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ORIGINAL PAPER

Pre-exposure Prophylaxis Among Men Who have Sex with Men: Dual Motivational Model of Intention to Use Pre-exposure Prophylaxis

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Abstract
Men who have sex with men (MSM) account for most new HIV infections in the United States. Despite representing a fraction of the population, MSM make up an estimated 65% of new infections. To address this epidemic, pre-exposure prophylaxis (PrEP) is recommended to supplement condom use. Despite its effectiveness, PrEP uptake among MSM is low. Few studies have employed theoretical approaches to understand PrEP use intention. Incorporating factors like safe sex fatigue, expectation of better sexual experiences, and perceived risk are proposed in this dual motivational path model of PrEP use intention. This model hypothesized that PrEP use intention is influenced by two key pathways: (1) protection motivation pathway, and (2) sexual expectancy pathway. Data were collected using social networking applications from 402 MSM. The model was tested using structural equation modeling. We elaborate the complex decision-making process proposed by this novel theoretical model and discuss its practical implications.

Keywords Men who have sex with men (MSM) · Pre-exposure prophylaxis (PrEP) · Dual motivational model · Safe sex fatigue, perceived risk

Introduction

Men who have sex with men (MSM) account for most new HIV infections in the United States [1]. Despite representing only 2–5% of the U.S. population, MSM comprise an estimated 65% of new HIV infections [2–4]. A contributing factor of increased HIV incidence among MSM is associated with increasingly prevalent condomless sex. From 2005 to 2011, condom use among MSM declined by 20% [5, 6]. To address this expanding epidemic, national prevention guidelines recommend pre-exposure prophylaxis (PrEP) using Truvada to supplement to condom use [7, 8]. A meta-analysis demonstrated that PrEP decreased the rate of seroconversion in MSM by 92% when taken as prescribed [9]. PrEP has also been shown to effectively reduce HIV infections among other key populations, including sex workers in India and Africa [10], people who inject drugs in Thailand [11], women in Africa [12], and transgender women in Brazil, Ecuador, Peru, South Africa, Thailand, and the United States [13]. PrEP is approved for all women including pregnant women, sero-discordant couples and transgender women.

Although PrEP uptake among MSM is increasing in certain parts of the country, it remains relatively low and is uneven, especially among young MSM of color [14–16]. With only 5% of MSM taking PrEP, a mathematical modeling study suggests that if coverage could increase by 40% in high risk MSM, one-third of HIV infections could be averted in the next decade [17]. Despite the evidence, low PrEP uptake in MSM is associated with lack of interest or awareness, low previous experience with post-exposure prophylaxis (PEP),

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access to health insurance and cost, concerns about side effects and impact on overall health [14, 16, 18, 19].

MSM were willing, however, to consider using PrEP if they perceived it to be efficacious and if they knew their partners were on PrEP [20, 21]. One study of high-risk, HIV-uninfected MSM suggested that nearly 70% of participants were willing to use PrEP if they believed PrEP to be 80% effective in preventing HIV [21].

While PrEP may be effective, one of the unintended consequences of this prevention intervention is perhaps MSM's interest in decreasing condom use. In a study conducted in New York city, half of the men interested in using PrEP and 30% of the HIV-negative members within a sero-discordant couple in San Francisco reported their intention to decrease condom use while on PrEP [20, 21]. Qualitative evidence suggests that MSM on PrEP avoid condoms to improve their sexual experience by mitigating HIV risk while increasing sexual pleasure, freedom, and intimacy [22, 23]. Collectively, these data imply two potentially distinct motivational pathways for PrEP use: (1) internal motivation to protect oneself from HIV, and (2) expectations of better sexual experiences through condomless sex [21]. Whether or not these pathways operate independently or not, however, have not been explored.

This interest in engaging in condomless sex while on PrEP has often been attributed to the psychological phenomena of behavioral disinhibition and risk compensation while on PrEP [21, 24–27]. The theory of behavioral disinhibition argues that MSM will engage in risky behavior by relaxing self-imposed constraints because they perceive PrEP as a substitute for behavioral control. The risk compensation theory argues that MSM will engage in increased condomless sex and have higher numbers of partners on PrEP because of reduced perceived risk of HIV transmission (e.g., when their HIV + partners are virally suppressed or when they themselves are on PrEP) [28]. Collectively, these theories assume that at least some MSM are risk-seekers who desire unrestrained sexual behavior and put oneself and others in harm's way despite the knowledge of the risk involved. This assumption negatively labels MSM and does not adequately address the dilemma MSM may experience when deciding to engage in condomless sex, and elaborate the underlying motives behind their unwillingness to use condoms in the presence of an alternative that promises protection. Additionally, the theory of risk compensation has not fully found strong support by the empirical evidence [29]. For example, an HIV vaccine study with unsubstantiated efficacy showed an increase in sexual risk-taking among MSM who received the vaccine [30], yet one post-exposure prophylaxis (PEP) [31] and one PrEP [29] study showed a decrease or no change in risky behavior among MSM in the intervention group, respectively. Rather, many sexual behavior studies have cited a strong appeal for sexual pleasure, emotional connectivity and intimacy between consenting individuals as an important motivation for condomless sex [32–34]. The distinct lines of inquiry between these competing theories therefore require further reconciliation. Hence, understanding the decision-making process of PrEP use is important to develop successful prevention strategies that acknowledge and address issues related to perceived barriers posed by condoms while promoting facilitators that drive MSM's interest in using PrEP.

Expectation of Better Sexual Experience as Motivation to Use PrEP

Many factors including physical discomfort, perception of HIV as a manageable condition, optimism or complacency generated by perception of reduced severity of disease, and issues related to condom negotiation and trust have been attributed to non-use of condoms among MSM [2, 3, 30, 35, 36]. Studies show that condoms interfere with intimacy and predict higher instances of condomless sex, and the motivation for intimacy supports condomless sex and predicts PrEP use intention among MSM [34, 37, 38]. Motivation for intimacy in these studies was measured by the relational aspects of sex such as trust and connection. While condoms provide the protection from HIV and other sexually transmitted infections, MSM often perceive condoms as a major hindrance to pleasure and intimacy of sexual experience. In sum, MSM abandon condom use because it thwarts emotional gratification during sex, and PrEP may provide the assurances that MSM need to feel safe from HIV, yet does not interfere with their desire for physical and emotional gratification and intimacy. The literature, therefore, suggests that for some MSM, the intention to use PrEP is influenced by the motivation to maintain affective and sexual pleasures while still seeking protection from acquiring HIV. Hence, this study posits that the expectation of better sexual experience on PrEP will predict PrEP use intention.

Safe Sex Fatigue and Negative Attitude Toward Condoms

An important barrier to condom use among MSM is related to safe sex fatigue [39–42], which is often measured by statements like "I find it difficult to maintain sexual safety" [39, 43]. Also known as "prevention burn-out", safe sex fatigue can be defined as a state where maintaining safe sex behavior is perceived as burdensome. Trying to be consistently safe during sex, therefore, contributes towards people's negative attitude towards safe sex. And this perception of burden, in turn, affects condom use. This cyclical condom-fatigue and attitude relationship seems to adversely impact safe sex behavior and increase the risk of becoming infected with HIV. Hence, MSM experiencing higher levels of fatigue are

more likely to seek and be open to trying safer alternatives such as PrEP compared to those less fatigued. Additionally, higher number of sexual partners (considered a risk behavior) is associated with PrEP uptake [15]. Although the association between the two has not been fully explained or elaborated in the literature, it can be assumed that MSM with greater number of sexual partners want to be safe because of their greater risk of acquiring HIV, and therefore, have a higher intention and/or use of PrEP, compared to low-risk MSM. Using PrEP, or intending to do so, may be supported by (a) their need to avoid risk, and (b) the need to avoid negative experiences when using condoms, including safe sex fatigue, which they experience at a greater level than those who have fewer partners. Hence, this study posits that the number of partner will influence safe sex fatigue directly and PrEP use intention indirectly.

Perception of Risk as Motivation for PrEP Use Intention

Interest in PrEP among MSM has increased since its approval in 2012, which provides evidence of motivation to protect oneself and others from HIV and other STIs [21, 37, 42, 44, 45]. When MSM perceive themselves to be at risk, their intention to use PrEP is stronger [37]. The perception of risk is shown to increase with higher instances of condomless sex and with increased number of sexual partners [18, 37, 46–50]. Hence, the motivation behind using PrEP arises also from the need to protect oneself as well as from maintaining the benefits or pleasures of condomless sex, such as skin-to-skin contact, increased intimacy, and stress-free situations devoid of the need to inquire about partner HIV status and condom negotiation [37, 49, 50].

Thus, this study aims to explore the complex relationship between attitudes toward condom use and safe sex fatigue, expectation of better sexual experiences on PrEP, and perceived risk on PrEP use intention among MSM. Understanding this decision-making process is extremely important to develop successful preventative strategies that acknowledge and address issues related to perceived barriers posed by condoms while promoting facilitators that drive MSM's interest in using PrEP.

Model of PrEP Use Intention

Many factors like motivation to maintain intimacy with condomless sex, safe sex fatigue, lack of awareness, education, cost, side effects, negotiating capabilities, perceived risk, self-efficacy, etc., have been cited as factors that influence PrEP use intention [14, 37, 38, 46, 51]. Few studies, however, have used theoretical models to understand the process by which these predictors interact and influence each other to affect the decision to use PrEP. A study among high risk male and female drug users used the Information-Motivation-Behavioral Skills (IMB) model to explain PrEP use intention [47]. The four items used in the composite motivation variable included three questions regarding general motivation to keep oneself and others safe from HIV, and one question about not being concerned of side effects [52]. The IMB model, however, did not incorporate any questions related to sexual (or drug use) expectations and risk compensation while on PrEP.

Given the complexity of the decision-making process regarding safe sex among MSM, the current study proposes a novel theoretical model that examines the interrelationship between motivating factors for PrEP use among MSM. The model (Fig. 1) posits that a higher number of sexual partners influence perception of risk and safe sex fatigue. Safe sex fatigue, in turn, influences negative attitudes about condoms, which influences the expectation of improved sexual pleasure on PrEP. Both perception of risk and the sexual expectancy on PrEP are expected to influence the intention to use PrEP. In sum, the proposed model hypothesizes a dual pathway to explain PrEP use intention: one driven by the intention to protect self and the other by the motivation to have enhanced sexual experience on PrEP.

Methods

Using social (and sexual) networking applications (Apps) commonly used by MSM (Grindr, Hornet, Scruff, and Growlr), we gathered data from a convenience sample of 402 participants in the U.S. Participants were recruited between May to August 2015 by randomly selecting app users. Their profiles are displayed on a grid of four photos in each row. We used a randomization number chart displaying numbers from one to four to match the App's display. A standardized script was used to message 800 selected App users. Interested participants received a link directing users to the survey, where eligibility was assessed and included: self-identifying as MSM, 21 years of age or older, self-reported HIV negative status, and no previous history of using Truvada for PrEP. Eligible participants used 'click to consent' procedure. Participants were not financially compensated and the study was approved by the institutional review at Yale University.

Measures

Number of sexual partners was measured using a single item, "How many sexual partners did you have in the past 6 months?" (1 = One partner to 5 = 10 + partners).

Negative attitude towards condoms was measured using six items on 4-point Likert scale. The items were:

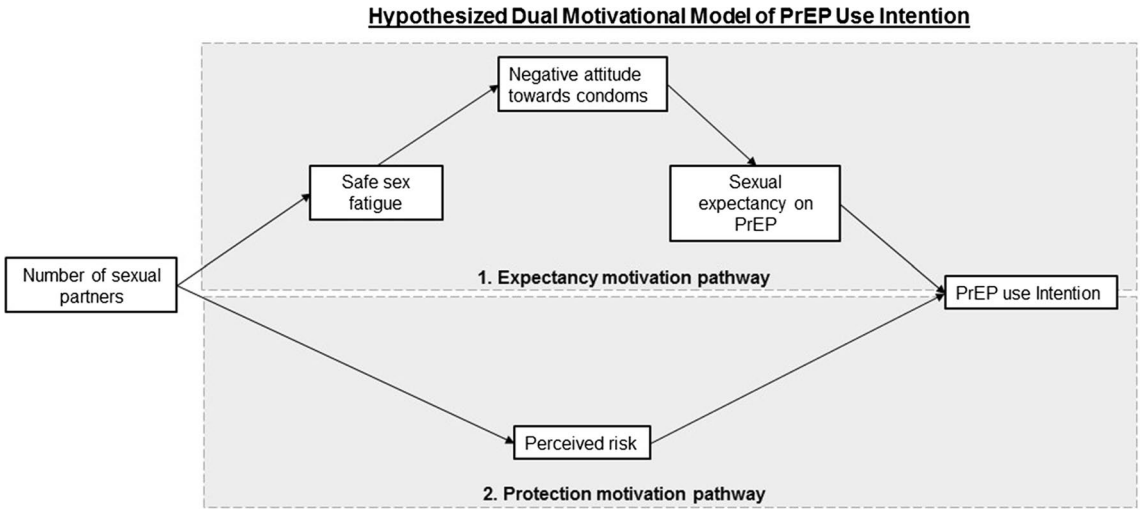

Fig. 1 Hypothesized dual motivational model of PrEP use intention. The hypothesized model proposes dual pathways to PrEP use intention. The expectancy motivation pathway, driven by the expectation of better sexual experience on PrEP and the protection motivation pathway, driven by perceived risk to self of acquiring HIV

"I believe that using condoms interferes with sexual pleasure"; "I believe that stopping to put on a condom ruins the moment"; "I believe that using condoms makes me less sexually desirable"; "Using condoms during sex ruins the mood"; "Using condom will feel unnatural"; and "My partner(s) will not be sexually satisfied if we use a condom". The Cronbach alpha of this scale in the current study was α = .90 [53].

Safe sex fatigue was measured using three items on the same 4-point Likert scale. The items were: "It takes a lot of effort for me to keep my sexual behavior safe"; "I feel tired of always having to monitor my sexual behavior"; and "I find it difficult to maintain my commitment to safer sex". The Cronbach alpha of the scale in the current study was α = .84 [41, 54].

Sexual expectancy on PrEP was measured using eight items on a 5-point Likert scale adapted from sex-related alcohol expectancies scale [55]. The items, reverse coded stemmed from one anchor statement: "When on PrEP": "I may be less likely to inquire about my partner's HIV status before having sex"; "I may be less likely to ask for/discuss/use condoms"; "I may be more likely have more adventurous sex"; "I think my sexual performance will be enhanced"; "I may feel more relaxed during sex"; "I think it will be easier to express my sexual needs or desires"; "I think sex will probably be more loving"; and "I may think about sex more often". The Cronbach alpha of this scale was α = .84.

Perceived risk was measured using two items on a 4-point Likert scale. The items were: "It is unlikely that I will get HIV in the next year" and "It is unlikely that I will get sexually transmitted infections (STI) other than HIV in the next year" [56].

PrEP use intention was measured using one item measured on a numeric rating scale: 1 = *I am certain I DO NOT WANT to start PrEP* to 10 = *I am certain I DO WANT to start PrEP* [21].

Analysis

To test the hypothetical model, we used structural equation modeling (SEM). Unlike linear regression or correlation, SEM is a statistical technique that provides flexibility to examine the interrelationships among dependent variables and independent variables. It also allowed us to examine the direct as well as indirect effects of each of the variables on the dependent variable [57, 58]. We used AMOS 24 to conduct the SEM analyses [59, 60]. Relationships that were weak (less than 0.1) and not significant at $p < 0.05$ were removed. We also used the modification indices to examine the missing links not hypothesized in the model. If those missing associations improved the overall goodness of fit of the model, we included those paths in the final model [57]. We tested for indirect effects among variables by using AMOS bootstrapping procedure with 4000 bootstrap samples and bias-corrected accelerated confidence intervals.

Results

Descriptive Results

The sample (n = 402), on an average, were their early forties ($M = 41.6$ years, $SD = 11.31$), mostly white (87.6%), 7.2%

identified as Black or African American and 12.7% identified themselves as Hispanic or Latino. Ninety-three percent reported their sexual orientation as homosexual, 5.5% as bisexual, 0.2% as heterosexual, and 0.5% as transsexual. More than half of the population had received some college education (57.8%). Majority of the population (95.3%) reported to have heard about PrEP (See Table 1).

Table 1 Key characteristics of participants

Characteristic	Total (n = 402), No. (%) or Mean ± SD
Age	M = 41.58, SD = 11.33
Race/ethnicity	
Latino or hispanic	51 (12.7)
Non-hispanic	351 (87.3)
White	353 (87.6)
African American/black	28 (7.2)
Asian	13 (3.2)
American Indian/Alaska Native	7 (1.7)
Native Hawaiian or Pacific Islander	1 (0.2)
Education	
< College	24 (6.0)
College	232 (57.7)
> College	146 (36.3)
Heard of PrEP before the study	
Yes	383 (95.3)
No	19 (4.7)
Sexual orientation	
Homosexual	374 (93)
Bisexual	22 (5.5)
Heterosexual	1 (0.2)
Transsexual	2 (0.5)
Other	3 (0.7)

M mean, *SD* standard deviation, *PrEP* pre-exposure prophylaxis

Dual Motivational Model of PrEP Use Intention

Results from the SEM analysis for the hypothesized model shown in Fig. 2 had a poor fit $\chi^2 = 48.73$, $df = 0$, p = .00 with root mean square error of approximation (RMSEA) of 0.11. Thus, a series of post hoc analyses were conducted to find the best fitting model. Missing paths suggested by modified indices based on the correlations were added to the model (See Table 2 for the correlation matrix). Additionally, age was correlated with PrEP use intention ($r = -.13$, $p < .05$), therefore it was controlled for by adding to the model. The final expanded model obtained a close fit to the data $\chi^2 = 18.55$, $df = 12$, p = .10. The final model shown in Fig. 3 also explained 20% of the variance in PrEP use intention and produced a comparative fit index (CFI) of .98, with RMSEA of .04 (PCLOSE = .72). These model fit indices suggest our model was a good fit for the data.

Direct Effects

A greater number of sexual partners in the past six months was associated with a higher perception of safe sex fatigue ($\rho = .20$, $p < .01$), and greater perceived risk ($\rho = .24$, $p < .01$). Higher perception of safe sex fatigue was directly associated with higher negative attitude towards condoms

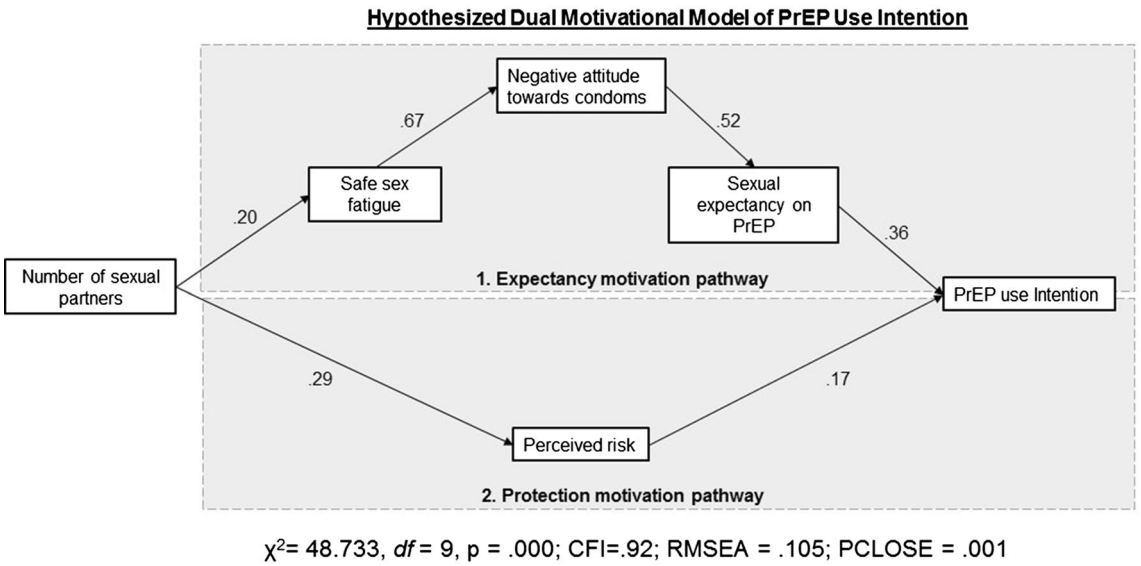

Fig. 2 Hypothesized dual motivational model of PrEP use intention. The hypothesized dual motivational model of PrEP use intention among MSM (N = 402) resulted in a poor fit. The final model explained 16% of the variance in the outcome variable PrEP use intention. Overall model fit: $\chi^2 = 48.733$, $df = 9$, p = .01; CFI = .98; RMSEA = .105; PCLOSE = .001

Table 2 Correlations among the variables used in the path analysis

		1	2	3	4	5	6	7	Mean	SD
1	Age	1.0							41.58	11.31
2	Number of partners	0.03	1.0						2.96	1.34
3	Safe sex fatigue	0.11*	0.20**	1.0					2.25	0.82
4	Negative attitude towards condoms	0.14**	0.13**	0.67**	1.0				2.29	0.72
5	Sexual expectancy on PrEP	0.059	0.14**	0.48**	0.51**	1.0			3.00	0.81
6	Perceived risk	− 0.00	0.29**	0.28**	0.18**	0.19**	1.0		1.78	0.69
7	PrEP use intention	− 0.13*	0.17**	0.28**	0.27**	0.39**	0.24**	1.0	6.41	2.73

*Correlation is significant at the 0.05 level (2-tailed)

**Correlation is significant at the 0.01 level (2-tailed)

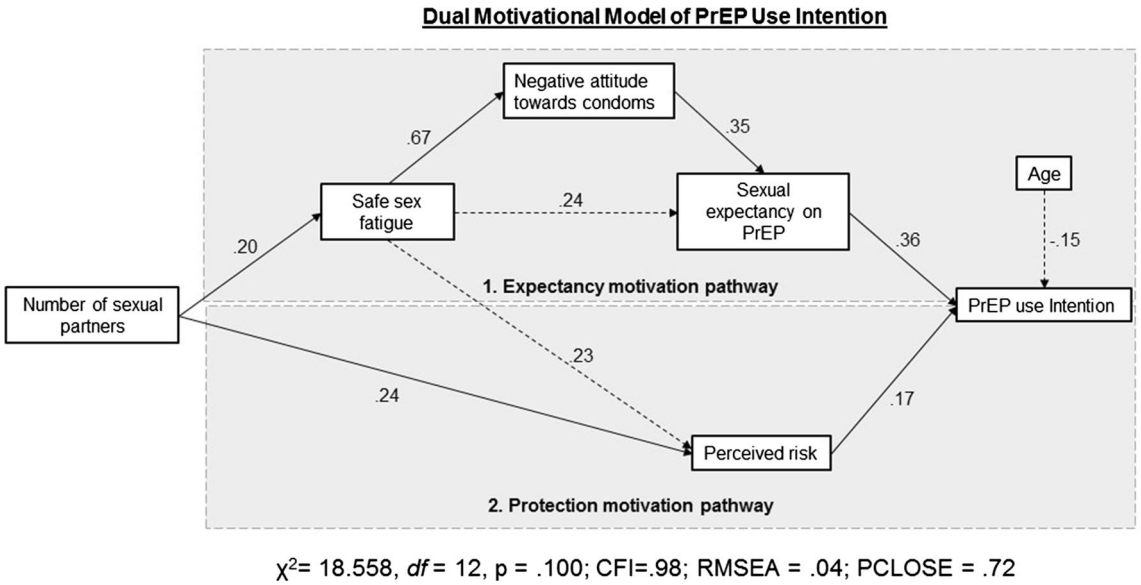

Fig. 3 Revised dual motivational model of PrEP use intention. The revised dual motivational model of PrEP use intention among MSM (N = 402). All paths are significant at p < .01. Indirect effects for tested AMOS bootstrapping procedure with 4000 bootstrap samples and bias-corrected confidence intervals. The dotted lines are paths added later based on modified indices. The final model explained 20% of variance in the outcome variable PrEP use intention. Overall model fit: $\chi^2 = 18.558$, $df = 12$, p = .100; CFI = 0.98; RMSEA = 0.04; PCLOSE = 0.72

($\rho = .67$, $p < .00$). The modified indices suggested two new direct mediating paths previously not hypothesized: paths from higher perception of safe sex fatigue to higher sexual expectancy on PrEP ($\rho = .24$, $p < .01$), and to higher perceived risk ($\rho = 0.23$, $p < .00$). Having higher negative attitude towards condoms also had a direct and positive influence on higher sexual expectancy on PrEP ($\rho = .35$, $p < .01$). Having higher sexual expectancy on PrEP was directly related to PrEP use intention ($\rho = .36$, $p < .01$). Perceived risk also directly influenced PrEP use intention ($\rho = .17$, $p < .05$). Finally, age was controlled for and it was added to the model. It was negatively related to PrEP use intention ($\rho = -.15$, $p < .00$).

Indirect Effects

We found that the number of sexual partners in the past 6 months had an indirect positive effect on PrEP use intention ($\rho = 0.08$, $p < .01$), mediated by four variables: (1) safe sex fatigue, (2) negative attitude towards condoms, (3) sexual expectancies while on PrEP, and (4) perceived risk. These mediated relationships suggested two independent paths to PrEP use intention. The relationship between the selected variables are presented in Table 3.

Specifically, a higher number of sexual partners had an indirect effect on PrEP use intention via safe sex fatigue, negative attitude towards condoms and expectation of better

Table 3 Direct, indirect and total effects among variables included in the model assessing PrEP use intention

Variables		Direct effects[a]		Indirect effects		Total effects	
Predictor	Criterion	B(SE)	Beta	B(SE)	Beta	B(SE)	Beta
Number of partners	Safe sex fatigue	0.21 (0.03)	0.2	–	–	0.12 (0.03)	0.19*
	Negative attitude towards condoms	–	–	0.07 (0.02)	0.13*	0.07 (0.02)	0.13*
	Sexual expectancy on PrEP	0.13 (0.03)	0.24	0.06 (0.02)	0.09*	0.15 (0.02)	0.09*
	Perceived risk	–	–	0.02 (0.01)	0.05*	0.06 (0.03)	0.29*
	PrEP use intention	–	–	0.17 (0.01)	0.08*	0.17 (0.04)	0.08*
Safe sex fatigue	Negative attitude towards condoms	0.60 (0.24)	0.67	–	–	0.6 (0.04)	0.67*
	Sexual expectancy on PrEP	0.24 (0.06)	0.24	0.24 (0.04)	0.24*	0.48 (0.05)	0.46*
	Perceived risk	0.23 (0.04)	0.23	–	–	0.19 (0.04)	0.23*
	PrEP use intention	–	–	0.71 (0.09)	0.21*	0.71 (0.09)	0.21*
Negative attitude towards condoms	Sexual expectancy on PrEP	0.40 (0.06)	0.35	–	–	0.4 (0.07)	0.36*
	PrEP use intention	–	–	0.49 (0.11)	0.13*	0.49 (0.01)	0.13*
Sexual expectancy on PrEP	PrEP use intention	1.23 (0.15)	0.36	–	–	1.23 (0.15)	0.17*
Perceived risk	PrEP use intention	0.65 (0.19)	0.17	–	–	0.65 (0.19)	0.36*
Age	PrEP use intention			–	–	−0.04 (0.01)	−0.15*

PrEP pre-exposure prophylaxis

*$p < .01$ for indirect and total effects

[a]All direct effects are significant at $p < .01$

sexual experience on PrEP. Negative attitudes toward condoms influenced PrEP use via sexual expectancy on PrEP ($\rho = 0.13$, $p < .01$). Using a more conventional way of testing mediation, when PrEP use intention was regressed on negative attitude towards condoms, the independent variable significantly predicted the dependent variable ($\beta = 0.26$, $p = .01$), however the relationship disappeared ($\beta = 0.09$, $p = .08$) when sexual expectancy ($\beta = 0.34$, $p < .01$) was entered into the model [61]. Perceived risk also mediated the relationship between higher number of partners and PrEP use intention. The direct and indirect paths are presented in Table 3.

Based on these findings, the final SEM favored two diverging pathways influencing PrEP use intention. One that is driven by the motivation to have better sexual experience, hence labeled as Expectancy Motivation Pathway, and the other that is driven by the need to protect oneself from infections, labeled as Protection Motivation Pathway.

Discussion

The primary goal of this study was to better understand the determinants of intention to use PrEP among MSM. Numerous individual (e.g., age, education and risky behavior such as condomless sex), medication (e.g., side effects, efficacy) and structural (e.g., free availability of PrEP) [14, 47] factors have been associated with PrEP use intention. In this study, however, as hypothesized we found two paths to PrEP use intention: (1) sexual expectancy on PrEP, and (2) perceived risk. These two pathways provide a basis for how PrEP expansion might be targeted. One path is associated with sexual expectations (expectancy driven motivation) and the other associated with protection (prevention driven motivation). For both pathways, the number of sexual partners is central to the proposed pathways. On one hand, higher number of sexual partners, condom attitude and safe sex fatigue were driving forces sexual expectancy on PrEP. On the other, higher number of sexual partners and safe sex fatigue was found to influence perceived risk (discussed in detail below). In doing so, we established a unique dual model of motivation for PrEP use intention (See Fig. 3). Examining each of these relationships separately provides us an explanation of how MSM making decision about using PrEP.

Expectancy Driven Motivation to PrEP Use Intention

In the expectancy driven motivational pathway to PrEP use intention, we see that sexual expectancy on PrEP was directly influenced by negative attitude towards condoms and safe sex fatigue, and indirectly influenced by higher number of partners. Here, sexual expectancy on PrEP is constructed by factors such as physical and emotional intimacy, condom negotiations and spontaneity. This path illustrates that those MSM who are tired of using condoms for safe sex and have stronger dislike for condoms are likely to consider using PrEP. Our finding suggest that it is not merely the negative attitude about condoms, but the promise of better sexual experiences without condoms that motivates MSM to use PrEP, expanding the process by which dislike for condoms

may trigger PrEP use intention. Consistent with previous findings, these results demonstrate the association between PrEP use intention and perceived barriers of condoms like intimacy, arousal and pleasure during sex [20, 21, 37]. This finding also highlights MSM's desire to have "normal sex" as expressed by a blogger, "When gay men have sex without a condom it is demonized as "barebacking". But when straight people do this, it is just "having sex". Many straight men have told me that their default setting is to have sex without a condom and that they will only wear one at the insistence of the female partner." [23] Future studies can examine which of the factors within sexual expectancies—namely physical pleasure, condom negotiation, or relational intimacy, is most influential in predicting PrEP use intention.

Additionally, safe sex fatigue, which is associated with decreased condom use, shows a direct influence on negative attitude towards condoms [32, 39, 43, 44, 54, 62]. Although distinctly different constructs, safe sex fatigue and negative attitudes toward condoms were found to be highly correlated in this study, suggesting that fatigue is still associated with continued use of condoms in some instances. Further, there was a direct association between higher number of sexual partners and safe sex fatigue and higher perceived risk. This suggests that MSM with higher number of sexual partners experienced a higher level of safe sex fatigue. Additionally, having multiple partners indirectly influenced PrEP use intention. These findings demonstrate that people who are engaging with many sex partners are more likely to use PrEP because they perceive using condoms as highly burdensome.

Protection Driven Motivation to PrEP Use Intention

Aligned with previous studies, the results show that perceived rather than actual risk directly and positively influences PrEP use intention [14, 52]. What is interesting and confirms previous findings is that perception of risk is directly influenced by both the number of sexual partners [14] and by safe sex fatigue [62]. This finding supports the notion that men, who engage in condomless sex despite the knowledge of risk to self, experience a state of cognitive dissonance and internal conflict [22, 23]. A study of MSM who engaged in condomless sex found a significant number of them expressed concerns about their risk of acquiring HIV, and were open to protecting oneself [45]. Hence, safe sex fatigued MSM who engage in condomless sex for the reasons of intimacy and sexual pleasure, may be more receptive to using PrEP to mitigate this internal conflict [34, 45].

In sum, this study highlights the complexity of decision-making about PrEP among MSM, while providing insights into strategies for effective intervention. The findings also provide an alternative explanation for condomless sex or increased risk behavior presented by risk compensation theory. Public health programs today are mostly geared towards promoting condoms. But because of increasing incidence of condomless sex, it is important to target those MSM, who perceive themselves to be at elevated risk, and address the underlying concerns of safe sex fatigue and the negative attitude towards condoms in all HIV communication at individual level as well as by health campaigns, without downplaying the preventative power of condoms against STIs [2, 19, 34, 41, 42].

Finally, in this study, age was negatively related to PrEP use intention, which means younger people are more likely to be interested in using PrEP. Alternatively, however, public health programs may also need to focus on older population of MSM who may be experiencing higher level of fatigue, either because they have been practicing sex with condoms longer or they simply dislike condoms for the reasons discussed above. It is also noteworthy that most MSM who participated in this study were racially white and more than 90% in this sample were college or more educated. This representation may be reflective a similar ethnic gap in access to HIV care [63] and of the digital divide [64] among different ethnic groups since this study was advertised through Internet based social networking apps used by MSM.

The findings of this study are compelling and could have several practical implications for public health programs. There are, however, noteworthy shortcomings. We can only draw associations among variables, and not causality because this was a cross-sectional data. Future studies should test the dual motivational model using longitudinal data. The study also measured intention and not the actual uptake of PrEP. Additionally, the data from this sample, did not have sufficient granularity to disentangle risk compensation.

Conclusion

This study presents a new theoretical model of understanding PrEP use intention among MSM: The Dual Motivational Model of PrEP use intention. While it is important to continue promoting condoms, especially with their benefits to preventing other treatable STIs, it is crucial to acknowledge safe sex fatigue among MSM who disproportionate experience excess burden of HIV transmission. The proposed model suggests two important path that influence PrEP use intention: (1) Expectancy Motivation Pathway (the expectation to have better sexual experience on PrEP) and (2) Protection Motivation Pathway (the expectation to protect oneself from HIV). Evidence from this study suggests that HIV campaigns need to be position and market PrEP as an additional protective strategy to supplement condom use, and as a safety net for times when there are gaps in condom use.

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Compliance with Ethical Standards

Conflict of interest Yerina S. Ranjit, Alex Dubov, Maxim Polonksy, Liana Fraenkel, Adedotun Ogunbajo, Kenneth Mayer, and Frederick L. Altice declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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