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Transactional Sex and Preferences for Pre-Exposure Prophylaxis (PrEP) Administration Modalities Among Men Who Have Sex with Men (MSM)

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Abstract

Pre-exposure prophylaxis (PrEP) is an important biomedical HIV prevention tool gaining more popularity among Parisian men who have sex with men (MSM) who engage in transactional sex. This study examines the knowledge of, and willingness to use, different modalities of PrEP among this subgroup. Broadcast advertisements were placed on a geosocial-networking smartphone application with a link to a web-based survey during three 24-hour periods in October 2016. Modified Poisson regression models were used to assess the association between engagement in transactional sex and preferences for each of these PrEP modalities. A total of 444 respondents were included. About 14% reported engagement in transactional sex. Ninety percent of MSM who engaged in transactional sex were knowledgeable of daily oral PrEP, while 13.3% were knowledgeable about long-acting injectable PrEP or penile or rectal microbicides. They were more likely to be aware of long-acting injectable PrEP (aRR=2.52, 95% CI=1.16-5.47) and willing to use daily oral PrEP (aRR=1.48; 95% CI=1.11-1.98) or long-acting injectable PrEP (aRR=1.40; 95% CI=1.09-1.81) than MSM who had not engaged in transactional sex. Long-acting injectable PrEP may be an important HIV prevention option for MSM who engage in transactional sex if this modality is proven effective.

Keywords

HIV/AIDS; Men Who Have Sex With Men; Transactional Sex; Pre-Exposure Prophylaxis

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The global HIV epidemic among men who have sex with men (MSM) remains a persistent public health challenge around the world, with almost 2 million new infections in the last year (UNAIDS, 2016). MSM face even greater vulnerability to HIV infection due to overlapping stigmas and structural barriers to healthcare access. Across Europe, the overall HIV incidence among MSM has been increasing since 2005 (Control, 2013). In France, for example, there was a 14% increase in HIV infection among MSM between 2011 and 2013 (Cazein et al., 2015).

In a recent global study, MSM who engaged in transactional sex (MSM-TS) had about 10-15% higher HIV prevalence than MSM who had not engaged in transactional sex (MSM-NTS) in nearly every region (Oldenburg, Perez-Brumer, Reisner, & Mimiaga, 2015). However, accurate reporting of HIV incidence among MSM-TS has proven difficult in some regions, given the criminalization of both sex work and same-sex relations, and difficulties capturing this MSM subgroup from a public health perspective (Fay et al., 2011). Research has shown varied motivation for MSM-TS. Some MSM engage in transactional sex due to financial hardship, including difficulty meeting monthly bill payments (Duncan et al., 2017). Other MSM engage in transactional sex with a stable partner and receive housing or gifts (Minichiello, Scott, & Callander, 2013). Despite the range of motivating factors guiding the sexual relationships of MSM-TS, it is important to consider the areas of HIV prevention that best target MSM-TS given their disproportionate incidence.

If used optimally, pre-exposure prophylaxis, or PrEP, is an effective form of HIV prevention for MSM (Grant et al., 2010; Liu et al., 2014). Oral daily PrEP, as well as “on-demand” PrEP administration – used before and after sexual intercourse – has been shown to significantly reduce the risk of HIV infection among MSM (Molina et al., 2015). Further studies are underway to explore the efficacy of long-acting injectable and implantable PrEP as well as rectal microbicides as appropriate alternatives (Markowitz et al., 2017). Several studies have shown that MSM in the U.S. have found these different forms of PrEP to be an attractive, acceptable alternative, and studies among MSM in parts of Europe and Asia have replicated these findings (Greene et al., 2017; Marra & Hankins, 2015; Meyers et al., 2017; Parsons, Rendina, Whitfield, & Grov, 2016).

In Europe, PrEP became available in France in 2016, representing both an opportunity to expand biomedical prevention widely throughout the population, as well as to devise a more targeted approach to reach the country’s most at-risk groups (McCormack, Noseda, & Molina, 2016). Initial studies have shown high levels of PrEP adherence among MSM in France without an increase in condomless sex, as well as reported openness to using different modalities of PrEP (Sagaon-Teyssier et al., 2016). However, the PrEP attitudes of MSM-TS in France are unknown.

MSM-TS report complex sexual networks and have more varied sexual identities (e.g. straight, bisexual, queer) making traditional MSM outreach efforts challenging (Baral et al., 2015). Furthermore, MSM-TS report less contact with the healthcare system and may face even more healthcare discrimination (Underhill et al., 2015). Additionally, they have reported higher rates of substance abuse, greater exposure to intimate partner violence and

higher numbers of sexual partners than other MSM, and may have economic incentives to engage in condomless sex (Klingelschmidt et al., 2017). PrEP can potentially serve as a reliably effective HIV prevention method among MSM in France who engage in transactional sex. However, an assessment of this population's attitudes towards various forms of PrEP is essential for successful implementation.

A recent U.S. based study examining PrEP use among MSM-TS revealed that many reported the need to conceal PrEP use because of fear that its discovery would have a negative impact on their sex-life with both primary partners as well as casual partners (Biello, Oldenburg, et al., 2017). Potential barriers remain largely unknown among MSM in Europe who engage in transactional sex, however it is important to understand the knowledge of and willingness to take different modalities of PrEP among this subpopulation. This study assessed the knowledge of and preferences for the various administration modalities of PrEP among MSM-TS in Paris, France. The effectiveness of PrEP in Paris among MSM-TS may impact the rollout of PrEP across the continent.

Method

Sample Recruitment

Potential participants were recruited utilizing broadcast advertisements placed on a popular geosocial-networking smartphone application for MSM in Paris, France. These advertisements, written in both French and English, were presented to users of this application over the course of three consecutive 24-hour periods in October 2016. Users were presented with the advertisement at their first log-in during each of the three periods. It is possible that users viewed this advertisement three times, so precautions were taken to prevent duplicate responses. In English, the advertisement read, "Looking to improve your health and the health of those in your community? Share your thoughts with us on gay and bisexual men's health and have a chance to win €65! Click more to get started!" After clicking the advertisement, users were directed to a landing page where they provided informed consent and began an online survey with 52 items.

Respondents were given the option of completing the survey in either French or English. The survey was first composed in English and translated into French using the translate, review, adjudicate, pretest, and document (TRAPD) model (Harkness, 2005). First, three native French speakers completed individual forward translations of the initial English version of the survey and these translations were then compared and integrated into a single version by a fourth French speaker. A fifth French speaker then back-translated the survey into English to test it for accuracy. All protocols were approved by the New York University School of Medicine Institutional Review Board prior to data collection.

History of Transactional Sex

Respondents were then asked about their history of transactional sex. We assessed engagement in transactional sex with the question, "Have you ever exchanged sex for money, drugs, food, or shelter?" Response options were: "Yes, in the last three months and I used a smartphone application to do so," "Yes, in the last three months and I did not use a

smartphone application to do so," "Yes, but not in the last three months; I did use a smartphone application to do so," "Yes, but not in the last three months; I did not use a smartphone application to do so," and "No." For the purposes of these analyses, a composite variable comprising all "Yes" responses was created to indicate any transactional sex vs. none.

Use of Daily Oral Pre-Exposure Prophylaxis

Respondents were given the following description of once daily PrEP, "Pre-exposure prophylaxis (PrEP) is a new prescription medication that can be taken by an HIV-negative person to protect against HIV. It is sometimes referred to by the brand name Truvada™. Currently, it is available in the form of a pill taken once every day." Participants were asked if they had ever heard of once daily PrEP to prevent HIV infection before taking the survey. Participants were also then asked if they had ever taken PrEP and if they were currently taking PrEP. Those who reported never taking PrEP were given the following statement, "Once daily PrEP has been shown to be at least 90% effective in preventing HIV when taken daily," and then asked, "How likely would you be to take this form of PrEP in the future?" Respondents answered this item on a five-point Likert scale ranging from "Very unlikely" (1) to "Very likely" (5). Responses for likelihood were recoded into unlikely/undecided to use once daily PrEP (very unlikely, unlikely and undecided) and likely to use once daily PrEP (very likely and likely combined).

Use of Event-Driven Pre-Exposure Prophylaxis

Respondents were given the following description of event-driven PrEP, "Scientists are testing the effectiveness of taking PrEP based on when someone has sex. Users of this type of PrEP would not need to take it when they are not having sex. It would involve taking four pills – two pills taken within 24 hours before sexual activity and two separate one-pill doses within two days after sex. Scientists believe that this can work similarly to daily PrEP to prevent HIV. This is called 'event-driven PrEP.'" Participants were asked if they had ever heard of event-driven PrEP before taking the survey, which is also known as event-driven PrEP. Participants were then given the following statement, "Suppose that event-driven PrEP is at least 90% effective in preventing HIV when used as described previously" and then asked, "How likely would you be to take this form of PrEP in the future?" Respondents answered this item on a Likert scale ranging from "Very unlikely" (1) to "Very likely" (5). Responses for likelihood were recoded into unlikely/undecided to use once daily PrEP (very unlikely, unlikely and undecided) and likely to use once daily PrEP (very likely and likely combined).

Use of Long-Acting Injectable Pre-Exposure Prophylaxis

Respondents were given the following description of long-acting injectable PrEP, "Scientists are also working to make a different kind of PrEP that would not requirement taking a pill every day. Instead, it would involve getting an injecting once a month and would not require a daily pill. Scientists believe that this new injection could work similarly to daily oral PrEP to prevent HIV, but conclusive results have not yet been obtained. This is called 'long-acting injectable PrEP.'" Participants were asked if they had ever heard of long-acting injectable PrEP before taking the survey. Participants were then given the following statement,

"Suppose that long-acting injectable PrEP is at least 90% effective in preventing HIV when injected every month, and then asked, "How likely would you be to take this form of PrEP in the future?" Respondents answered this item on a Likert scale ranging from "Very unlikely" (1) to "Very likely" (5). Responses for likelihood were recoded into unlikely/undecided to use once daily PrEP (very unlikely, unlikely and undecided) and likely to use once daily PrEP (very likely and likely combined).

Use of Topical Microbicides

Respondents were given the following description of topical microbicides, "Microbicides are products that are applied directly to the penis or the rectum prior to sex to prevent the transmission of HIV. They come in the form of a gel, cream, or suppository. A number of these products are currently being tested around the world to see if they are effective." Participants were asked if they had ever heard of microbicides before taking the survey. Participants were then given the following statements "Suppose a microbicide was at least 90% effective in preventing HIV as a gel applied to the penis," and "Suppose a microbicide was at least 90% effective in preventing HIV as a gel applied to the rectum," and then asked, "How likely would you be to use it the future?" for both rectal and penile microbicides respectively. Respondents answered these items on a Likert scales ranging from "Very unlikely" (1) to "Very likely" (5). Responses for likelihood were recoded into unlikely/undecided to use once daily PrEP (very unlikely, unlikely and undecided) and likely to use once daily PrEP (very likely and likely combined).

Knowledge of and Preferences for PrEP Administration Modalities

Respondents were asked "Do you know about the following kind of PrEP?" regarding the different PrEP modalities (once daily PrEP, event-driven PrEP, long-acting injectable PrEP, microbicide applied to the penis, microbicide applied to the rectum) with the following answer choices: "yes" or "no". They were also asked, "Do you currently use daily PrEP?" Respondents were then asked, "Given the choice between these different forms of prevention, which would you prefer to use?" with the following answer choices: once daily PrEP, event-driven PrEP, long-acting injectable PrEP, microbicide applied to the penis, microbicide applied to the rectum, whichever form is most effective, I have no preference, and none of these prevention strategies." Each response option was then dummy coded for use as an outcome variable in multivariate analyses with the response category being the selection the specified administration method (e.g., once daily pills) and the reference category being the selection of all other response options to this question.

Demographic Characteristics

Participants were asked to report their age (in years), which was then grouped into five categories (18 to 24, 25 to 29, 30 to 9, 40 to 49, 50 and older). Participants also reported whether they were born in France (yes, no), their sexual orientation (gay, bisexual), employment status (employed, unemployed, student), and their current relationship status (single, relationship with a man).

Data Analysis

All analyses were conducted in Stata Version 14.1 (StataCorp, College Station, Texas). First, descriptive statistics were calculated for all study variables. Next, the demographic, behavioral characteristics and likelihood and knowledge of PrEP of MSM-TS were compared to MSM-NTS using chi-square statistics. Modified Poisson regression models were then used to estimate adjusted relative risks (RR) and 95% confidence interval (CI) for the association between engagement in transactional sex, knowledge and preferences for each of the PrEP administration modalities (Zou, 2004). In addition to general engagement in transactional sex, a sensitivity analysis was conducted assessing recent engagement in transactional sex within the last 3 months. All demographic variables were included in these models as covariates.

Results

Demographics

In the 72-hour recruitment, 5,206 users clicked through the advertisement and reached the survey's landing page, while 935 users began the survey, and 580 users completed the survey, representing a response rate of 11.1%. Most users (93.4%) took the survey in French. The survey took, on average, 11.4 minutes (Standard Deviation [SD]: 4.0) to complete. The analytical sample was restricted to 444 participants (76.6%) who answered "negative" to HIV status. About 14% of MSM respondents reported engaging in transactional sex. The demographics of the analytical sample are reported in Table 1. The average age in the sample was 35.2 years (SD: 10.0). The majority of respondents (79.3%) were born in France. Most (84.7%) identified as gay, while a small number (12.6%) identified as bisexual. Most participants (83.1%) were either employed or enrolled as a student. The majority (67.1%) reported being single, while less than half (29.1%) reported being in a relationship with a man. Only a small percentage (10.4%) had ever taken or were currently taking daily oral PrEP.

Knowledge of and Likelihood to Use Different PrEP Administration Modalities

Nearly all (90.0%) MSM-TS reported knowing about daily oral PrEP, while a slight majority (55.0%) reported knowing about on-demand PrEP. A much smaller number of MSM-TS (13.3%) reported knowing about long-acting injectable PrEP or were aware of penile or rectal microbicides (13.3%). Less than half (48.3%) of MSM-TS reported they were likely or very likely to use daily oral PrEP, while a similar number (45.0%) reported they were likely or very likely to use on-demand PrEP. More than half (56.7%) of MSM-TS reported they were likely or very likely to use long acting injectable PrEP while a little more than half were likely or very likely to use penile microbicides (51.7%) and were likely or very likely to use rectal microbicides (60.0%).

Multivariate Associations Between Engagement in Transactional Sex and Knowledge of/ Likelihood to Use Different PrEP Administration Modalities

In multivariate analyses (Table 2), MSM-TS were more likely to report they were aware of long-acting injectable PrEP (aRR=2.52; 95% CI=1.16-5.47) and willing to use long-acting

injectable PrEP (aRR=1.40; 95% CI=1.09-1.81) than MSM-NTS. They were also more likely to use daily oral PrEP (aRR=1.48; 95% CI=1.11-1.98). There was no statistically significant association of transactional sex work with reported knowledge of on-demand PrEP, or topical microbicides. For MSM-TS within the last 3 months, statistically significant associations were found in terms of current use and likelihood to use daily oral PrEP, as well as likelihood to use long-acting injectable PrEP (Table 3).

Discussion

The majority of this sample of HIV-negative MSM-TS in Paris, France, reported they knew about daily oral PrEP, suggesting that public health messaging in favor of PrEP may be successful, even among MSM subgroups in Paris. However, while respondents were largely knowledgeable of daily oral and on-demand PrEP, many respondents were unaware of the development of injectable or topical microbicides to prevent HIV transmission. As studies around the efficacy of these different modalities are completed, and if these modalities demonstrate efficacy it will be important for governments to invest in educational campaigns to ensure that at-risk MSM are aware of the various options of PrEP administration. Cost-effectiveness analyses around PrEP in Europe are ongoing, and focusing on the most at-risk groups will be vital to successful implementation (Hoornenborg, Krakower, Prins, & Mayer, 2017). Public health education focused on educating MSM about different modalities may increase PrEP use substantially.

While many respondents knew about oral PrEP, the gap between those who have ever used oral PrEP and those likely to use oral PrEP among MSM may signify a problem with healthcare access. This same trend was noted whether or not MSM engaged in transactional sex. In 2016, a national risk assessment showed that about 50,000 MSM in France could benefit from PrEP (Velter et al., 2013; Velter et al., 2015). While the French government has agreed to subsidize the cost of PrEP, patients still must consider the cost and consideration of multiple doctor visits and associated lab testing.

In terms of MSM-TS, there is debate regarding the most appropriate terminology we use to describe this sexual practice (McMillan, Worth, & Rawstorne, 2018). While sex work (e.g. labor and economic mobility) or survival sex (e.g. power and disenfranchisement) are potential options, “transactional sex” arguably encompasses a broader range of men and focuses more on how the transaction of money or goods affects decision-making when it comes to sexual practice – both of the individual who gives money or goods and the individual who receives money or goods. It is important to acknowledge that MSM engage in transactional sex for many different reasons. Historically, studies have approached this group of men as economically disadvantaged and desperate; however, a more accurate understanding of this community reveals MSM-TS with a range of economic and social status (McMillan et al., 2018). Indeed, the group of men in this study represented a diverse cross-section of MSM-TS in Paris not only by employment status, but also by relationship status, age, and other demographics. Furthermore, MSM-TS are a diverse group of men in terms of sexual identity (e.g. gay, bisexual), sexual practice (e.g. condomless anal intercourse), and the frequency with which they engage in transactional sex (Grov, Koken, Smith, & Parsons, 2017). Future studies must explore how the involvement of a transaction

itself affects the sexual practices among MSM and perceived HIV risk, which has important implications for PrEP and other forms of HIV prevention. Future studies must also explore the role of sexual identity among MSM-TS on perceived HIV risk and attitudes towards PrEP.

MSM-TS however are a unique subgroup with particular HIV vulnerability. While all MSM may have mistrust of the healthcare system or may have been mistreated when they have attempted to engage care in the past, MSM-TS in particular may face even higher rates of vulnerability in seeking access to care and prevention due to the dual stigma of sexual orientation and sexual practice. MSM-TS also face higher rates of homelessness or poverty, and increased migration (Castaneda, 2013). In addition to these barriers, it is well-documented in the U.S. literature that there is still stigma around PrEP use both within and outside the MSM community despite its proven efficacy (Biello, Hosek, et al., 2017). Some MSM associate PrEP use with promiscuity and higher risk of sexually transmitted infection (STI) acquisition outside of HIV (Calabrese & Underhill, 2015). This however may be a misperception given studies showing similar rates of condom use and other sexual risk behaviors among MSM who use PrEP and those who do not (S. McCormack et al., 2016). It is possible that current options of PrEP fail MSM-TS as they deal with concerns of "anticipated stigma" from their partners (Biello, Oldenburg, et al., 2017).

Notably in our study, MSM-TS reported they were more likely to be aware of and willing to use long-acting injectable PrEP when compared to MSM-NTS, potentially speaking to a need for effective yet invisible forms of protection available without the knowledge of clients or partners. It may be difficult to engage in a discussion about HIV prevention and safe sex with clients, thus long-acting injectable PrEP may be an attractive method of HIV prevention for this MSM subpopulation. Furthermore, since MSM-TS were more knowledgeable of long-acting injectable PrEP than other MSM, it may signal that this MSM subgroup is more engaged in finding alternative prevention methods. Interestingly MSM-TS were also more likely to use daily oral PrEP, signaling that this subgroup may have a perception of greater HIV acquisition risk and thus may be more likely to use daily oral PrEP despite potential concerns around stigma.

In terms of ensuring the success of other forms of PrEP like topical microbicides, it will be important to understand which MSM subgroups are more likely to use this modality and to understand the barriers. Privacy and convenience have proven to be important considerations in determining preference for varying modalities of PrEP among MSM (Greene et al., 2017). This may be the reason that similar studies assessing preferences for different PrEP modalities among MSM in the US revealed a lower likelihood to use a topical microbicide form of PrEP (Hall, Heneine, Sanchez, Sineath, & Sullivan, 2016). Furthermore, a recent study on rectal microbicide gel noted practical barriers prior to use, including how difficult microbicides are to apply and their effects on sexual intercourse, which are important factors in considering its success in PrEP implementation (Giguere et al., 2017). Our sensitivity analysis in Table 3 showed that showed that MSM-TS but not in the last three months were more likely to use rectal microbicides. This may be a potential area of investigation to explore any specific aspects of a history of engagement in transactional sex, rather than ongoing engagement in transactional sex, may affect openness to PrEP microbicides.

There are several important limitations of this study. First, this sample was restricted to those engaged in a geospatial smartphone application, potentially missing a large swath of MSM-TS who do not have access to the application. Second, there is a wide range for what is considered “transactional sex”, from street-based sex work to monogamous relationships in which one partner benefits materially. This amorphous definition encompasses a number of MSM with different lifestyles and risk behaviors and this study did not distinguish between the specific forms of transactional sex. Furthermore, it is difficult to generalize these conclusions as the sample of MSM-TS was mostly born in France and the majority identified as gay. The experiences of immigrant MSM-TS in Paris, as well as those who do not identify as gay and thus may not be privy to public health messaging targeting the gay community are important demographics to consider. Lastly, we acknowledge that there is a difference between MSM with any lifetime history of engagement in transactional sex as opposed to those who have engaged in transactional within a period of 3 months. We conducted sensitivity analyses to ensure we explored findings with important implications for future research.

It will be important in future studies to further capture a diverse group of MSM-TS. For example, a U.S.-based study showed an association between MSM-TS with casual partners and hard drug use versus MSM-TS with regular partners and alcohol use (Bauermeister, Eaton, Meanley, & Pingel, 2017). Assessing the risk factors associated with different forms of transactional sex among MSM in Paris will allow for an accurate assessment of HIV risk. The success of PrEP as a biomedical prevention tool among at-risk MSM subgroups will perhaps be the best measure of its impact.

While MSM-TS share the same barriers to healthcare access as all MSM, the literature suggests there are likely concerns and barriers specific to this subgroup’s sexual experience that are important to consider in biomedical prevention efforts. All MSM were quite knowledgeable about oral daily PrEP, however MSM-TS were more likely to use daily oral PrEP. Stigma reduction and increased healthcare access among MSM in Paris, France may increase the number of those willing to use PrEP, however targeted interventions are required for MSM for whom the complexities of sexual relationships may increase perceived HIV vulnerability. MSM-TS have a particular incentive not to appear at greater risk of HIV infection. Public health education campaigns around the different modalities of PrEP are necessary and long-acting injectable forms of PrEP, an invisible form of prevention, may be an important option for MSM-TS.

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References

Baral SD, Friedman MR, Geibel S, Rebe K, Bozhinov B, Diouf D, Caceres CF. 2015; Male sex workers: practices, contexts, and vulnerabilities for HIV acquisition and transmission. Lancet. 385:260–273. DOI: 10.1016/s0140-6736(14)60801-1 [PubMed: 25059939]

Bauermeister JA, Eaton L, Meanley S, Pingel ES. 2017; Transactional sex with regular and casual partners among young men who have sex with men in the Detroit metro area. American Journal of Mens Health. 11:498–507. DOI: 10.1177/1557988315609110

Biello KB, Hosek S, Drucker MT, Belzer M, Mimiaga MJ, Marrow E, Mayer KH. 2017; Preferences for injectable PrEP among young U.S. cisgender men and transgender women and men who have sex with men. Archives of Sexual Behavior. doi: 10.1007/s10508-017-1049-7

Biello KB, Oldenburg CE, Mitty JA, Closson EF, Mayer KH, Safren SA, Mimiaga MJ. 2017; The “safe sex” conundrum: anticipated stigma from sexual partners as a barrier to PrEP use among substance using MSM engaging in transactional sex. AIDS and Behavior. 21:300–306. DOI: 10.1007/s10461-016-1466-y [PubMed: 27351194]

Calabrese SK, Underhill K. 2015; How stigma surrounding the use of HIV preexposure prophylaxis undermines prevention and pleasure: a call to destigmatize "truvada whores". American Journal of Public Health. 105:1960–1964. DOI: 10.2105/ajph.2015.302816 [PubMed: 26270298]

Castaneda H. 2013; Structural vulnerability and access to medical care among migrant street-based male sex workers in Germany. Social Science & Medicine. 84:94–101. DOI: 10.1016/j.socscimed.2013.02.010 [PubMed: 23455375]

Cazein F, Lot F, Pillonel J, Le Strat Y, Sommen C, Pinget R, Semaille C. 2015New HIV and AIDS diagnoses, France, 2003-2013. Bulletin Epidémioogiquel Hebdomadaire. :152–161.

Control, E. C. f. D. P. a. STI and HIV prevention in men who have sex with men in Europe. 2013. Retrieved from https://ecdc.europa.eu/en/hiv-infection-and-aids

Duncan DT, Park SH, Schneider JA, Al-Ajlouni YA, Goedel WC, Elbel B, Mayer KH. 2017; Financial hardship, condomless anal intercourse and HIV risk among men who have sex with men. AIDS and Behavior. 21:3478–3485. DOI: 10.1007/s10461-017-1930-3 [PubMed: 29101606]

Fay H, Baral SD, Trapence G, Motimedi F, Umar E, Iipinge S, Beyrer C. 2011; Stigma, health care access, and HIV knowledge among men who have sex with men in Malawi, Namibia, and Botswana. AIDS and Behavior. 15:1088–1097. DOI: 10.1007/s10461-010-9861-2 [PubMed: 21153432]

Giguere R, Rael CT, Sheinfil A, Balan IC, Brown W 3rd, Ho T, Cranston RD. 2017; Factors supporting and hindering adherence to rectal microbicide gel use with receptive anal intercour 2 trial. AIDS and Behavior. doi: 10.1007/s10461-017-1890-7

Grant RM, Lama JR, Anderson PL, McMahan V, Liu AY, Vargas L, Glidden DV. 2010; Preexposure chemoprophylaxis for HIV prevention in men who have sex with men. The New England Journal of Medicine. 363:2587–2599. DOI: 10.1056/NEJMoa1011205 [PubMed: 21091279]

Greene GJ, Swann G, Fought AJ, Carballo-Dieguez A, Hope TJ, Kiser PF, D’Aquila RT. 2017; Preferences for long-acting pre-exposure prophylaxis (PrEP), daily oral PrEP, or condoms for HIV prevention among U.S. men who have sex with men. AIDS and Behavior. 21:1336–1349. DOI: 10.1007/s10461-016-1565-9 [PubMed: 27770215]

Grov C, Koken J, Smith M, Parsons JT. 2017; How do male sex workers on Craigslist differ from those on Rentboy? A comparison of two samples. Culture, Health & Sexuality. 19:405–421. DOI: 10.1080/13691058.2016.1229035

Hall EW, Heneine W, Sanchez T, Sineath RC, Sullivan P. 2016; Preexposure prophylaxis modality preferences among men who have sex with men and use social media in the United States. Journal of Medical Internet Research. 18:e111.doi: 10.2196/jmir.5713 [PubMed: 27199100]

Harkness, J. SHARE Translation Procedures and Translation Assessment. In: Börsch-Supan, A, Jürges, H, editors. The Survey of Health, Aging, and Retirement in Europe – Methodology. Mannheim: Mannheim Research Institute for the Economics of Aging; 2005. 24

Hoornenborg E, Krakower DS, Prins M, Mayer KH. 2017; Pre-exposure prophylaxis for MSM and transgender persons in early adopting countries. AIDS. 31:2179–2191. DOI: 10.1097/qad.0000000000001627 [PubMed: 28991023]

Klingelschmidt J, Parriault MC, Van Melle A, Basurko C, Gontier B, Cabie A, Nacher M. 2017; Transactional sex among men who have sex with men in the French Antilles and French Guiana: frequency and associated factors. AIDS Care. 29:689–695. DOI: 10.1080/09540121.2016.1234680 [PubMed: 27690562]

Liu A, Cohen S, Follansbee S, Cohan D, Weber S, Sachdev D, Buchbinder S. 2014; Early experiences implementing pre-exposure prophylaxis (PrEP) for HIV prevention in San Francisco. PLOS Medicine. 11:e1001613.doi: 10.1371/journal.pmed.1001613 [PubMed: 24595035]

Markowitz M, Frank I, Grant RM, Mayer KH, Elion R, Goldstein D, Spreen WR. 2017; Safety and tolerability of long-acting cabotegravir injections in HIV-uninfected men (ECLAIR): a multicentre, double-blind, randomised, placebo-controlled, phase 2a trial. Lancet HIV. 4:e331–e340. DOI: 10.1016/s2352-3018(17)30068-1 [PubMed: 28546090]

Marra E, Hankins CA. 2015; Perceptions among Dutch men who have sex with men and their willingness to use rectal microbicides and oral pre-exposure prophylaxis to reduce HIV risk–a preliminary study. AIDS Care. 27:1493–1500. DOI: 10.1080/09540121.2015.1069785 [PubMed: 26695133]

McCormack S, Dunn DT, Desai M, Dolling DI, Gafos M, Gilson R, Gill ON. 2016; Pre-exposure prophylaxis to prevent the acquisition of HIV-1 infection (PROUD): effectiveness results from the pilot phase of a pragmatic open-label randomised trial. Lancet. 387:53–60. DOI: 10.1016/s0140-6736(15)00056-2 [PubMed: 26364263]

McCormack SM, Noseda V, Molina JM. 2016; PrEP in Europe - expectations, opportunities and barriers. Journal of the International AIDS Society. 19:21103.doi: 10.7448/ias.19.7.21103 [PubMed: 27760681]

McMillan K, Worth H, Rawstorne P. 2018; Usage of the terms prostitution, sex work, transactional sex, and survival sex: their utility in HIV prevention research. Archives of Sexual Behavior. doi: 10.1007/s10508-017-1140-0

Meyers K, Wu Y, Qian H, Sandfort T, Huang X, Xu J, Shang H. 2017; Interest in long-acting injectable PrEP in a cohort of men who have sex with men in China. AIDS and Behavior. doi: 10.1007/s10461-017-1845-z

Minichiello V, Scott J, Callander D. 2013; New pleasures and old dangers: reinventing male sex work. The Journal of Sex Research. 50:263–275. DOI: 10.1080/00224499.2012.760189 [PubMed: 23480072]

Molina JM, Capitant C, Spire B, Pialoux G, Cotte L, Charreau I, Delfraissy JF. 2015; On-Demand preexposure prophylaxis in men at high risk for HIV-1 infection. The New England Journal of Medicine. 373:2237–2246. DOI: 10.1056/NEJMoa1506273 [PubMed: 26624850]

Oldenburg CE, Perez-Brumer AG, Reisner SL, Mimiaga MJ. 2015; Transactional sex and the HIV epidemic among men who have sex with men (MSM): results from a systematic review and meta-analysis. AIDS and Behavior. 19:2177–2183. DOI: 10.1007/s10461-015-1010-5 [PubMed: 25652233]

Parsons JT, Rendina HJ, Whitfield TH, Grov C. 2016; Familiarity with and preferences for oral and long-acting injectable HIV pre-exposure prophylaxis (PrEP) in a national sample of gay and bisexual men in the US. AIDS and Behavior. 20:1390–1399. DOI: 10.1007/s10461-016-1370-5 [PubMed: 27000145]

Sagaon-Teyssier L, Suzan-Monti M, Demoulin B, Capitant C, Lorente N, Preau M, Spire B. 2016; Uptake of PrEP and condom and sexual risk behavior among MSM during the ANRS IPERGAY trial. AIDS Care. 28(Suppl 1):48–55. DOI: 10.1080/09540121.2016.1146653 [PubMed: 26883400]

UNAIDS. Global AIDS Response Progress Reporting (GARPR) 2016. 2016. Retrieved from http://www.unaids.org/sites/default/files/media_asset/global-AIDS-update-2016_en.pdf

Underhill K, Morrow KM, Colleran C, Holcomb R, Calabrese SK, Operario D, Mayer KH. 2015; A qualitative study of medical mistrust, perceived discrimination, and risk behavior disclosure to clinicians by U.S. male sex workers and other men who have sex with men: implications for biomedical HIV prevention. The Journal of Urban Health. 92:667–686. DOI: 10.1007/s11524-015-9961-4 [PubMed: 25930083]

Velter A, Barin F, Bouyssou A, Guinard J, Leon L, Le Vu S, Semaille C. 2013; HIV prevalence and sexual risk behaviors associated with awareness of HIV status among men who have sex with men

in Paris, France. AIDS and Behavior. 17:1266–1278. DOI: 10.1007/s10461-012-0303-1 [PubMed: 22968398]

Velter A, Saboni L, Sommen C, Bernillon P, Bajos N, Semaille C. 2015; Sexual and prevention practices in men who have sex with men in the era of combination HIV prevention: results from the Presse Gays et Lesbiennes survey, France, 2011. Euro Surveillance. 20

Zou G. 2004; A modified poisson regression approach to prospective studies with binary data. American Journal of Epidemiology. 159:702–706. [PubMed: 15033648]

Table 1

Sample characteristics by engagement in transactional sex (N = 444)

	Engagement in transactional sex, n (%)			
	Total, N (%)	**No**	**Yes**	***p*[a]**
Overall	**444 (100.0)**	**384 (86.5)**	**60 (13.5)**	
Age				0.159
18-24	64 (14.4)	50 (13.0)	14 (23.3)	
25-29	88 (19.8)	74 (19.3)	14 (23.3)	
30-39	131 (29.5)	119 (40.0)	12 (20.0)	
40-49	108 (24.3)	95 (24.7)	13 (21.7)	
≥ 50	46 (10.4)	40 (10.4)	6 (10.0)	
Sexual orientation				0.151
Gay	376 (84.7)	323 (84.1)	53 (88.3)	
Bisexual	56 (12.6)	52 (13.5)	4 (6.7)	
Born in France				0.646
Yes	352 (79.3)	306 (79.7)	46 (76.7)	
No	87 (19.6)	74 (19.3)	13 (21.7)	
Employment status				**0.042**
Employed	304 (68.5)	271 (70.6)	33 (55.0)	
Unemployed	64 (14.4)	50 (13.0)	14 (23.3)	
Student	65 (14.6)	54 (14.1)	11 (18.3)	
Current relationship status				0.720
Single	298 (67.1)	258 (67.2)	40 (66.7)	
Relationship with a man	129 (29.1)	110 (28.7)	19 (31.7)	
Knowledge of daily PrEP				0.480
No	57 (12.8)	51 (13.3)	6 (10.0)	
Yes	387 (87.2)	333 (86.7)	54 (90.0)	
Use of daily PrEP				0.207
No	397 (89.4)	346 (90.1)	51 (85.0)	
Yes	46 (10.4)	37 (9.6)	9 (15.0)	
Likelihood to use daily PrEP				0.070

	Engagement in transactional sex, n (%)			
	Total, N (%)	**No**	**Yes**	***p*[a]**
Overall	**444 (100.0)**	**384 (86.5)**	**60 (13.5)**	
Very unlikely/unlikely/undecided	275 (61.9)	244 (63.5)	31(51.7)	
Likely/very likely	167 (37.6)	138 (35.9)	29 (48.3)	
Knowledge of on-demand PrEP				0.394
No	222 (50.0)	195 (50.8)	27 (45.0)	
Yes	221 (49.8)	188 (49.0)	33 (55.0)	
Likelihood to use on-demand PrEP				0.939
Very unlikely/unlikely/undecided	240 (54.1)	207 (53.9)	33 (55.0)	
Likely/very likely	200 (45.1)	173 (45.1)	27 (45.0)	
Knowledge of long-acting injectable PrEP				0.079
No	407 (91.7)	355 (92.5)	52 (86.7)	
Yes	34 (7.7)	26 (6.8)	8 (13.3)	
Likelihood to use long-acting injectable PrEP				**0.033**
Very unlikely/unlikely/undecided	247 (55.6)	221 (57.6)	26 (43.3)	
Likely/very likely	194 (43.7)	160 (41.7)	34 (56.7)	
Knowledge of microbicide				0.223
No	401 (90.3)	350 (91.2)	51 (85.0)	
Yes	41 (9.2)	33 (8.6)	8 (13.3)	
Likelihood to use rectal microbicides as prophylaxis				0.398
Very unlikely/unlikely/undecided	193 (43.5)	170 (44.3)	23 (38.3)	
Likely/very likely	245 (55.2)	209 (54.3)	36 (60.0)	
Likelihood to use penile microbicides as prophylaxis				0.861
Very unlikely/unlikely/undecided	213 (48.0)	185 (48.2)	28 (46.7)	
Likely/very likely	226 (50.9)	195 (50.8)	31 (51.7)	

Note.

[a]Chi-square statistic

Table 2

Multivariate association (aRRs)[a] between engagement in transactional sex and knowledge of PrEP and likelihood to use PrEP

	Knowledge of daily PrEP	Use of daily PrEP	Likelihood to use daily PrEP	Knowledge of on-demand PrEP	Likelihood to use on-demand PrEP	Knowledge of long-acting injectable PrEP	Likelihood to use long-acting injectable PrEP	Knowledge of microbicide	Likelihood to use rectal microbicides as prophylaxis	Likelihood to use penile microbicides as prophylaxis
	aRR (95% CI)	aRR (95% CI)	aRR (95% CI)	aRR (95% CI)	aRR (95% CI)	aRR (95% CI)	aRR (95% CI)	aRR (95% CI)	aRR (95% CI)	aRR (95% CI)
Engagement in trans-actional sex										
Yes	1.03 (0.94, 1.14)	1.83 (0.92, 3.63)	**1.48** (1.11, 1.98) **	1.07 (0.82, 1.39)	1.08 (0.80, 1.45)	**2.52** (1.16, 5.47) *	**1.40** (1.09, 1.81) **	1.74 (0.82, 3.70)	1.15 (0.93, 1.43)	1.09 (0.85, 1.39)
No	Referent	Referent	Referent	Referent	Referent	Referent	Referent	Referent	Referent	Referent

Note. aRR,adjusted risk ratio; CI, confidence interval; PrEP, pre-exposure prophylaxis

[a]Adjusted for age, sexual orientation, origin (born in France), employment and relationship status.

*p<0.05;

**p<0.01

Table 3

Sensitivity Analyses of the association between engagement in transactional sex in the past 3 months and knowledge of PrEP and likelihood to use PrEP (N = 444)

	Knowledge of daily PrEP	Use of daily PrEP	Likelihood to use daily PrEP	Knowledge of on-demand PrEP	Likelihood to use on-demand PrEP	Knowledge of long-acting injectable PrEP	Likelihood to use long-acting injectable PrEP	Knowledge of microbicide	Likelihood to use RECTAL microbicides as prophylaxis	Likelihood to use PENILE microbicides as prophylaxis	Likelihood to use both RECTAL and PENILE microbicides as prophylaxis
	aRR (95% CI)	aRR (95% CI)	aRR (95% CI)	aRR (95% CI)	aRR (95% CI)	aRR (95% CI)	aRR (95% CI)	aRR (95% CI)	aRR (95% CI)	aRR (95% CI)	aRR (95% CI)
Engagement in transactional sex											
Yes, in the last three months	1.07 (0.95, 1.20)	**3.01 (1.36, 6.66)** **	**1.88 (1.35, 2.64)** **	1.06 (0.73, 1.56)	1.37 (0.97, 1.94)	2.22 (0.70, 7.02)	**1.60 (1.16, 2.20)** **	1.87 (0.68, 5.17)	0.94 (0.65, 1.37)	0.87 (0.56, 1.37)	0.77 (0.46, 1.30)
Yes, but not in the last three months	1.01 (0.88, 1.15)	1.01 (0.34, 3.02)	1.17 (0.77, 1.80)	1.07 (0.76, 1.49)	0.85 (0.53, 1.35)	**2.75 (1.09, 6.94)** *	1.26 (0.89, 1.77)	1.63 (0.63, 4.22)	**1.33 (1.05, 1.67)** *	1.26 (0.96, 1.65)	1.28 (0.96, 1.71)
No	Referent	Referent	Referent	Referent	Referent	Referent	Referent	Referent	Referent	Referent	Referent

Note. aRR, adjusted risk ratio; CI, confidence interval; PrEP, pre-exposure prophylaxis

[a]Adjusted for age, sexual orientation, origin (born in France), employment and relationship status.

*p<0.05;

**p<0.01