ 20,000 per year. A little over half of the sample reported that their primary partner was HIV negative (57.9%) and 69% of the participants reported that they were not in a monogamous relationship. Nearly three quarters of the sample reported

that they had engaged in condomless anal sex with casual partner and about half reported that they had engaged in condomless anal sex with their primary partner. There was a high level of actual PrEP uptake with over two thirds of the sample decided to take PrEP.

Bivariate Pearson's correlation coefficients and Spearman's rank correlations, which examine bivariate associations between closeness discrepancies, intimacy interference, and covariates are presented in Table 4. Closeness discrepancy scores were negatively associated with greater actual closeness scores and positively correlated with greater ideal closeness scores. Greater closeness discrepancy scores were negatively associated with higher reports of relationship commitment, relationship satisfaction, and sexual satisfaction. In addition, greater closeness discrepancy scores were negatively associated with earning less than a bachelor's Degree compared with those who earned a bachelor's degree or higher. There were no significant associations between closeness discrepancy and intimacy interference scores.

Bivariate and multivariable associations between closeness discrepancy, intimacy interference, covariates, and actual PrEP uptake are presented in Table 5. In bivariate logistic regression analyses, reporting a monogamous sexual agreement, $OR = 0.64$, 95% CI [0.31, 0.89], $p < .05$, was associated with a reduced odds of PrEP uptake. Greater perceived HIV risk, $OR = 1.03$, 95% CI = [1.01, 1.05], $p < .01$; actual closeness, $OR = 1.65$, 95% CI = [1.08, 2.52], $p < .05$; closeness discrepancies, $OR = 1.05$, 95% CI = [1.02, 1.15], $p < .05$; and intimacy interference, $OR = 1.02$, 95% CI = [1.01, 1.14], $p < .05$, were each associated with an increased odds of PrEP uptake.

Results of the multivariable logistic regression model, which include the interaction terms between closeness discrepancies and intimacy interference are also presented in Table 5. Closeness discrepancies remained significant in multivariable models such that for every one unit change from desiring less closeness to desiring more closeness, there was 53% increase in odds in the odds of PrEP uptake, $AOR = 1.11$, 95% CI = [1.03, 1.63], $p < .05$. In addition, being in a monogamous compared with an open sexual agreement, $AOR = 0.33$, 95% CI = [0.12, 0.87], $p < .05$, was associated with a reduced odds of PrEP uptake; whereas, greater perceived HIV risk, $AOR = 1.03$, 95% CI = [1.01, 1.05], $p < .01$; actual closeness, $AOR = 1.58$, 95% CI = [1.02, 2.51], $p < .05$; and intimacy interference, $AOR = 1.04$, 95% CI = [1.01, 1.22], $p < .05$, were each associated with an increased odds of PrEP uptake. There was no significant interaction between closeness discrepancies and intimacy interference on PrEP uptake. The results of the multivariable model that include the interaction between desiring more closeness and sexual agreement are also presented in Table 5. The interaction between closeness discrepancies and sexual agreement was also not statistically significant, $AOR = 4.93$, 95% CI = [0.79, 30.85], $p = .089$.

Table 4. Bivariate Correlations (Study 2, n = 145).

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Closeness discrepancy	—																
2. Actual closeness	-.68**	—															
3. Ideal closeness	.50**	.22**	—														
4. Intimacy interference	.00	-.01	.01	—													
5. Relationship commitment	-.36**	.39**	-.05	.11	—												
6. Relationship satisfaction	-.52**	.48**	-.08	-.00	.58**	—											
7. Sexual satisfaction	-.20*	.14	-.03	.04	.19*	.43**	—										
8. HIV risk perception	-.00	-.13	-.07	.07	-.00	-.01	.02	—									
9. Age	.06	-.04	.09	-.20*	-.03	-.20*	-.18*	-.06	—								
10. HIV-positive partner	-.01	.03	.07	-.08	.04	-.01	.02	.06	.05	—							
11. HIV unknown partner	.14	-.13	.13	-.02	-.10	-.13	-.03	-.04	.05	-.06	—						
12. Race/ethnicity	.00	-.16*	-.27**	.15	-.01	-.14	-.11	.05	.05	-.05	-.09	—					
13. Less than bachelor's degree	-.16*	.13	-.09	.08	.14	.05	-.03	-.08	.20*	.02	.06	.07	—				
14. Less than US\$ 20,000	-.02	-.03	-.01	.09	.03	.03	.06	.11	-.18*	.04	-.06	.02	-.24**	—			
15. Monogamous agreement	-.02	.15	.13	-.02	.14	.25**	.08	-.22**	-.24**	.23**	-.06	-.06	.02	.01	—		
16. Any CAS with CP	-.11	.04	-.10	.05	-.07	-.07	.15	.27**	.10	-.30**	.10	-.07	.06	-.11	-.39**	—	
17. Any CAS with PP	-.05	.06	.03	-.01	-.04	.11	.11	.27**	-.08	.07	.08	.02	-.10	-.03	-.12	.12	—

Note. CAS = condomless anal sex; CP = casual partner; PP = primary partner.

*p < .05. **p < .01.

Table 5. Bivariate and Multivariable Logistic Regression Models Predicting PrEP Uptake Among Men in Primary Partnerships (Study 2, $n = 145$).

	Bivariate		Multivariable	
	OR	95% CI	AOR	95% CI
Partner HIV status				
HIV negative	0.83	[0.25, 2.76]	0.66	[0.18, 2.53]
HIV positive	3.66	[0.93, 14.80]	3.05	[0.67, 13.47]
Unknown	—	—	—	—
Race/ethnicity				
Black	0.48	[0.16, 1.43]	—	—
Latino	2.31	[0.79, 6.76]	—	—
White	—	—	—	—
Other	0.63	[0.24, 1.62]	—	—
Education				
Less than bachelor's degree	1.24	[0.59, 2.60]	—	—
Bachelor's degree or higher	—	—	—	—
Income				
Less than US\$ 20,000 annually	1.24	[0.58, 2.62]	0.92	[0.39, 2.20]
US\$ 20,000 or more annually	—	—	—	—
Sexual identity				
Gay	1.12	[0.31, 4.08]	—	—
Bisexual	0.70	[0.16, 3.13]	—	—
Other	—	—	—	—
Sexual agreement				
Monogamous	0.64*	[0.31, 0.89]	0.33*	[0.12, 0.87]
Open	—	—	—	—
Any CAS with CP	1.50	[0.71, 3.15]	—	—
Any CAS with PP	2.67	[0.80, 7.09]	—	—
Age	0.98	[0.95, 1.02]	0.96	[0.91, 1.01]
HIV risk perception	1.03**	[1.01, 1.05]	1.03**	[1.01, 1.05]
Actual closeness	1.65*	[1.08, 2.52]	1.58*	[1.02, 2.51]
Ideal closeness	1.10	[0.82, 1.48]	—	—
Closeness discrepancy	1.05*	[1.02, 1.15]	1.11*	[1.03, 1.63]
Relationship commitment	1.03	[0.95, 1.11]	—	—
Relationship satisfaction	1.03	[0.97, 1.10]	—	—
Sexual satisfaction	1.22	[0.86, 1.72]	—	—
Intimacy interference	1.02*	[1.01, 1.14]	1.04*	[1.01, 1.22]
Desiring more closeness × Intimacy interference	—	—	1.04	[0.96, 1.12]

Note. PrEP = pre-exposure prophylaxis; OR = odds ratio; CI = confidence interval; CAS = condomless anal sex; CP = casual partner; PP = primary partner; AOR = adjusted odds ratio.

* $p < .05$. ** $p < .01$.

Discussion

Findings from both studies advance self-expansion theory and its more recent extension, *closeness discrepancies*, to understand the adoption of behaviors, specifically, engaging in HIV prevention behaviors among HIV-negative gay and bisexual men in primary partnerships. Consistent with self-expansion theory (Aron et al., 1992) and prior research (Gamarel, Neilands, Golub, & Johnson, 2014; Gamarel, Starks, et al., 2014), greater levels of closeness as assessed by the IOS were related to increased levels of HIV prevention adoption intentions and behavior. However, study findings also suggest that more recent theorizing and research on

closeness discrepancies (Frost & Forrester, 2013; Mashek & Sherman, 2004) may be a particularly useful theoretical framework for understanding behavioral outcomes. Specifically, closeness discrepancies—desiring more closeness than one currently feels with one's partner—was associated with increased odds of both PrEP adoption intentions and behavior over and above actual levels of closeness and intimacy interference beliefs about condom use. This finding provides further support for men's desire for closeness in their relationships as a potential motive for engaging in HIV prevention behaviors to protect themselves and their relationships (Gamarel, Starks, et al., 2014).

Contrary to hypotheses, there was no significant interaction between closeness discrepancies and intimacy interference beliefs about condom use and PrEP uptake. That is, the association between closeness discrepancies and PrEP uptake was not intensified by greater beliefs that condoms interfere with intimacy. However, both closeness discrepancies and intimacy interference beliefs about condom use remained significant in multivariable models, suggesting that these desires for closeness and intimacy interference beliefs about condoms may act as separate psychological motives in men's decisions to take PrEP as a prevention strategy. The direction of the independent effect for closeness discrepancies suggests that gay and bisexual men's desires for closeness may not be a function of wanting to engage in more condomless sex or risk compensation while on PrEP (GroV, Whitfield, Rendina, Ventuneac, & Parsons, 2015). Instead, PrEP may provide a strategy for gay and bisexual men to obtain their desired levels of closeness with their partner without the constant worry of the potential fear of HIV acquisition and transmission.

Although existing theorizing and research suggest that any type of discrepancy is detrimental for individuals and their relationships (Frost & Forrester, 2013; Mashek & Sherman, 2004), our findings suggest that the *direction* of the discrepancy may be particularly useful in understanding behaviors. It should also be noted that the majority of the gay and bisexual men in both samples desired more closeness than they currently felt in their relationship (e.g., 59.5% of Study 2 participants desired at least one circle closer to their partner than they actually felt; whereas only 4.1% of Study 2 participated desired at least one circle less close to their partner than they actually felt). Historically, gay and bisexual men have been told that they can never trust their partners to reinforce the message that there is always the potential threat of HIV if they engage in condomless anal sex (Gamarel & Golub, 2015). If fears around HIV inhibit closeness, PrEP may be a viable option to enhance men's relationships by alleviating the threat of HIV, as well as countering the potential stigmatizing public health messages geared toward gay and bisexual men.

Men who reported a monogamous sexual agreement, compared with those in open sexual agreements, had reduced odds of PrEP actual uptake; however, the interaction between closeness discrepancies and sexual agreements was not statistically significant. The lack of a significant interaction term may be a function of the large number of participants in open sexual agreements. Nonetheless, study findings underscore the importance of accounting for gay and bisexual men's psychological and emotional needs for closeness as opposed to solely focusing on sexual agreements as a proxy for closeness and intimacy. Although men who are in open sexual agreements may be at heightened risk of HIV, open sexual agreements are not inherently risky if they are driven by relationship dynamics such as intimacy, trust, and open communication (Hoff et al., 2010; Hoff et al., 2009; Parsons

et al., 2012). Study findings illustrate the importance of accounting for psychological motivations in HIV prevention research and interventions rather than solely focusing on behavioral proxies to guide effective prevention campaigns and interventions for gay and bisexual men in primary relationships.

Accounting for actual and ideal levels of closeness, as well as beliefs about condom use, may be a particularly useful tool for counselors to help men decide on the best prevention strategy for themselves and their relationship. Although this study did not include a measure of sexual closeness discrepancies, future research, which accounts for men's actual and ideal levels of sexual closeness, may be particularly useful in understanding how to foster open communication about sexual health planning (Frost et al., 2017). Given the multitude of evolving behavioral and biomedical HIV prevention strategies, HIV prevention interventions, which have both partners reflect on their current and ideal levels of closeness to determine how each partner can achieve their relationship needs, may be particularly useful in helping couples develop the best HIV prevention plan. Rather than focusing on how to increase closeness, couples-based HIV prevention interventions may be more effective in helping each partner obtain their ideal level of closeness with their partner. In addition, understanding each partner's ideal level of closeness may assist in providing the best sexual health counseling to individuals in primary partnerships. For example, condom use promotion *along* with PrEP may be the most effective sexual health promotion strategy for men who desire less closeness and report an open sexual agreement to reduce the risk of other contracting other sexually transmitted infections.

Limitations and Areas for Future Research

Study findings must be interpreted in light of several limitations. First, we collected data only from one partner, which limits our ability to draw inferences about the specific dynamics between couples and how these dynamics influence PrEP adoption intentions and uptake. It is also possible that both members of a couple were enrolled in our studies. Although we did not recruit couples, we also did not ask participants whether or not their partner had participated, so it is plausible that not all of our observations are independent in both samples. In addition, Study 2 did not collect data on intentions prior to PrEP adoption; future research warranted to determine whether behavioral intentions mediate the associations between closeness discrepancies and PrEP adoption behavior. Given the large number of gay and bisexual men in New York City and the differences in recruitment strategy and demographics of the two samples, overlap (i.e., nonindependence) of the two samples is unlikely, but is a potential limitation as well.

In addition, both studies are cross-sectional, which precludes our ability to determine whether closeness discrepancies and intimacy interference barriers cause PrEP adoption

among gay and bisexual men in primary relationships. For example, it is plausible that closeness discrepancies may result in lower relationship quality and even relationship dissolution on its own or as a function of PrEP use, which is an important area for future research. It is also possible that those who elect to take PrEP may have outside sexual partners, which may result in greater closeness discrepancies. Further relationship processes, such as commitment, satisfaction, and closeness can fluctuate over time. Thus, future research using longitudinal designs is warranted to better understand the direction of the association between closeness discrepancies, intimacy interference, and other aspects of relationship quality in understanding PrEP adoption. In both studies, participants completed the survey on their own to mitigate social desirability bias; however, self-report data such as sexual risk behavior is still subject to social desirability and recall bias and participants may have underestimated or overestimated their level of risk.

Furthermore, we focused on measures of relationship commitment and satisfaction that have been associated with cognitive interdependence (Agnew et al., 1998), but did not include measures specific to Rusbult's Investment Model of Commitment (Rusbult, 1980), which proposes that commitment is a product of satisfaction, investment, and alternatives. Alternatives refer to other available and more attractive partners or a more rewarding single life (Rusbult, 1980). Perceiving fewer alternatives to a primary partnership has been associated with greater intentions to use condoms with causal partners among partnered gay men (Buunk & Bakker, 1997; de Vroome, Stroebe, Sandfort, de Wit, & Van Griensven, 2000). Future research that includes validated measures of the Investment Model could shed important additional insight into the mechanisms through which closeness discrepancies and intimacy beliefs about condom use affect HIV prevention behaviors.

Finally, these analyses are restricted to HIV-negative gay and bisexual men in New York City, where there have been tremendous efforts to insure that individuals have access to and can afford PrEP. Generalizability of the study findings may be limited, given that social and structural barriers may be more of a contributing factor in PrEP uptake (Arnold et al., 2017). Nonetheless, there is reason to believe that closeness discrepancies and intimacy beliefs about condoms may operate similarly in other groups and in other geographic regions, which is an important area for future research.

Conclusion

Despite these limitations, the current study's extension of self-expansion theory and application of closeness discrepancies to HIV prevention has the potential to enhance our understanding of the psychological underpinnings of gay and bisexual men's health and their relationships. Accounting for individual's knowledge, attitudes, and intentions may not be sufficient to effectively explain the uptake of HIV prevention strategies

for gay and bisexual men in primary relationships. Although closeness discrepancies have been shown to be detrimental to relationship quality (Frost & Forrester, 2013), desiring more closeness may serve as a cognitive guide in gay and bisexual men's decision-making processes, motivating them to use prevention strategies that both alleviate fears of HIV transmission and meet their relationship needs. Future research is needed to better understand whether closeness discrepancies, along with other aspects of relationship quality, change over time as a function of PrEP use, as well as whether PrEP and other HIV prevention strategies help support men's relational needs for closeness and intimacy in their relationships.

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Supplemental Material

Supplementary material is available online with this article.

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