

# HIV-Negative Partnered Men's Willingness to Use Pre-Exposure Prophylaxis and Associated Factors Among an Internet Sample of U.S. HIV-Negative and HIV-Discordant Male Couples

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## Abstract

**Purpose:** Research on male couples' willingness to use pre-exposure prophylaxis (PrEP) is critically lacking.

**Methods:** A cross-sectional 2011 Internet survey collected dyadic data from 275 HIV-negative and 58 HIV-discordant male couples to describe 631 HIV-negative partnered men's willingness to use PrEP and associated couple-level demographic and behavioral factors with multivariate multilevel modeling.

**Results:** Fifty-three percent were very to extremely likely to use PrEP. Willingness was positively associated with being in a mixed race and behaviorally non-monogamous relationship, and with amyl nitrate use with sex outside the relationship. Willingness was negatively associated with having a college education.

**Conclusion:** Prevention efforts should educate male couples about the potential benefits of PrEP.

**Key words:** HIV prevention, male couples, pre-exposure prophylaxis (PrEP), relationship characteristics, willingness to use.

## Introduction

MEN WHO HAVE SEX WITH MEN (MSM) are the only group within the U.S. HIV epidemic which continues to have increased HIV incidence.<sup>1</sup> Although HIV risk among MSM was long messaged as driven by multiple casual sex partners, recent evidence shows that between one- and two-thirds of MSM acquire HIV from their main partner (i.e., male couples).<sup>2,3</sup> Within the context of HIV-negative and discordant male couples' relationships, increases in HIV risk are attributed to lack of confirmation of both partners' HIV-status (as negative) before condomless anal sex (CAS), higher number of anal sex acts without condoms, more frequent receptive roles, and lack of viral load suppression for the HIV-positive partner.<sup>2-8</sup> HIV testing rates within these relationships are also low despite CAS occurring within and outside the relationships.<sup>9-12</sup> Partnered MSM also test less frequently because they perceive to be at less risk due to being in a relationship,<sup>13</sup> and viewing their main partner as dependable for being trustworthy.<sup>10</sup>

Pre-exposure prophylaxis (PrEP)—a daily regimen of ART (i.e., Truvada™) taken by those who are HIV-negative to prevent the acquisition of HIV—is one promising biomed-

ical approach to reducing the risk of HIV infection among male couples. Efficacy trials have demonstrated that use of PrEP can reduce the risk of sexual acquisition of HIV infection.<sup>14-18</sup> In the multinational iPrEPx study, the safety and efficacy of PrEP in HIV uninfected MSM was established and showed a 44% reduction in incidence of HIV infection.<sup>14</sup> Participants in this randomized control trial study who reported using PrEP on 90% or more of the days had a 72.8% reduction in acquisition risk for HIV.<sup>14</sup> Since these findings, the U.S. Food and Drug Administration on July 16, 2012, approved Truvada™ for PrEP in combination with safer sex practices to reduce the risk of sexually acquired HIV-infection in adults at high risk, and at the forefront of the targeting of PrEP are high-risk MSM.<sup>19</sup> The CDC has also provided guidelines for who may best benefit from PrEP.<sup>20</sup> With respect to gay men and other MSM, this includes anyone who: is in an ongoing relationship with an HIV-positive partner (i.e., HIV-discordant male couples); is not in a mutually exclusive monogamous relationship with a partner who recently tested HIV-negative (i.e., HIV-negative male couples with an open relationship or perceived to be monogamous but not); and has had CAS or been diagnosed with a sexually transmitted disease (STD) in the past 6

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months.<sup>4</sup> However, behavioral research into the factors shaping PrEP willingness, acceptability, and use among male couples is at a nascent stage.

Recent studies have examined attitudes, awareness and willingness to use PrEP among MSM primarily in the U.S.,<sup>21–31</sup> with more limited research in Australia, China, France, Thailand, UK, and Canada<sup>32–39</sup> through an individual lens, focusing on the individual characteristics of men that shape their desire and ability to use and adhere to PrEP. In general, this body of research has illustrated that MSM, and in particular high-risk MSM (those with multiple sex partners), have positive attitudes towards the adoption of PrEP as a HIV prevention strategy. However, this focus on high-risk MSM has almost ignored male couples' willingness to use PrEP. Studies that provide this type of data are critical to increase PrEP uptake given that two of the Centers for Disease Control and Prevention's (CDC) three recommended PrEP guidelines include those who are in a relationship. By using dyadic data collected in 2011 from a nation-wide U.S. Internet study with 333 gay male couples comprised of 275 HIV-negative and 58 HIV-discordant dyads, we sought to describe 631 HIV-negative partnered men's willingness to use PrEP, and to assess couple-level demographic and behavioral factors associated with their willingness to use PrEP.

## Methods

The Medical College of Wisconsin Institutional Review Board approved the study protocol; methods have been previously described.<sup>9,10</sup> Recruitment for this study sample was conducted through Facebook banner advertising: In 2011, advertisements targeting partnered men who reported in their Facebook profile being  $\geq 18$  years of age, living in the U.S., interested in men, and being in a relationship, engaged, or married. Banner advertisements briefly described the purpose of the study and included a picture of a male couple. Of a total of 7,994 Facebook users who clicked on an advertisement, 4,056 (51%) answered eligibility questions: 722 (18%), representing both men of 361 MSM couples provided consent and completed the study questionnaire. A total of 631 HIV-negative MSM, representing 275 concordantly negative and 58 HIV-discordant male couples ( $n = 333$  dyads), are included in this analysis. Men were eligible to participate if they were  $\geq 18$  years of age, lived in the U.S., were in a sexual relationship with another male, and had had oral and/or anal sex with this partner within the previous three months. A partner referral system was embedded in the online survey to enable data collection from both men in the couple. Post-hoc analyses of response consistency in several variables and email addresses were used to verify couples' relationships.

## Measures

Participants' willingness to use PrEP was assessed by 1-item with a 5-point Likert-type scale that had response options ranging from 0 (Not at all), 1 (Not very likely), 2 (Somewhat likely), 3 (Very likely) to 4 (Extremely likely). Participants were asked: "How likely are you to take an HIV medication (i.e., Truvada<sup>TM</sup>) daily if the medication helped lower their chances of contracting HIV and consistent condom use is difficult for you?"

Several demographic (e.g., age, race) and relationship characteristics (e.g., relationship length) were assessed, as well as

self and primary partner's HIV status, engagement in CAS within the relationship, whether sex had occurred with any casual MSM partners within the previous three months, including CAS with that casual MSM partner. Substance use with sex was assessed categorically by partner type. Other characteristics about this sample have been reported.<sup>40–50</sup>

Dyadic data from 333 dyads with 631 HIV-negative partnered men were analyzed using Stata v12 (StataCorp, College Station, TX) following recommended guidelines.<sup>51,52</sup>

TABLE 1. CHARACTERISTICS OF THE SAMPLE: 275 HIV-NEGATIVE CONCORDANT MALE COUPLES AND 58 HIV-DISCORDANT MALE COUPLES

<i>Couple-level demographic characteristic</i>	<i>% (n = 333 dyads)</i>
<b>Relationship HIV status</b>	
In HIV-discordant relationship	17% (58)
In concordantly HIV-negative relationship	83% (275)
Mixed or nonwhite race	34% (113)
Education level: Both men had at least a bachelor's degree	34% (112)
Employment status: Both men employed	66% (220)
Had primary care provider: One or both men reported yes	61% (203)
Geographical location: Urban/suburban	88% (279)
	<b>Mean (SD)</b>
Individual age [range: 18–68 years]	32.2 (10.6)
Age difference between partners	4.9 (5.7)
Relationship length [range: 0.25–35 years]	4.8 (5.4)
Cohabitation length [range: 0.08–31.7 years] <sup>a</sup>	5.0 (5.7)
<b>Couple-level sexual behavior</b>	<b>% (n)</b>
CAS practiced within relationship	83% (278)
Sex outside of relationship	30% (101)
CAS outside of relationship <sup>b</sup>	63% (64)
CAS within and out of relationship <sup>b</sup>	53% (54)
<b>Couple-level substance use with sex—main partner</b>	<b>% (n)</b>
Party drugs <sup>c</sup>	11% (35)
EDM <sup>d</sup>	18% (61)
Amyl nitrate (e.g., poppers)	14% (46)
Marijuana	30% (101)
Alcohol	83% (278)
<b>Couple-level substance use with sex—casual partner</b>	<b>% (n)</b>
Party drugs <sup>c</sup>	3% (11)
EDM <sup>d</sup>	9% (30)
Amyl nitrate (e.g., poppers)	10% (32)
Marijuana	8% (28)
Alcohol	17% (58)

With the exception of condomless anal sex (CAS) practiced within the relationship, all reported behaviors include male couples in which one or both men in the relationship self-reported engaging in that behavior (e.g., amyl nitrate with sex—main partner).

<sup>a</sup>Regional data represents the individual men because not all couples reported living together.

<sup>b</sup>Data represents participants who reported living with their main partner for at least one month or longer.

<sup>c</sup>Data reflects among the couples who had one or both partners that had sex outside of their relationship.

<sup>d</sup>Party drugs include ecstasy, ketamine, gamma hydroxybutyrate (GHB), cocaine, and methamphetamine.

<sup>e</sup>EDM, erectile dysfunction medication.

Descriptive statistics were calculated. Responses from both partners were used to create couple-level dummy variables to describe and assess demographic and behavioral factors at the couple-level. Independent couple-level variables that were significantly ( $P < .05$ ) associated with the outcome in the bivariate random-effects regression models were included in a multivariate random-effects multilevel regression model with maximum likelihood estimation. For the final model, backward elimination was used to remove independent variables that remained non-significant until all variables, excluding the pre-determined confounders, remained significant. Age difference between partners, HIV-status, and relationship length

were included as potential confounders for the model. The coefficients, standard errors, and statistical significance for the factors in the bivariate and multivariate models are reported.

## Results

The average age of men and age difference between partners was 32.2 and 4.9 years, respectively (Table 1). Mean relationship length was approximately 5 years. About one third of couples were nonwhite or mixed race; another third had both partners who earned at least a bachelor's degree. Most partners in the couple reported being employed, having a

TABLE 2. FACTORS SIGNIFICANTLY ASSOCIATED WITH ATTITUDE TOWARD USING PrEP AMONG 631 HIV-NEGATIVE PARTNERED MSM IN 275 HIV-NEGATIVE AND 58 HIV-DISCORDANT MALE COUPLES: RESULTS FROM BIVARIATE AND FINAL MULTIVARIATE RANDOM-EFFECTS MULTILEVEL REGRESSION MODELS

	<i>Bivariate Models</i>	<i>Final multivariate model</i>
<b>Individual-level demographic</b>	<b><math>\beta</math> (SE)</b>	<b><math>\beta</math> (SE)</b>
Age	-0.01 (0.01)	
Education: bachelor's degree or higher	-0.33 (0.11)**	-0.32 (0.11)**
Hispanic (vs. non-Hispanic)	0.36 (0.19)*	
Has health insurance	-0.33 (0.13)**	
Has primary care provider	-0.20 (0.12)	
<b>Couple-level demographic</b>	<b><math>\beta</math> (SE)</b>	<b><math>\beta</math> (SE)</b>
Relationship length		
5 years and less (ref)	0.23 (0.13)*	0.23 (0.12)
Greater than 5 years		
Age difference between partners	-0.01 (0.01)	-0.01 (0.01)
HIV status of relationship		
Negative concordant (ref)	-0.27 (0.17)	-0.20 (0.16)
Discordant		
Race		
Mixed or nonwhite (ref)	0.36 (0.12)**	0.31 (0.12)**
White		
<b>Couple-level sexual behavior</b>	<b><math>\beta</math> (SE)</b>	<b><math>\beta</math> (SE)</b>
CAS practiced within relationship	0.24 (0.16)	
Sex outside of relationship		
One or both men reported "Yes" (ref)	0.36 (0.12)**	0.32 (0.14)*
Both partners reported "No"		
CAS with casual MSM partner		
One or both men reported "Yes" (ref)	-0.28 (0.22)	
Both partners reported "No"		
CAS with both partner types		
One or both men reported "Yes" (ref)	0.33 (0.15)*	
Both partners reported "No"		
Amyl nitrate use with sex within relationship		
One or both men reported "Yes" (ref)	0.20 (0.17)	
Both partners reported "No"		
Amyl nitrate use with sex outside relationship		
One or both men reported "Yes" (ref)	0.62 (0.19)**	0.47 (0.21)*
Both partners reported "No"		
EDM use with sex within relationship		
One or both men reported "Yes" (ref)	0.08 (0.15)	
Both partners reported "No"		
EDM use with sex outside relationship		
One or both men reported "Yes" (ref)	0.42 (0.20)*	
Both partners reported "No"		

Results from final multivariate random-effects multilevel regression model controlled for couples' relationship length, HIV serostatus, and age difference between partners.

626 obs., 333 dyads,  $\chi^2(7) = 40.00$ ,  $P < .001$ , Log likelihood = -1054.15.

\* $P < .05$ ; \*\* $P < .01$ .

SE, standard error.

primary care provider, being in a concordantly HIV-negative relationship, and cohabitating. Most couples also practiced CAS within their relationship. Thirty percent of couples had one or both partners who had sex outside of the relationship. Of these relationships, 63% had one or both partners who had CAS with a casual partner and 53% had one or both partners who had CAS within and outside of their relationship.

Just over half of HIV-negative partnered men reported being very to extremely likely to use PrEP (53%); the modal response was extremely likely (30%). Men's willingness to use PrEP did not significantly differ by relationship HIV status.

Findings from the bivariate and final multivariate random-effects multilevel regression models are provided in Table 2. The final random-effects multilevel regression model revealed several factors were associated with HIV-negative partnered men's willingness to use PrEP. After controlling for potential confounding factors, willingness to use PrEP was positively associated with being in a mixed race or non-white couple, behaviorally non-monogamous relationship, and/or one or both partners having used amyl nitrates with sex outside their relationship. Willingness to use PrEP was negatively associated with being in a relationship with both partners having at least a bachelor's degree.

## Discussion

The present investigation is one of a few studies which assess willingness to use PrEP and associated factors among a U.S. Internet sample of concordant HIV-negative and HIV-discordant gay male couples. More than half of the HIV-negative partnered men were very to extremely likely to use PrEP. In contrast, in a study conducted in San Francisco with concordant HIV-positive and HIV-discordant male couples, Saberi and colleagues (2012) found that the majority of partnered men did not endorse PrEP and some were concerned about the possible increases in risk compensation as a result of PrEP use.<sup>53</sup> Although this study did not collect qualitative data to examine the reasons why partnered men might be more or less willing to use PrEP, these findings provide support for partnered men's willingness to use PrEP, particularly among certain subgroups of gay male couples. However, future research studies that collect data from a more representative sample of male couples would provide a greater understanding of men's willingness to use PrEP.

We found that men's willingness to use PrEP increased among those who were in a behaviorally non-monogamous relationship. Given that most couples in this sample practiced CAS within their relationship and for some, also outside of their relationship, this finding is in line with the current guidelines established by the CDC for who may best benefit from using PrEP.<sup>20</sup> Under certain circumstances, HIV-negative partnered men may be at substantial risk for HIV acquisition.<sup>2,3</sup> Interestingly, there was no difference in PrEP willingness between concordant negative and sero-discordant couples, suggesting that PrEP attitudes may not be sero dependent. Couples may perceive their risk of HIV acquisition differently, and therefore male decision, including their willingness to use PrEP, based on more than the serostatus of themselves and their partner. As shown in pre-

vious clinical trial studies, PrEP can help reduce one's risk for acquiring HIV when it is taken consistently and as directed.<sup>14-18</sup> Informative prevention messaging is needed to enhance awareness and proper use of PrEP as a risk-reduction strategy for partnered HIV-negative men and male couples in non-monogamous behavioral relationships.

Men's willingness to use PrEP increased among those who were in a nonwhite or mixed race relationship. This finding is significant because U.S. MSM of color are disproportionately affected by HIV/AIDS compared to their white counterparts.<sup>1</sup> Educational tools and targeted messaging for this particular population—MSM of color as well as mixed-race male couples—is essential to help advance HIV prevention via PrEP and other methods. Willingness to use PrEP decreased among those with higher levels of education. Although this study did not assess the reasons associated with willingness to use PrEP (i.e., being less willing), men in these relationships may be more skeptical about the effectiveness and/or the side effects of PrEP, thereby emphasizing the need to provide informative messaging about it to address these possible concerns.

## Limitations

The use of a cross-sectional study design with a U.S. convenience sample inhibits casual inference and the ability to generalize these results to all Internet-using U.S. male couples or those who do not use Facebook. Although identifying information was not collected, biases of participation, social desirability, and recall may have influenced participants to inaccurately self-report information. Further, other factors could affect male couples' willingness to use of PrEP, including their mental health, presence or history of intimate partner violence, and perceived risk for acquiring HIV. We included responses from all couples, including couples that did not report having outside sex partners; the responses of such couples might have reflected their willingness to use PrEP if their partnership became open, or if they became single in the future. Moreover, these data were collected at a time before PrEP was being discussed in the media and LGBT settings and may not reflect current attitudes toward using PrEP among partnered MSM. Future studies may benefit from the inclusion of these limitations to further assess male couples' willingness to use PrEP and under what circumstances.

HIV-negative partnered men are willing to use PrEP, especially while in a behaviorally non-monogamous and/or mixed race, nonwhite same-sex relationship. As strategies are developed and added to the HIV prevention toolbox for male couples, informative and targeted messaging is needed to promote and enhance the uptake of these new tools, including PrEP. We encourage additional research to better understand how dynamics within and outside of male couples' relationships may encourage or inhibit willingness and actual PrEP use, including their social (e.g., peers) and healthcare environments.

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