

HIV-Negative Partnered Men's Willingness to Use Non-Occupational Post-Exposure Prophylaxis and Associated Factors in a U.S. Sample of HIV-Negative and HIV-Discordant Male Couples

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Abstract

Purpose: Non-occupational post-exposure prophylaxis (nPEP) is an underutilized biomedical option for HIV prevention. Few studies have assessed male couples' knowledge of and willingness to use nPEP.

Methods: Cross-sectional dyadic data from 275 HIV-negative and 58 HIV-discordant male couples were used to describe HIV-negative, partnered men's awareness of and willingness to use nPEP, and factors associated with their willingness to use nPEP. Data were analyzed with the use of multivariate multilevel modeling.

Results: Less than a third of the men were aware of nPEP, yet 73% were very-to-extremely likely to use nPEP. Partnered men's willingness to use nPEP was positively associated with having an individual income less than \$30,000 USD and serosorting within the relationship. Willingness to use nPEP was negatively associated with greater age difference between primary partners and with higher scores on measures of couples' investment in their relationship.

Conclusion: Efforts should be made to increase male couples' awareness of nPEP and how to access nPEP. Uptake of nPEP has the potential to help avert new HIV infections among male couples.

Key words: awareness, HIV prevention, male couples, non-occupational post-exposure prophylaxis (nPEP), willingness to use.

Introduction

UNLIKE OTHER POPULATIONS, rates of HIV infections continue to increase among gay, bisexual, and other men who have sex with men (MSM) in the United States.¹ To help address this disparity, new biomedical methods for preventing the acquisition of HIV have emerged, including pre-exposure prophylaxis (PrEP) and non-occupational post-exposure prophylaxis (nPEP).²⁻⁴ For some HIV-negative MSM, PrEP may be an ideal option to help prevent HIV acquisition on an ongoing basis whereas other MSM who do not engage in risk-related behaviors often, may prefer to use nPEP after a potential exposure to HIV. Non-occupational PEP also remains a viable and effective strategy for MSM who may not yet have sought out PrEP, which in some cases requires a substantial amount of forethought, planning, and resourcefulness to locate a provider who prescribes PrEP and secure financial resources or assistance to pay for it. Non-occupational PEP's similarity to the longstanding

practice of occupational PEP may make it more likely that an individual could find a willing and knowledgeable prescriber of nPEP after an unexpected exposure to HIV than a provider to prescribe PrEP preemptively.

Though studies have reported that most single and partnered MSM are willing to use PrEP,⁵⁻⁸ less attention has been given to assessing their willingness to use nPEP. Non-occupational PEP is a 28-day course of 3 antiretroviral medications, that should be taken within 72 hours after a potential exposure to HIV.^{2, 9-11} Guidelines developed by the Centers for Disease Control and Prevention and the California Department of Health Services indicate that individuals who have had sexual, injection drug use, or other nonoccupational exposures to potentially infectious fluids of persons known to be HIV infected would benefit most from taking nPEP;^{2,4,9} HIV testing should also take place prior to starting the regimen, and again at 4, 12, and 24 weeks post-exposure.¹¹ The effectiveness of nPEP to avert HIV infection diminishes as time increases between exposure to HIV and uptake of

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treatment; evidence suggests a potential 80% effectiveness rate if nPEP is taken within 72 hours of exposure, though effectiveness may decrease over time.^{2,9–12}

Other factors also influence the effectiveness of nPEP to avert HIV acquisition, including: antiretroviral adherence; injection drug use; and/or further engagement in HIV risk-related behaviors.^{4,9,13–15} The effectiveness of nPEP is also dependent upon the ability of at-risk individuals as well as health care providers to correctly identify high HIV risk exposure events.¹⁶ Access (e.g., cost and where available) may also be a barrier for nPEP uptake. For example, a 28-day treatment of nPEP can cost between \$2,500 to \$3,500 USD without insurance coverage; copayments may be \$100 or more for each drug for those with insurance.¹⁰ Further, not all health insurance companies provide coverage for prevention services.⁸ Finding providers to prescribe nPEP is also a concern. Landovitz et al. reported that among 117 health care venues in Los Angeles County, California, only 14.5% ($n=17$) were able to offer nPEP services and only 8.5% ($n=10$) offered nPEP services to individuals who were not privately insured.¹⁷ In addition, they discovered that emergency departments are strained for resources and often only provide a starter supply of nPEP (i.e., 3 to 4 day supply), where individuals must arrange their own follow-up and fund the remainder of the 28-day course of treatment.¹⁷ Despite these barriers, analyses indicate nPEP is cost-effective for averting HIV infection among MSM and even provides *cost savings* among MSM who were exposed to HIV through condomless anal sex (CAS).¹⁸

Despite the potential benefits of nPEP, prior studies have noted that MSM's willingness to use nPEP is generally high while awareness of nPEP is low. Among a sample of HIV uninfected men who engaged in anal sex with other MSM, Donnell et al. discovered that about half of the participants who had serodiscordant CAS (i.e., sex with HIV positive or unknown serostatus MSM) were aware of nPEP, with higher awareness among those from research sites with funded nPEP programs.¹⁹ Zablotska et al. reported a greater likelihood of nPEP use if men were aware of it being currently available.²⁰ Although nPEP is used by HIV-negative MSM, awareness of nPEP by HIV positive MSM is beneficial to inform their HIV-negative sex partners.

Research about male couples' knowledge of and willingness to use nPEP is lacking yet would be beneficial for informing future HIV prevention efforts. Research about nPEP among concordantly HIV-negative and HIV-discordant male couples is warranted because between one- and two-thirds of MSM in the U.S. acquire HIV from their primary sex partners while in a same-sex relationship (i.e., male couples).^{21,22} Despite low rates of testing for HIV and other sexually transmitted infections,^{23–26} many male couples practice CAS within their relationship,^{26–28} and some of these partnered MSM also engage in concurrent CAS with both their primary and casual MSM partners with or without the knowledge of their main partner. Furthermore, male couples' risk for HIV increases when one or more of the following occur: partners fail to confirm their HIV serostatus as negative before engaging in CAS; engagement in a higher number of anal sex acts, including more frequent receptive roles; lower rates of condom use during anal sex.^{21,22} In addition, studies have reported that MSM—single and partnered—use risk-reduction strategies, such as serosorting, to engage

in CAS while aiming to reduce their risk for HIV.^{19,29–32} Serosorting refers to selecting a sex partner perceived to have the same HIV serostatus as oneself (e.g., HIV-negative MSM only engaging in CAS with another HIV-negative MSM).^{19,29–32} However, because viral load may be high prior to seroconverting, serosorting is an ineffective method for HIV prevention.^{32–34}

Though few evidence-based HIV prevention interventions exist for male couples, some studies have explored how characteristics and dynamics of these relationships are associated with HIV risk. For example, male couples who report having higher levels of relationship commitment and constructive communication are less likely to engage in CAS outside of their relationship, thereby helping to reduce their risk for HIV.³⁵ In order to provide male couples with additional prevention options, such as nPEP, additional research is needed to explore nPEP knowledge and attitudes in this population. By using dyadic data from a large nationwide U.S. Internet study of gay male couples, we sought to describe knowledge of and willingness to use nPEP among HIV-negative participants as well as to assess which individual- and couple-level factors were associated with their willingness to use nPEP.

Methods

The Medical College of Wisconsin Institutional Review Board approved the study protocol; methods have been previously described.^{7,23,26,27,30} Recruitment for this study sample was conducted through Facebook banner advertising in 2011. Advertisements targeted partnered men who reported in their Facebook profile being ≥ 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. Men were eligible to participate if they: were ≥ 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.

Of a total of 7,994 Facebook users who clicked on an advertisement, 4,056 (51%) answered eligibility questions; and 722 (18%) individuals, representing both men of 361 MSM couples, provided consent online and completed the study questionnaire. All but one state in the U.S. (i.e., Wyoming) were represented in the study sample. A total of 631 HIV-negative and unknown serostatus MSM, representing 275 concordantly HIV-negative and 58 HIV-discordant male couples ($n=333$ dyads), are included in this analysis.

Measures

Participants' awareness of nPEP was assessed by 1 item with a "yes/no" response to: "Have you ever heard of post-exposure prophylaxis or PEP?" Participants' willingness to use nPEP 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 would you take an HIV medication (i.e., Truvada™) daily for a month if you had unprotected

sex with an HIV positive person and you wanted to remain HIV negative?"

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; and whether sex had occurred with any casual MSM partners within the previous three months including CAS with that casual MSM partner. Other characteristics about this sample have been reported, including the use of the risk-reduction strategy of serosorting.^{7,23,26,27,30}

The Investment Model was also used to examine participants' level of relationship commitment with their main partner.^{36,37} The 22-item validated scale consisted of four constructs. *Commitment level* assessed long-term orientation toward the partnership, intention to remain in a relationship, and psychological attachment to a partner (7 items, $\alpha = 0.78$).^{36,38,39} *Satisfaction level* assessed, in a comparative fashion, the negative and positive outcomes of the relationship (5 items, $\alpha = 0.87$). *Quality of alternatives* assessed the perception that being single or an attractive alternative partner existed outside of the main relationship, and that this alternative would provide superior outcomes when compared to the current relationship (5 items, $\alpha = 0.75$).³⁶ *Investment size* assessed the existence of concrete or tangible resources in the relationship that would be lost or greatly reduced if the relationship ended (5 items, $\alpha = 0.71$).³⁶ The combination of satisfaction level, quality of alternatives, and investment size were an index of the level of commitment existing in interpersonal relationships and in turn, the probability that the relationship will persist.⁴⁰ Responses to each item were based on a 7-point Likert-type scale (0=Do Not Agree at All, 6=Agree Completely). The 22-item measure had a Cronbach's α (alpha) of 0.87.

Analysis

Dyadic data from 333 dyads with 631 HIV-negative partnered men were analyzed using Stata v12 (StataCorp, College Station, TX) following recommended guidelines.^{41,42} 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 individual- and 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. Relationship HIV-status was included as a potential confounder 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 average age difference between partners was 32.2 and 4.9 years, respectively (Table 1). Mean relationship length was approximately 5 years. About a 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 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 couples, 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.

Approximately 28% ($n = 176$) of HIV-negative partnered men were aware of nPEP, and 73% of those men reported being very-to-extremely likely to use nPEP; the modal response to willingness was extremely likely (57%). Men's awareness of and willingness to use nPEP did not significantly differ by relationship HIV status. Table 2 provides data on whether one or both men of the couple were aware of nPEP.

Findings from the bivariate and final multivariate random-effects multilevel regression models are provided in Table 3. The final random-effects multilevel regression model revealed that several factors were associated with HIV-negative partnered men's willingness to use nPEP. After controlling for relationship HIV status, willingness to use nPEP was positively associated with having an annual income less than \$30,000 USD ($\beta = 0.23$, $SE = 0.12$, $P < .05$) and/or using serosorting as a risk-reduction strategy within the relationship ($\beta = 0.32$, $SE = 0.12$, $P < .01$). Willingness to use nPEP was negatively associated with a larger age difference between primary partners ($\beta = -0.02$, $SE = 0.01$, $P < .05$) and with a larger average relationship investment size ($\beta = -0.21$, $SE = 0.07$, $P < .01$). No other factors were significantly associated with willingness to use nPEP.

Discussion

The present investigation is the first to assess nPEP awareness, willingness to use nPEP, and factors associated with willingness to use nPEP among concordant HIV-negative and HIV-discordant male couples. Our findings are in line with what other studies have reported regarding MSM's knowledge of nPEP;^{16,43} this sample's awareness of nPEP was also low. In contrast, partnered men's willingness to use nPEP was higher than what was previously reported in prior studies with MSM.^{19,43} Furthermore, almost three-fourths were "very" to "extremely" likely to use nPEP. These data suggest that increasing awareness of nPEP may result in higher utilization of this HIV prevention strategy among partnered men.

Our analysis revealed that partnered men with an annual individual income less than \$30,000 were more likely to be willing to use nPEP than those with higher incomes. This association is noteworthy and may affect the potential uptake and use of nPEP among HIV-negative partners within male couples' relationships, particularly those with lower incomes. Despite the possible benefit, provision of nPEP remains controversial and underutilized because of the cost to the patient (~\$3500 per 28-day regimen) and the logistical challenges of finding a provider to prescribe nPEP and to have the costs covered in a timely manner.¹⁸ Yet, nPEP can be a cost saving¹⁸ and effective biomedical method of averting HIV among MSM, particularly when their exposure to HIV occurred from having had CAS.^{14,18,19,44,45} Health insurance plans often cover nPEP drug costs, though sometimes only after completing additional paperwork, and drug manufacturers offer assistance programs—some with expedited approval protocols specifically for nPEP—for

TABLE 1. CHARACTERISTICS OF THE SAMPLE

Demographic Characteristic	% (n = 333 dyads)
Relationship HIV status	
In HIV discordant relationship	17% (58)
In concordantly HIV negative relationship	83% (275)
Mixed or nonwhite race couple	34% (113)
Education level: Both men had at least a Bachelor's degree	34% (112)
Employment status: Both men employed	66% (220)
Had health insurance: One or both men reported "yes"	88% (294)
Individual income less than \$30,000 USD: One or both men reported "yes"	55% (183)
Had primary care provider: One or both men reported "yes"	61% (203)
Geographical location: Urban/suburban ^a	88% (279)
	Mean (SD)
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) ^b	5.0 (5.7)
	% (N)
Couple-Level Sexual Behavior	
CAS practiced within relationship	83% (278)
Sex outside of relationship	30% (101)
CAS outside of relationship	63% (64)
CAS within & out of relationship	53% (54)
Serosorting practiced with primary partner	40% (134)
	M (SD)
Investment Model Relationship Dynamic: Couples' Averaged Scores^c	
Commitment level	5.4 (0.66)
Relationship satisfaction	4.9 (0.88)
Investment size	4.7 (0.80)
Quality of alternatives	3.7 (1.08)
	M (SD)
Investment Model Relationship Dynamic: Intra-Couple Differences in Scores^c	
Commitment level	0.69 (0.79)
Relationship satisfaction	0.94 (0.88)
Investment size	0.92 (0.75)
Quality of alternatives	1.14 (1.02)

With the exception of 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.

^aRegional data represent the individual men because not all couples reported living together.

^bData represent participants who reported living with their main partner for at least one month or longer.

^cRange of possible responses to this validated measure were 0 (Do not agree at all) to 6 (Agree completely).

CAS, condomless anal sex.

individuals without insurance. Thus, interventions are needed to: raise awareness of nPEP among MSM, both single and partnered men; and increase health care providers' awareness of nPEP, ability to prescribe nPEP, and their ability to navigate the systems required to get nPEP costs covered by insurance or manufacturers' financial assistance programs. These latter items are especially important as our data suggest that those men most willing to use nPEP—those with lower incomes—may also be less able to afford nPEP without financial assistance to obtain it.

TABLE 2. AWARENESS OF nPEP

	<i>HIV-negative male couples</i>	<i>HIV-discordant male couples</i>
Heard of nPEP	% (n = 275)	% (n = 58)
Both partners reported "yes"	11% (31)	24% (14)
Only one partner reported "yes"	33% (90)	28% (16)
Both partners reported "no"	56% (154)	48% (28)

nPEP, non-occupational postexposure prophylaxis.

In addition, those who reported using serosorting as a risk-reduction strategy in their relationship were more likely to be willing to use nPEP than those who did not serosort. This suggests that some partnered men may be aware of multiple HIV prevention methods, while other partnered men may have little awareness of various prevention methods. This finding supports the need to increase awareness of a variety of prevention options, as well as their effectiveness, among partnered men and male couples to help manage and reduce their risk for HIV while in a relationship. Indeed, research has noted that some male couples tend to use one or more risk-reduction strategies while in their relationship.³⁰

Our analyses also revealed a negative association between age and willingness to use nPEP. We conducted additional analyses to better understand this finding and found that those men aged 18–29 were more likely to be willing to use nPEP compared to all other age groups within the sample. It is possible that young MSM may be more open and supportive to using new forms of HIV prevention compared to older men. This finding is relevant to future research and promotion of nPEP because many new HIV infections occur within the context of male same-sex relationships,^{21,22} as well as among young MSM in the U.S.⁴⁶

TABLE 3. FACTORS SIGNIFICANTLY ASSOCIATED WITH ATTITUDE TOWARD USING PEP 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>
Individual-Level Demographic	β (SE)	β (SE)
Annual income less than \$30,000 USD	0.26 (0.11)*	0.23 (0.12)*
Individual-Level Sexual Behavior		
Serosorting with primary partner	0.35 (0.12)**	0.32 (0.12)**
Couple-Level Demographic		
Age difference between partners	-0.02 (0.01)*	-0.02 (0.01)*
HIV status of relationship		
Negative concordant (ref)	0.10 (0.17)	-0.03 (0.18)
Discordant		
Couple-Level Relationship Dynamic		
Averaged investment size in relationship	-0.20 (0.08)**	-0.21 (0.07)**

Results from final multivariate random-effects multilevel regression model controlled for couples' HIV serostatus. 592 observations, 315 dyads, $\chi^2(5) = 23.86$, $P < .001$, Log likelihood = -1021.34.
* $P < .05$, ** $P < .01$.

A larger average relationship investment size was negatively associated with partnered men being more willing to use nPEP. Male couples with more tangible and social resources (e.g., greater relationship investment size) may perceive they are at less risk for HIV and therefore may be less willing to use nPEP. This finding supports other research with male couples that has shown that merely by being in a relationship, some partners perceive that they are protected against HIV.⁴⁷ This is concerning since being in a relationship does not necessarily offer protection from HIV acquisition.^{21,22}

Finally, our findings of a higher level of willingness to use nPEP among couples with a lower income level and a lower level of willingness to use nPEP among couples with a greater level of relationship investment—a measure of the combined resources of the couple—are notable. These findings may suggest that couples with greater resources may prefer to take a proactive approach to HIV prevention compared to using a reactive method such as nPEP. Due to the study design and data collection method used, it is unclear why having a lower income was associated with a higher willingness to use nPEP. These findings need additional study, but may indicate that interventions to increase nPEP awareness may be especially salient for individuals and couples with lower levels of financial resources if indeed they are more likely to utilize a more reactive (e.g., nPEP) than a proactive (e.g., PrEP) approach to HIV prevention.

Limitations

The use of a cross-sectional study design with a convenience sample inhibits casual inference and the ability to generalize these results to all Internet-using 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 report information. Further, other factors that we did not measure could affect male couples' willingness to use nPEP, including their mental health, other relationship dynamics (e.g., intimacy, power), presence or history of intimate partner violence, perceived risk for acquiring HIV, and cost of the medication. We included responses from all couples, including couples who did not report having outside sex partners.

The responses of such couples might have reflected their willingness to use nPEP if their partnership became open, or if they became single in the future. Future studies may benefit from overcoming these limitations to further assess male couples' willingness to use nPEP and under what circumstances, as well as targeting those who live in rural areas.

Conclusion

Non-occupational PEP remains an HIV prevention strategy that is likely to be efficacious, yet is burdened by logistical barriers as well as relatively low uptake by HIV-negative MSM. Because HIV is frequently transmitted within the context of coupled male relationships, nPEP has the potential to reduce HIV in this population. This study provides valuable data about HIV-negative partnered men's willingness to use nPEP. Our data demonstrated relatively low levels of nPEP awareness overall, but a high level of willingness to use nPEP. This suggests that efforts to raise awareness of nPEP among HIV-negative and HIV-discordant male couples could be effective in increasing nPEP utilization as a prevention strategy. Additional study is needed to better understand how nPEP can become a strategy that is viewed as salient and valuable among different populations of partnered MSM.

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