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The Influence of PrEP-Related Stigma and Social Support on PrEP-Use Disclosure among Women Who Inject Drugs and Social Network Members

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Abstract

Pre-exposure prophylaxis (PrEP) is a promising but underutilized HIV prevention strategy for Women who Inject Drugs (WWID). Stigma and disclosure concerns have been key barriers to PrEP use among women in PrEP efficacy trials. Social support has been found to buffer against some PrEP stigma, though these factors have been largely unexplored among WWID. Investigating how WWID disclose PrEP use is important given evidence that disclosure is associated with higher adherence. We aimed to identify the impact of stigma and support on PrEP disclosure within social networks of WWID participating in a PrEP demonstration project in Philadelphia, PA, USA. PrEP-using WWID 18 years completed social network surveys. Generalized estimating equations were used to account for the correlation of network structure. Thirty-nine WWID (i.e. egos) named an average of 9.5 ± 3.3 network members (i.e. alters), for a

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Code Availability NA

Conflict of interest The authors declare that they have no conflict of interest.

Ethical Approval Research was approved by the institutional review boards at Drexel University and Prevention Point Philadelphia.

Consent to Participate This study was performed in line with the principles of the Declaration of Helsinki. Verbal informed consent was obtained prior to data collection.

Consent for Publication Participants consented to the publication of their de-identified data.

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total sample of 371 unique relationships. Egos disclosed their PrEP use to an average of 4.0 alters (SD = 2.8). Related to PrEP stigma, participants had 0.4 times decreased odds of PrEP disclosure with alters who would disapprove of them taking PrEP (95% CI: 0.1–0.9). Related to support, participants had 2.5 times higher odds of disclosure among peers who could provide PrEP advice (95% CI: 1.0–6.0). Interventions that increase social support and decrease stigma are pivotal for increasing PrEP use disclosure among WWID.

Keywords

Pre-exposure prophylaxis; Women who inject drugs; Social networks; HIV

Introduction

In 2017, the United States Department of Health and Human Services declared a public health emergency to address the opioid crisis. Among the many devastating consequences of the opioid epidemic [1-3] is the increase of HIV outbreaks among people who inject drugs (PWID) [4-8], reversing a downward trend in this group and reflecting the need for better HIV prevention strategies for this vulnerable population. Important gender-based disparities in HIV persist among PWID, with women who inject drugs (WWID) reporting more frequent engagement in drug- and sex-related behaviors that introduce greater risks for HIV exposure than male counterparts [9-12]. Use of male condoms [13, 14] and new injection paraphernalia are effective for HIV prevention but often require negotiation with male partners [9, 15], which has impeded their use [13, 15] among WWID, who may lack power within drug and sexual relationships. Thus, innovative WWID-controlled strategies are needed to reduce the likelihood of HIV acquisition in this population.

Daily oral pre-exposure prophylaxis (PrEP) with emtricitabine/ tenofovir disoproxil fumarate (FTC/TDF) is a biobehavioral intervention that is > 90% effective in preventing HIV among women when taken consistently (i.e. taking 6 to 7 pills per week) [16-22]. However, PrEP use among WWID in the United States (US) is exceedingly low [23]. Furthermore, PrEP clinical trials and demonstration projects show that PrEP adherence has been a challenge for women [24-29]. Therefore, programs that seek to scale up PrEP for WWID will need to address adherence. One strategy shown to increase medication adherence, such as to antiretroviral therapy among people living with HIV, is by encouraging disclosure of medication use to social network members [30-32]. The main mechanisms through which disclosure may positively affect adherence is by: (1) alleviating the negative psychological and physiological consequences of hiding one's medication use [33, 34] and (2) garnering social support from confidants that can serve as a valuable resource in mutual learning and coping with stigma [34-36], all of which improve adherence outcomes. This relationship has also been described in qualitative work from PrEP clinical trials and demonstration projects among women whereby self-disclosure of PrEP-use to network members, such as family and partners, improved adherence by removing the need to hide pills, which contributed to nonadherence, as well as by increasing social support for taking PrEP [28, 37-42]. Because of the potential benefits surrounding PrEP disclosure, research is needed to identify barriers and facilitators to PrEP disclosure within relationships.

The Consequence Theory of HIV disclosure provides insight into key factors that may impact PrEP disclosure within relationships [43, 44]. Used widely to explain why HIV disclosure may or may not occur [43, 45, 46], the Consequence Theory suggests that people with HIV evaluate the consequences of disclosure, particularly the rewards, before the disclosure occurs. It follows that disclosure is more likely to occur once the rewards for disclosing outweigh the costs. One key cost of HIV disclosure is stigma [47], which is negative labeling, social devaluation and discrediting associated with a personal attribute, mark, or characteristic [48]. Stigma theory suggests that stigma is experienced by individuals as enacted, anticipated and internalized [49]. *Enacted stigma* reflects personal experiences of stereotyping, prejudice, and/or discrimination from others in the past or present due to one's stigmatized attribute. These past experiences may or may not influence one's expectation of future stigma [49, 50]. *Anticipated stigma* reflects expectations of stereotyping, prejudice, and/or discrimination from others in the future due to one's stigmatized attributes [49, 50]. People may anticipate stigma as a result of their own past experiences, or as a result of observing the experiences of others. *Internalized stigma* is seen in the endorsement and application of negative feelings and beliefs about people with the stigmatized attribute to oneself [49, 50]. As applied in the context of PrEP, stigma represents an expression of social power whereby people who use PrEP are differentiated from others and devalued because of their PrEP use [48, 51]. The negative impact of stigma on PrEP disclosure has been reported in qualitative work among women participating in PrEP clinical trials [22, 37, 38, 52-56]. The broader literature points to a variety of characteristics about PrEP and PrEP users that may be stigmatized. The similarity of PrEP to antiretrovirals used for HIV treatment facilitates HIV stigma as PrEP users may be mistakenly labeled as having HIV [57-60] which may result in stereotyping, discrimination and status loss [61]. PrEP users may also be seen as promoting sexual promiscuity, leading to sexual stigma related to norms around sexuality [54, 62-64]. For example, women participating in all three sites of the HIV Prevention Trials Network (HPTN) 082/HERS study described how anticipated HIV and sexual stigma related to their PrEP use deterred them from disclosing their PrEP use to partners and family members [37]. Additionally, many participants who disclosed their PrEP use experienced enacted stigma from partners and family members, such as having their partner end their relationship after accusing them of infidelity [37]. Anticipated stigma related to PrEP disclosure may be heightened among WWID who, in addition to experiencing stigma related to drug use, also experience greater stigma than male counterparts due to being stereotyped as promiscuous and unable to fulfill traditional gender roles as primary caregivers [65].

According to the Consequence Theory, along with potential harms of disclosure, people also consider potential rewards of disclosure, often as it relates to the acquisition of social support [66-70]. Supportive individuals provide what can be termed emotional support (e.g. expressions of caring), informational support (e.g. information that might be used to deal with stress), or tangible support (e.g. direct material aid) [71]. These functions can also be differentiated in terms of whether social support is perceived (i.e. the perception that others will be available to provide support if needed) or received (i.e. the actual support provided by others) [72]. For example, among people living with HIV in Iran, receipt of tangible support was positively and significantly associated with HIV serostatus disclosure

[66]. While the role of support on disclosure has been less studied in the PrEP literature, a qualitative analysis related to PrEP communication among WWID participating in a PrEP demonstration project in Philadelphia reported that some participants disclosed their PrEP use to partners who could provide advice about their decision to initiate PrEP [42].

These studies provide important insight into how stigma and support may be considered prior to women's PrEP use disclosure. However, less is known about how WWID, a population understudied in the PrEP literature, disclose their PrEP use. Previous work also highlights that stigma, support and disclosure are embedded within social relationships, such as among family members and partners. However, there are a range of social relationships in WWID's lives that may be important for disclosure that have yet to be explored. In order to tease apart the influences of the distinct but interrelated social influences of stigma, support and disclosure, the current study is guided by social network theory [73]. Social network theory emphasizes that individuals are embedded within a web of influential relationships. Therefore, in order to understand individuals' behaviors, network theory suggests that it is imperative to identify meaning and patterns within relationships that may constrain or facilitate behavior. One approach to social network analysis is egocentric analysis, which is a process through which respondents (hereafter referred to as "egos") list and describe their relationships with their social network partners (hereafter referred to as "alters"). Egocentric analysis is particularly useful for understanding relationship patterns, social structures, and the influence of an individual's social network on his/her behavioral outcomes. This approach has been used extensively to understand interpersonal communications [42, 74-78] and health behaviors in general [79-81], and to identify factors associated with PrEP awareness [82, 83], interest [84], and use [85]. The current analysis aims to investigate PrEP disclosure within social networks of WWID, and to determine how anticipated stigma and social support impact these disclosures. Specifically, understanding how disclosure of PrEP use occurs in interpersonal relationships could help to inform interventions to improve adherence among women at risk for HIV.

Methods

Study Participants

Egos were recruited from a PrEP demonstration project assessing PrEP engagement in a community-based syringe services program (SSP) in Philadelphia [86]. Participants in the PrEP demonstration project were HIV-negative English-speaking cisgender females, 18 years or older, were eligible for PrEP based on Centers for Disease Control and Prevention clinical guidelines [87] and were offered a PrEP prescription. Participants were followed longitudinally for up to 6 months. To be eligible to participate in the present study, participants had to be enrolled in the PrEP demonstration project and have accepted a PrEP prescription based on clinical records from the parent study. Recruitment for the present study occurred in person at the SSP as participants attended follow up visits for the PrEP demonstration project. One study team member reviewed participants' clinical records and baseline survey responses, and eligible participants were sequentially enrolled as they arrived.

Data Collection

Baseline data related to egos' socio-demographic characteristics were obtained from the PrEP demonstration project. To collect social network data for this analysis, one trained female research assistant administered computer-assisted face-to-face surveys with egos in a private space at the SSP. Egos provided verbal informed consent at the beginning of the study visit. Egos received a \$20 gift card incentive for completing the interview, which lasted approximately one hour. Research was approved by the institutional review boards at Drexel University and Prevention Point Philadelphia.

Measures

Survey items assessed egos' social networks. Egos were asked to enumerate up to 20 alters beginning with the following prompt, "*Looking back over the last 6 months—who are the people with whom you discussed matters important to you? Can you give me the name or nickname of 5 of these persons?*" Subsequent network name generators were: (a) "*Please give me the name or nickname of 5 people not previously mentioned you have had sex with in the past 6 months;*" (b) "*Please give me the name or nickname of 5 people not previously mentioned you have injected drugs with in the past 6 months;*" and (c) "*Please give me the name or nickname of 5 women not previously mentioned who you know have injected drugs in the past 6 months.*" Once this list was established, egos answered a series of questions about each alter (hereafter referred to as "alter characteristics") and their relationship with each alter (hereafter referred to as "dyadic attributes" since variables refer to each ego and alter pair [88]) described in detail below.

Dependent Variable: PrEP Use Disclosure.

The primary outcome of interest is whether or not ego disclosed that she initiated PrEP to each alter elicited, which is a dyadic variable. Egos were asked of each alter, "Did you tell [alter x] you were taking PrEP? (no/yes)."

Independent Variables

Ego Characteristics—Socio-demographic data related to egos' own attributes and behaviors included: age (measured in years), race (categorized as White, Black or Other), education level (dichotomized to "at least high school graduate" or not, due to skewness), sexual orientation (heterosexual, bisexual or homosexual, but dichotomized to heterosexual or not, due to small number of women reporting being bisexual), being homeless at the time of the survey (yes/no) and engagement in transactional sex in the last 6 months (yes/no). Self-perceived HIV risk was measured on a 5-point Likert scale ranging from extremely unlikely to extremely likely to acquire HIV. Due to small cell sizes, HIV risk was dichotomized to extremely/very likely or extremely/very unlikely/neutral for analysis. The composition of egos' egocentric networks was assessed by calculating network size (average number of alters listed by each ego) as well as the average number of alters across networks to whom egos disclosed their PrEP use.

Alter Characteristics—Egos reported on alters' age (in years), gender (male, female, trans male or trans female, later dichotomized to male/female due to skewed data), and

race (White, Black, or Other). Egos were also asked to select from the list of alters those they think: were homeless, and those perceived to be engaging in a variety of behaviors, including injecting drugs, engaging in transactional sex, and who are currently taking PrEP, with answer choices of *yes* or *no*.

Dyadic Attributes—Egos were asked to select the main relationship type with each alter, with answer choices of: acquaintance, friend, family member, main romantic partner, casual sex partner, transactional sex client, and drug buddy. Frequency of interaction was measured with the question, “*How often do you talk with or see each of the people you have listed?*”, with response categories of: every day, a few times a week, a few times a month, about once a month, a few times a year, and less than once a year [89], which was recategorized for the present analysis into to daily or not. Trust within relationships was assessed with a continuous scale ranging from 1 to 10, where 1 indicated no trust and 10 indicated high trust.

PrEP stigma and support items were developed based on formative qualitative interviews among 20 WWID participating in a PrEP demonstration project [42]. In-depth interview questions included, “*What are some of the good things that could come from you disclosing your PrEP use to others?*” and “*What are some of the bad things that could happen from you disclosing your PrEP use?*” A list of possible benefits and harms was compiled and used to formulate the quantitative items used in the present analysis. Given our interest in situating these constructs within social networks, all questions were formulated to be asked of each alter. Items were pre-tested with five WWID to ensure that the measures and concepts were relevant and written in a way that future participants would understand.

PrEP stigma was assessed with the following four items, measured on a 7-point Likert scale from 0 to 7 where 0 is strongly disagree and 7 is strongly agree: 1) *[Alter x] would judge me negatively for taking PrEP*; 2) *If I told [alter x] I was taking PrEP, [alter x] would think I had HIV*; 3) *If [alter x] was taking PrEP, he/she would keep it a secret from others*; and 4) *[Alter x] would disapprove of me taking PrEP*.

PrEP support items were measured on 7-point Likert scales from 0 to 7 where 0 is strongly disagree and 7 is strongly agree. Informational support was assessed by asking, *I could go to [alter x] for advice about taking PrEP*. Emotional support was assessed with: *[Alter x] would be proud of me for taking PrEP*. and *[Alter x] would encourage me to take my PrEP pills every day*. Tangible support was assessed with the following question: *[Alter x] could store my PrEP pills for me, if I asked him/her to*. All PrEP stigma and support items were dichotomized to agree vs disagree due to skewness of data.

Analytic Approach

The analytic approach was to explore a range of explanatory variables at the dyad (pair of each alter and their ego) level that predicted PrEP disclosure (a dyadic variable). Because the outcome of interest is a dyadic variable, the unit of analysis consisted of the 371 dyads elicited from 39 naming egos. First, descriptive statistics (e.g. frequencies and means) were constructed to examine ego-, alter-, dyadic, and network-level summary measures. Second, logistic generalized estimating equations (GEE) models were fit using ‘xtgee’ in STATA

[90] to examine the bivariate relationship between each predictor variable and our primary outcome of PrEP-use disclosure within dyads. Briefly, the GEE approach corrects for the correlated (i.e. dependent) structure of social network data wherein alters ($n = 371$) are clustered around egos ($n = 39$). Because we adopted an exploratory approach and included a larger number of potentially relevant predictor variables, a forward selection approach to model specification was used [91]. Correlation matrices among predictor variables were first explored to identify collinearity and a moderate to strong correlation threshold (where $r > 0.30$) resulted in two variables being excluded from multivariable analyses: “alter engages in transactional sex” and “alter injects drugs” as they were highly correlated with alters’ HIV risk. Variables identified as being statistically (or marginally) significant predictors ($p < 0.10$) were retained and estimated in a final model. It is important to highlight that no ego-level variable was significant at the bivariate level (data not shown), so none were included in the final multivariable model. The final multivariable model tested for significant alter-, dyad-, and network-level predictors of PrEP use disclosure. Lastly, a post hoc crosstabulation was conducted to identify correlations between relationship type and endorsement of PrEP-use disapproval (a stigma item) and advice-giving (a support item).

Results

Ego characteristics are reported in Table 1. Egos ($n = 39$) named an average of 9.5 ($SD = 3.3$) alters, for a total sample size of 371 unique dyads. All ($n = 39$) had disclosed their PrEP use to at least one person in their network. Attributes of alters and dyads are summarized in Table 2. The majority of alters were female ($n = 236$; 63.6%), non-Hispanic White ($n = 200$; 53.9%), with a mean age of 40.1 ($SD = 9.4$). Across egos’ networks, half of alters were perceived to be at risk for HIV ($n = 184$), and 19 alters (5.1%) were currently taking PrEP. Alters represented a diverse group of relationships: 35.6% ($n = 132$) were friends, 23.2% ($n = 86$) were acquaintances, 17.3% ($n = 64$) were family members, and 7.6% ($n = 28$) were main romantic partners. Egos interacted in-person with 72.2% ($n = 268$) of alters every day.

Focusing on the total 371 dyads elicited, egos disclosed their PrEP use to 42.3% of alters ($n = 157/371$). This included 78.6% ($n = 22/28$) main partners, 56.3% of family ($n = 36/64$), 47.7% of friends ($n = 63/132$), 29.1% of acquaintances ($n = 25/86$), 22.7% of transactional sex clients ($n = 5/22$), 16.0% of drug buddies ($n = 4/26$) and 14.3% of casual sex partners ($n = 2/14$).

Related to PrEP stigma, egos perceived that 32.4% of alters would keep their PrEP use a secret ($n = 120/371$), 29.4% would disapprove of them for taking PrEP ($n = 109/371$), 17% would think the ego had HIV ($n = 63/371$), and 12.2% would judge the ego negatively for taking PrEP ($n = 45/370$). Related to PrEP support, egos perceived that 42.3% of all alters would be proud of them for taking PrEP ($n = 157/371$), 32.1% would encourage them to take their PrEP daily ($n = 119/371$), 27.5% could provide advice ($n = 102/371$), and 22.1% could store their PrEP pills for them ($n = 82/371$).

Factors Associated with PrEP Disclosure within Dyads

Table 3 shows unadjusted and adjusted odds ratios (UOR and AOR) of factors associated with PrEP disclosure in dyads. At the bivariate level, egos had higher odds of disclosing

PrEP use to alters perceived to be taking PrEP (UOR 2.5; 95% CI: 1.1–5.9), within dyads with higher trust (UOR 1.2; 95% CI: 1.1–1.3), and with whom they interact in-person daily (UOR 1.9; 95% CI: 1.1–3.1). Egos had increased odds of disclosure with main romantic partners (UOR 7.4; 95% CI: 2.4–23.0), family (UOR 3.0; 95% CI: 1.0–8.5), and friends (UOR 2.1; 95% CI 1.0–4.4), compared to acquaintances. Related to stigma, egos had 0.2 times decreased odds of disclosure to alters perceived to disapprove of them taking PrEP (95% CI: 0.1–0.4). Related to support, egos had increased odds of disclosure with alters that could provide PrEP advice (UOR 3.9; 95% CI: 2.2–7.1), could store PrEP pills (UOR 5.5; 95% CI: 2.5–12.1), would be proud of the ego (UOR 4.2; 95% CI: 2.0–8.8), and would encourage the ego to take PrEP every day (UOR 5.2; 95% CI: 2.5–10.8). In the multivariable model, PrEP disclosure remained significantly associated with perceptions that the alter is taking PrEP (AOR 4.0; 95% CI: 1.4–13.4) and that the alter could provide advice-related support (AOR 2.5 95% CI: 1.0–6.0). Related to PrEP stigma, egos had 0.4 times decreased odds of PrEP disclosure with alters who would disapprove of them taking PrEP (95% CI: 0.1–0.9).

Due to the statistical significance of alter disapproving of PrEP use (stigma) and alter being able to provide advice (informational support), a post hoc analysis was conducted to identify the percentages of endorsement of these two constructs by relationship type (Table 4). Related to alter disapproval, 50% of casual partners (7/14), 45.5% of transactional sex clients (10/22), 45.4% of acquaintances (39/86), 40% of drug buddies (10/25) 21.9% of family members (14/64), 18.2% of friends (24/132) and 17.9% of main romantic partners (5/28) would disapprove of egos taking PrEP. Related to advice, 48.4% of family members (31/64), 39.5% of main romantic partners (11/28), 36% of drug buddies (9/25), 31.8% of friends (42/132), 14.3% of casual sex partners (2/14), 7% of acquaintances (6/86), and 1% of transactional sex clients (9/25) would be able to provide advice related to taking PrEP.

Discussion

The current findings indicate that that dynamics within relationships, such as anticipated stigma and support, were associated with PrEP disclosure within social networks of WWID. To our knowledge, this is the first study to identify the impact of stigma and support on PrEP use disclosure within networks of WWID, a population at increased risk for HIV infection [92-95] that is often neglected in harm reduction research [49]. Using a network approach was vital for identifying the nuanced impact of social networks on PrEP disclosure. Our results suggest that the function of support provided was critical for disclosure, whereas the role of the alter was less important. These findings have important implications for the design of interventions to increase PrEP disclosure with the goal of improving PrEP adherence among WWID while also decreasing community-wide stigma.

Egos in this study identified a variety of network members who could provide PrEP support, including main romantic partners, family members, and drug buddies. While all support measures were significantly associated with disclosure at the bivariate level, relationships where peers could provide advice was the only support variable significant in the multivariable model. Therefore, strategies that capitalize off of advice-supporting relationships may be useful for increased PrEP disclosure and adherence. To enhance

support and PrEP disclosure, it may be beneficial to help WWID both identify network members who may be supportive as well as enhance their skills in how to obtain PrEP support from network members. There are various strategies for creating advice-supporting relationships when they do not exist within egos' social networks, such as through in-person or virtual adherence support groups where women taking PrEP can come together to discuss their experiences, as well as offering and receiving PrEP-related advice. For example, adherence support clubs were incorporated in the FACTS001 and HPTN082 clinical trials, and were found to be acceptable, rewarding, and associated with higher adherence [96, 97]. Additionally, PrEP-using WWID may benefit from serving as peer mentors in future PrEP interventions. Peer mentor interventions would have the advantage of placing women in an empowering advice role while also supporting potential PrEP users as they learn about and consider PrEP use. This approach has been used frequently to engage, connect and support vulnerable populations as they navigate care for substance use disorder treatment [98], HIV [99], HCV [100], and has been found to be an acceptable and effective way to educate women at high risk for HIV about PrEP [101]. Additional studies are warranted to evaluate WWID's perceptions of the acceptability of serving in these peer leadership roles.

In addition to social support, sources of PrEP-related stigma were found within WWID's social networks. Of particular importance was a sense of peer disapproval, which was commonly anticipated with acquaintances, transactional sex clients, casual sex partners, and drug buddies. While social scientists have long held that close and intimate relationships (e.g. family and romantic partners) are essential for understanding social networks, ties with acquaintances and more peripheral network members also serve a variety of important social functions, such as the diffusion of information and access to social capital [102, 103]. Findings from our study suggest that many of the peripheral relationships were sources of anticipated PrEP stigma, which may reflect perceptions that stigma exists within the wider community. More research is needed to identify whether network members perceived to be stigmatizing actually endorse stigmatizing attitudes. WWID interested in PrEP may therefore benefit from developing skills to overcome potential stigma within relationships to facilitate disclosure, such as counseling sessions where women could discuss disclosure strategies with a variety of relationship types and role play disclosure with a counselor [37]. Community-level interventions shown to decrease stigma, such as peer outreach and educational campaigns [104], may also be critical.

In line with previous studies examining PrEP use disclosure among women participating in the PrEP clinical trials [37, 39], we found that the relationship between WWID and their main romantic partner was important for disclosure. For example, data from the Partners PrEP clinical trial similarly demonstrated that African women in serodiscordant relationships identified that main romantic partners could support PrEP adherence by providing daily reminders of dosing times, matching their dosing schedules, and helping with other tasks such as housework [39]. As a point of contrast, women in this same clinical trial who experienced uncooperative partners claimed that this contributed to adherence lapses [39]. Disapproving partners, including partners who would terminate a relationship with a woman if they were to take PrEP, were additionally shown to reduce PrEP adherence in the HPTN 082 PrEP Trial performed in Africa [37]. Given the multitude of studies demonstrating that partner support or opposition can significantly impact women's PrEP

adherence, strategies to foster support from romantic partner relationships may be key to improving PrEP use among WWID [41]. For example, couples based interventions have been previously endorsed as an effective way of improving engagement in other HIV-related interventions, such as HIV testing and antiretroviral therapy adherence [105, 106]. Despite their successes in other populations for improving HIV testing and treatment, couples-based HIV prevention and intervention studies remain limited among WWID [106]. However, even if women have uncooperative partners, data from this analysis suggest that other network members may be supportive and could be used in a dyadic intervention.

Our findings must be interpreted in light of limitations. Being a cross-sectional study, we cannot account for patterns in PrEP use disclosure that may change over time. Additionally, we cannot establish causality between disclosure, stigma, and support. Another limitation includes not assessing the forms of support or stigma women actually experienced (also known as received support and enacted stigma) after disclosure. Future studies should assess the support and stigma experienced after PrEP disclosure. Although the study had a relatively small number of egos, the rich and detailed social network data allowed for a nuanced examination of the network attributes and relationships associated with PrEP use disclosure. Lastly, instruments used to assess stigma and support have not been previously validated. However, items were constructed to be appropriate for the social network nature of this study, developed based on interviews with WWID and pilot tested for relevance and comprehension. Despite these limitations, we believe this study makes key contributions to inform the development of programs to increase PrEP use among WWID. Stigma and support from a variety of network members impact PrEP use disclosure among WWID and peers. Therefore, interventions aimed at these different relationships may be key to increasing PrEP disclosure, PrEP adherence, and potentially PrEP uptake within the community.

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Table 1

Ego Characteristics (n = 39)

	N (Percent)
Age (mean, std)	40.1 (9.3)
Race ^a	
White	19 (52.8)
Black	11 (30.6)
Other ^b	6 (16.7)
At least high school education	21 (53.9)
Heterosexual	26 (66.7)
Currently homeless	24 (61.5)
Engagement in transactional sex	24 (61.5)
Perceives herself as extremely/very likely to acquire HIV	19 (39.5)
Accepted PrEP prescription	39 (100)
Disclosed PrEP use to 1 network member	39 (100)
Network size ± SD	9.5 (3.3)
Average number of alters with whom participants disclosed PrEP to within personal networks	4.0 (2.8)

^a race data missing for 4 participants

^b includes Asian, Pacific Islander, Native Hawaiian and mixed race

Table 2

Alter and Dyadic Attributes (n = 371)

Characteristic	N (Percent)
Alter Attributes (n = 371)	
Female	236 (63.6)
Race	
White	200 (53.9)
Black	116 (31.3)
Other ^a	55 (14.8)
Age (mean, std)	40.1 (9.4)
Homeless	126 (34.3)
HIV risk is medium/high	184 (50.8)
Engages in transactional sex	156 (56.0)
Injects Drugs	230 (29.5)
Perceived to be taking PrEP	19 (5.1)
Dyadic Attributes (n = 371)	
Relationship type	
Friend	132 (35.6)
Acquaintance	86 (23.2)
Family	64 (17.3)
Main romantic partner	28 (7.6)
Drug buddy	25 (6.7)
Transactional sex client	22 (5.9)
Casual sex partner	14 (3.8)
Interacts in-person daily	268 (72.2)
Trust on a scale of 1–10 (mean, std)	5.6 (3.5)
Ego disclosed PrEP use within dyad	157 (42.3)
Agreement with PrEP Stigma	
Alter would judge ego negatively	45 (12.2)
Alter would think ego had HIV	63 (17.0)
Alter would keep PrEP use a secret	120 (32.4)
Alter would disapprove of ego taking PrEP	109 (29.4)
Agreement with PrEP Support	
IS ¹ : Alter could provide advice	102 (27.5)
TS ² : Alter could store PrEP pills	82 (22.1)
ES ³ : Alter would be proud of ego for taking PrEP	157 (42.3)
ES ³ : Alter would encourage respondent to take PrEP daily	119 (32.1)

^aincludes Asian, Pacific Islander, Native Hawaiian and mixed race

¹IS = Informational support

²TS = Tangible support

³ES = Emotional support

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Table 3

Unadjusted and Adjusted Odds Ratios (UOR and AOR) of Alter and Dyadic Attributes that Predict PrEP Use Disclosure within Relationships using Generalized Estimating Equations (n = 371)

Characteristic	UOR (95% CI)	AOR (95% CI)
Alter Attributes		
Female	1.4 (0.9–2.1)	–
Race		
White	REF	–
Black	1.0 (0.6–1.8)	–
Other ^a	1.8 (0.9–3.5)	–
Age	1.0 (1.0–1.0)	–
Homeless	0.4 [†] (0.2–0.9)	1.0 (0.3–2.7)
HIV risk is medium/high	0.7 (0.4–1.2)	–
Perceived to be taking PrEP	2.5 [*] (1.1–5.9)	4.4 [*] (1.4–13.4)
Dyadic Attributes		
Relationship type		
Friend	2.1 [*] (1.0–4.4)	1.4 (0.6–3.3)
Acquaintance	REF	REF
Family	3.0 [*] (1.0–8.5)	1.1 (0.3–4.1)
Main romantic partner	7.4 ^{**} (2.4–23.0)	3.6 (0.8–15.7) [†]
Drug buddy	0.3 (0.1–1.6)	0.3 (1.0–1.0) [†]
Transactional sex client	0.4 [†] (0.1–1.2)	0.4 (0.1–1.0) [†]
Casual sex partner	0.7 (0.2–2.1)	0.9 (0.3–2.7)
Interacts in-person daily	1.9 [*] (1.1–3.1)	1.5 (0.8–3.1)
Trust	1.2 [*] (1.1–1.3)	1.0 (0.9–1.0)
Agreement with PrEP Stigma		
Alter would judge ego negatively	0.5 (0.2–1.2)	–
Alter would think ego had HIV	0.9 (0.4–2.0)	–
Alter would keep PrEP use a secret	0.6 (0.3–1.3)	–

Characteristic	UOR (95% CI)	AOR (95% CI)
Alter would disapprove of ego taking PrEP	0.2* (0.1–0.4)	0.4* (0.1–0.9)
Agreement with PrEP Support		
IS ¹ : Alter could provide advice	3.9*** (2.2–7.1)	2.5* (1.0–6.0)
TS ² : Alter could store PrEP pills	5.5*** (2.5–12.1)	1.2 (0.4–3.7)
ES ³ : Alter would be proud of ego for taking PrEP	4.2*** (2.0–8.8)	1.1 (0.4–3.0)
ES ³ : Alter would encourage respondent to take PrEP daily	5.2*** (2.5–10.8)	2.0 (0.8–4.9)

^a includes Asian, Pacific Islander, Native Hawaiian and mixed race

¹ IS = Informational support

² TS = Tangible support

³ ES = Emotional support

⁺ p < 0.10

^{*} p < 0.05

^{***} p < 0.01

Post-hoc crosstabulation of relationship types endorsing PrEP-use disapproval (n = 109) and advice giving (n = 102)

Table 4

Relationship Type	Total	Alter would disapprove (n = 109) N (percent)	Alter could provide advice (n = 102) N (percent)
Associate	86	39 (45.4)	6 (7.0)
Friend	132	24 (18.2)	42 (31.8)
Family member	64	14 (21.9)	31 (48.4)
Main romantic partner	28	5 (17.9)	11 (39.3)
Casual sex partner	14	7 (50.0)	2 (14.3)
Transactional sex client	22	10 (45.5)	1 (4.5)
Drug buddy	25	10 (40.0)	9 (36.0)