Original Research Article

INTERNATIONAL JOURNAL OF STD & AIDS

International Journal of STD & AIDS
2023, Vol. 0(0) 1–8

DOI: 10.1177/09564624231214287
journals.sagepub.com/home/std
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Substance use, economic vulnerability, and HIV/STI risk among female sex workers in Mexico

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Abstract

Background: Economic hardship (e.g., difficulty to pay for basic needs) has been associated with increased HIV/STI risk among female sex workers (FSW), and may be exacerbated by high levels of substance use. Few studies have assessed the intersection of economic hardship, substance use, and HIV/STI risk among FSW.

Methods: Quantitative data were collected via questionnaires among 469 FSW residing in Tijuana and Ciudad Juarez, Mexico. Using logistic regression, we assessed the role of economic hardship on the association between substance use (past 30-days alcohol use, drug use, or injection drugs use with clients, and past 6-months drug use) and testing positive for an STI (also an indicator of HIV risk).

Results: Drug use in the preceding six months was significantly associated with testing positive for an STI (AOR = 1.8, CI: 1.1 = 2.9, $p = .02$); no difference in this association was found by whether women reported economic hardship. Past 30-day drug use with clients was associated with STI infection, but only among those who did not report economic hardship (AOR = 1.5, 95% CI: 1.1–1.9, $p < .01$).

Conclusions: Findings suggest that economic hardship influences the association between substance use and increased risk for HIV/STI among FSW; however, these associations may be more complex than previously hypothesized.

Keywords

Female sex workers, economic security, sexual risk, HIV

Date received: 27 July 2023; accepted: 30 October 2023

Introduction

HIV is a significant issue in Tijuana and Ciudad Juarez, two cities in Mexico on the U.S.-Mexico border.[1,2] While Mexico has a low overall HIV prevalence, higher rates of HIV have been observed in certain subgroups near the U.S.-Mexico border, including female sex workers (FSW) and people who inject drugs.[1,2] Notably, HIV prevalence has been reported to be as high as 5%–10% among FSW and up to 12% among FSW who inject drugs.[1,2] In both cities, many FSW originally migrated there from other parts of Mexico in search of economic opportunities. FSW in Mexico are at increased risk for HIV/STI, primarily through occupational risk exposures that involve (1) high rates of violence perpetrated by clients and police, (2) sexual risks for HIV/STI, and (3) risks for HIV/STI related to substance use.[1,2]

Heightened vulnerability to HIV among FSW stems from a range of structural factors that shape the context in which sex work occurs and that drive risk.[1,2] FSW experience high levels of physical and sexual violence perpetrated by clients and police, increasing HIV/STI susceptibility (i.e., via forced unprotected sex).[3–8] FSW are also at greater risk for HIV/STI through sexual transactions with clients, particularly via unprotected sex trades (i.e., sex without a condom).[7,8] Notably, venues have been reported to limit women's access to condoms and condom negotiation with clients among FSW, either directly through discouraging the

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use of condoms or indirectly by requiring women to drink alcohol or use drugs with clients, which reduces women's power to negotiate condom use with clients.[9,10]

Substance use, which is commonly reported among FSW in Tijuana, has a well-documented association with reduced condom use as well as physical and sexual violence, all of which compound HIV/STI risk.[3,11,12] Substance use decreases women's capacity to negotiate condom use[13] and substance use by clients increases client perpetration of violence against FSW.[3,12] However, FSW report making more money when they use drugs and alcohol with clients.[3] Substance use is also often a condition of employment; certain organized entertainment venues, such as bars and clubs, require FSW to use drugs/alcohol while working or encourage FSW to drink with customers.[10,14,15] Many organized venues also encourage client substance use, which increases the likelihood of experiencing client violence and further impedes FSW ability to negotiate condom use.[6,13] Thus, while many FSW view working in organized venues as "safer" than working elsewhere (e.g., on the street),[12] women working in venues may be engaging in riskier behaviors for HIV/STI, given that substance use is so commonly promoted in these contexts.[13] FSW also report using drugs/alcohol in order to work longer hours and potentially make more money,[12,13,16] but also to cope with the stress of their job, particularly from experiences of violence from clients and others.[12]

Substance use may also deplete financial resources, thereby increasing economic hardship, which can impact HIV/STI-related health outcomes. Previous work among FSW has found that women who experience economic hardship (e.g., identify as being the sole provider for their family, report being in debt, report food insecurity) are also at heightened risk for HIV/STI.[17–20] Economic hardship among FSW is associated with higher levels of physical and sexual violence, inconsistent condom use with clients, and agreeing to unprotected sex in exchange for more money.[15,21–23] One study conducted among FSW in India found women who reported debt were more likely to report experiencing at least one STI symptom and more likely to engage in unprotected sex with occasional clients.[17] Economic vulnerability may also be exacerbated by high levels of substance use. However, studies have not been conducted to understand the intersection of economic hardship, substance use, and risk for HIV/STI among FSW.

Given the well-documented relationship between substance use and HIV/STI risk, as well as recent work establishing that economic hardship also exacerbates HIV/STI risk, more work is needed to determine how substance use, economic hardship, and HIV/STI risk intersect. The purpose of this study was to assess the association between substance use and HIV/STI risk, and how this association varies by women's economic situation, among 469 FSW in Tijuana and Ciudad Juarez, Mexico.

Methods

Study setting

Proyecto Mapa de Salud is a longitudinal cohort study assessing the HIV/STI risk environment for FSWs in Tijuana and Ciudad Juarez, Mexico. The study was conducted in Tijuana (Baja California) and Ciudad Juárez (Chihuahua), two US-Mexico border cities. Tijuana (population: 2.1 million) shares a border with San Diego, California, while Ciudad Juarez (population: 2.5 million) shares a border with El Paso, Texas.[23] In Tijuana, sex work is quasi-regulated in the Zona Norte, an area in the city where women are permitted to conduct sex work if they undergo routine HIV/STI testing and carry a current work permit verifying recent STI testing.[24,25] Sex work is not legal in Ciudad Juarez and occurs throughout the city.

Data collection

Data for the current analysis are from the Mapa de Salud 6-months follow-up survey, which was collected between March 2013 and March 2014. Participants were recruited for the initial Mapa de Salud study using modified time-location sampling in indoor and outdoor sex work venues (e.g., bars, clubs, brothels), with no more than 15 women recruited from one venue. Eligibility criteria for the baseline survey included (a) 18 years of age or older, (b) biologically female, (c) report having exchanged sex for money or other goods at least 4 times in the past month with at least four different clients, (d) agree to treatment if testing positive for STIs, and (e) residing in Tijuana or Ciudad Juarez with no plans to move over the next 18 months (the duration of the study). In the 6-months follow-up survey, some participants no longer reported sex work in the past 30 days; thus, we restricted our data for the present analysis to only include participants who reported having exchanged sex for drugs, money, food, or other goods within the past 30-days (n = 469). In a private location within our study offices and facilitated by a trained interview facilitator, participants completed an interviewer administered quantitative survey using computer-assisted personal interviewing (CAPI) and were tested for HIV/STI. Participants received $25 US for participating in the 6-months follow-up survey. More detail on study design can be found elsewhere.[26] The study was approved by Institutional Review Boards (IRB) at the University of California, San Diego (UCSD), El Colegio de la Frontera Norte (El COLEF) in Tijuana, and Universidad Autónama de Ciudad Juárez in Ciudad Juarez.

Measures

STI serostatus (as an indicator of HIV risk). Laboratory testing was used to measure STI serostatus. Within our study offices, in a private room equipped with the necessary clinical

equipment, a study nurse tested participants for gonorrhea and chlamydia using vaginal swabs (Aptima Combo 2, Genprobe). Rapid tests (e.g., finger prick) were used to test for syphilis (SD BIOLINE Syphillis 3.0, Standard Diagnostics) and sent to the San Diego County laboratory for testing. Participants received counseling before STI testing and again after receiving results. Free on-site treatment was provided to participants who tested positive for any STI. A dichotomous STI variable was constructed to represent participants who tested positive for *any* STI (chlamydia, gonorrhea, syphilis) versus participants who did not test positive.

Substance use. Participants were asked how often (never to more than once a day) they used drugs (cocaine, crack, heroin, methamphetamine, inhalants, and/or tranquilizers) in the past 6-month. Items were dichotomized (ever vs never) and a new variable was created to assess whether participants ever used *any* drug in the past 6-month (yes/no). Past 30-days substance use with clients was measured with three separate items asking participants how often they: (1) used alcohol with clients, (2) used any drug with clients, or (3) injected drugs with clients right before or during sex in the past 30-days. All variables were measured using a 0 (*never*) to 4 (*always*) point scale.

Economic hardship. Although there are not any validated scales that capture economic hardship, previous studies have measured various forms of economic hardship among female sex workers; this work has most often found that the difficulty in being able to pay for basic needs, such as food, creates an urgency in women's work and can reduce women's power to negotiate condom use and for safety precautions with clients.[18,19,27,28] In this analysis, participants were asked to rate their current financial situation using a 5-point scale ranging from 1 (*extremely good*) to 5 (*extremely poor*), with higher scores indicative of a worse economic situation.

Demographics. Current civil status whether participants had children living at home (yes vs no), sex work venue type (e.g. hotel, street, bar), study site (Tijuana or Ciudad Juarez), and current age were collected.

Statistical analysis

Descriptive statistics (continuous variables) and frequencies (dichotomous variables) were generated for all variables. After testing for normality of the data, chi-square tests and independent samples t-tests were used to identify demographic characteristics associated with testing positive for an STI. Demographic variables that were significantly associated with testing positive for an STI at $p < .10$ were considered for inclusion in the final adjusted models. Chi square analyses and independent samples t-tests were also conducted to examine associations between each substance use variable and testing positive for an STI.

Separate crude and adjusted logistic regression models were used to analyze the association between: (a) each of the four substance use variables (past 30-days alcohol use with clients, past 30-days drug use with clients, past 30-days injection drug use with clients, and past 6-months drug use) and testing positive for an STI; and (b) between economic hardship and testing positive for an STI. Procedures outlined by Baron and Kenny[29] were used to assess whether economic hardship moderated the association between substance use and testing positive for any STI. Separate interaction terms were created for economic hardship and each of the four substance use variables and logistic regression was conducted. For each of the four models, control variables were entered in block 1, main effects were entered in block 2, and the interaction term was entered in block 3. Posthoc simple slope analyses were conducted for all significant interaction models. All regression models were presented with 95% confidence intervals, using the Statistical Package for the Social Sciences (SPSS, version 21).

Results

Sample characteristics

The mean age of participants was 34.9 years (SD = 10.4) and over half of participants (57.8%) were single, followed by married (28.6%), separated (7.2%), divorced (4.4%) and widowed (1.9%). The majority of participants (64.1%) had children living with them. Half of participants (50.3%) reported working in a hotel, followed by a bar/dance hall (19.3%), street/car (14.2%), or some other location (15.8%). [Table 1].

Almost one in five (19.4%) participants tested positive for an STI at the 6 months follow-up. Almost half of participants (45.4%) reported drug use in the past 6-month and among participants who reported past 6-months drug use, 25% tested positive for an STI ($p < .01$). Using the average score from the scale (0 = *never* to 4 = *always*), the average score was 1.5 (SD: 1.6) for past 30-days alcohol use with clients, 0.8 (SD: 1.3) for past 30-days drug use with clients, and 0.3 (SD: 0.9) for past 30-days injection drug use with clients; however substance use with clients was not significantly associated with STI diagnosis. Among participants who reported past 6-months drug use, 71% also report drug use with clients. The average economic hardship score was 3.3 (SD: 0.7) (scores ranging between 0 and 5, with higher scores indicating greater levels of economic hardship); economic hardship was found to be significantly associated with STI.

Table 1. Participant characteristics and associations with STI.

Variable	Total % (*n*)/mean (SD)	STI (*n* = 91) % (*n*)/mean (SD)	No STI (*n* = 378) % (*n*)/mean (SD)	*p*-value
Demographic variables				
Mean age[a]	34.9 (10.4)	37.2 (11.4)	34.4 (10.1)	**.07**
Marital status				.88
Single	57.8% (271)	18.8% (51)	81.2% (220)	
Married	28.6% (134)	19.4% (26)	80.6% (108)	
Divorced	4.4% (21)	19.0% (19)	81.0% (17)	
Separated	7.2% (34)	20.6% (7)	79.4% (27)	
Widowed	1.9% (9)	33.3% (3)	66.7% (6)	
Children at home				.16
Yes	64.1% (300)	17.0% (51)	83.0% (249)	
No	28.1% (132)	22.7% (30)	77.3% (102)	
Sex work venue[a]				**.06**
Bar/dance hall	19.2% (90)	12.2% (11)	87.8% (79)	
Hotel	50.3% (236)	20.8% (49)	79.2% (187)	
Street/car	14.1% (66)	28.8% (19)	71.2% (47)	
Other	15.8% (74)	16.2% (12)	83.8% (62)	
Interview site[a]				**.10**
Tijuana	41.1% (192)	22.9% (44)	77.1% (148)	
Ciudad Juarez	59.1% (277)	17% (47)	83.0% (230)	
Substance use variables				
Mean past 30-days alcohol use with clients[b]	1.5 (1.6)	1.6 (1.6)	1.5 (1.6)	.70
Mean past 30-days drug use with clients[b]	0.8 (1.3)	1.0 (1.4)	0.8 (1.3)	.08
Mean past 30-days injection drug use with clients[b]	0.3 (0.9)	0.3 (1.0)	0.3 (0.9)	.75
Past 6-months drug use				<.01
Yes	45.4% (213)	25.0% (57)	75.0% (171)	
No	54.6% (256)	14.1% (34)	85.9% (201)	
Mean economic hardship	3.3 (0.7)	3.4 (0.8)	3.2 (0.7)	.05

[a]indicates independent samples *t*-test. All other analyses are chi-squared.
[b]indicates range is 0 (never) - 4 (always).
% (*n*) are presented as row percent.
Bolded *p*-values indicate demographic variables included in multivariate models.

Substance use and STI. In bivariate models examining associations between each substance use variable and testing positive for an STI, only past 6-months drug use was significantly associated with testing positive for an STI (AOR = 2.1, 95% CI: 1.3–3.2, $p < .01$). Similar results were found in multivariate models (adjusted for age, sex work venue, and study site): FSW who used drugs in the past 6-months had a 1.8 times greater odds of testing positive for an STI (AOR = 1.8, 95% CI: 1.1–2.9, $p = .02$) [Tables 2 and 3].

Economic hardship and STI. The odds of testing positive for an STI were 1.4 times larger among FSW experiencing economic hardship relative to those who did not in the bivariate analysis, but the relationship was only marginally significant (OR = 1.4, 95% CI: 1.0–1.8, $p = .05$) [Table 2]. Economic hardship was not significantly associated with testing positive for an STI in multivariate models.

Interaction effect between economic hardship and substance use on STI. The interaction between past 30-days drug use with clients and economic hardship was significantly associated with testing positive for an STI (B = −0.3, SE = 0.2, $p = .01$) [Table 3]. Posthoc analyses testing simple slopes revealed that, among participants who reported lower levels of economic hardship, past 30-days drug use with clients was associated with greater likelihood of testing positive for an STI (AOR = 1.5, 95% 95% CI: 1.1–1.9, $p < .01$). Among participants who reported higher levels of economic hardship, the association between past 30-days drug use with clients and testing positive for an STI was not significant (AOR = 1.0, 95% 95% CI: 0.8–1.2, $p = .96$) [Figure 1]. The interaction between past 6-months drug use and economic hardship was not significantly associated with testing positive for an STI (B = −0.6, SE = 0.3, $p = .08$).

Table 2. Bivariate associations between independent variables and testing positive for an STI.

Variable	OR (95% CI)	*p*-value
Past 30-days alcohol use with clients	1.0 (0.9–1.2)	.70
Past 30-days drug use with clients	1.2 (1.0–1.4)	.08
Past 30-days injection drug use with clients	1.1 (0.7–1.5)	.75
Past 6-months drug use		
Yes	2.0 (1.3–3.2)	<.01
No	Ref	
Economic hardship	1.4 (1.0–1.8)	.05

Table 3. Multivariate models testing main effects of drug use with clients and economic hardship on testing positive for an STI and the interaction between drug use with clients and economic hardship.

	Model 1		Model 2[a]	
Variable	AOR (95% CI)	*p*-value	AOR (95% CI)	*p*-value
Age	1.0 (1.0–1.1)	.06	1.0 (0.9–1.0)	.06
Sex work venue				
Bar/dance hall	0.6 (0.3–1.1)	.11	0.5 (0.3–1.1)	.10
Street/car	1.2 (0.6–2.5)	.55	1.2 (0.6–2.4)	.66
Other	0.8 (0.4–1.6)	.47	0.8 (0.4–1.6)	.49
Hotel	Ref		Ref	
Interview site				
Tijuana	1.3 (0.8–2.3)	.34	1.4 (0.8–2.4)	.25
Ciudad Juarez	Ref		Ref	
Past 30-days drug use with clients	1.1 (0.9–1.3)	.48	1.2 (1.0–1.4)	.10
Economic hardship	1.1 (0.8–1.6)	.48	1.2 (0.9–1.7)	.29
Past 30-days drug use with clients X economic hardship	—	—	0.8 (0.6–0.9)	.01

[a]Model two is the multivariate model testing the interaction between drug use with clients and economic hardship on STI.

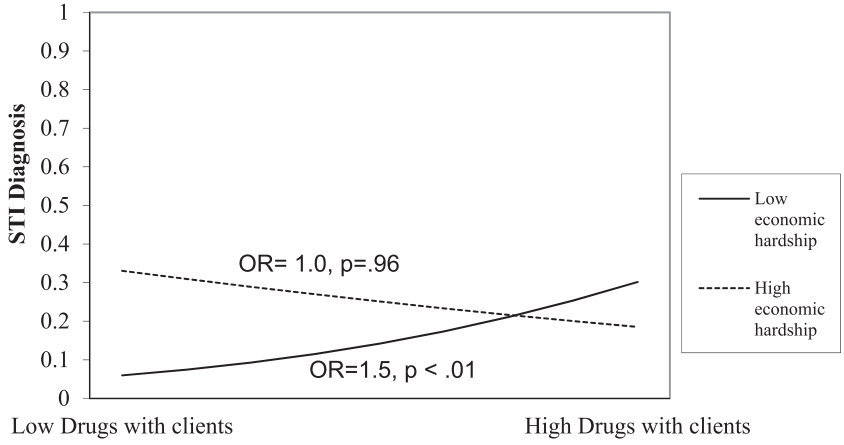

Figure 1. Interaction between drug use with clients and economic hardship on testing positive for an STI. Women who report low economic hardship are more likely to test positive for an STI as drugs use with clients increases.

Discussion

Our findings suggest that economic hardship influences the association between substance use and increased risk for HIV/STI among FSW; however, these associations may be more complex than previously hypothesized. We found that the association between using drugs with clients and STI risk was only statistically significant among women who did not report economic hardship, suggesting that other factors may be more salient to HIV/STI risk among those reporting economic hardship. While previous research has highlighted the associations between substance use and heightened HIV/STI risk as well as the role of economic vulnerability in increasing HIV/STI risk, little or no research has focused on how substance use and economic vulnerability may intersect to influence HIV/STI risk. To the best of our knowledge, this is among the few studies to examine whether economic hardship plays a role in the association between substance use and HIV/STI among FSW. Our study findings highlight the importance for more research to better understand the role of economic vulnerability on HIV/STI risk, as well as how economic vulnerability intersects with substance use to influence HIV/STI risk among FSW in contexts where both substance use and HIV/STI are prevalent. Findings will be important for the development of public health programs and interventions that account for the complex vulnerabilities that FSW face. Our findings begin to inform necessary interventions, particularly in contexts where substance use is occurring in high proportions among FSW, which we found in our study among FSW working by the US-Mexico border region.

Findings from the current study are consistent with previous work documenting the association between substance use and increased HIV/STI risk among FSW,[30–34] but build on prior work by exploring the role of economic hardship in this relationship. Counterintutively, the interaction effect of drug use with clients and economic hardship was only significant among participants who reported less economic hardship. Prior work on HIV/STI risk demonstrates that FSW report making more money when using drugs/alcohol with clients, which in turn, reduces condom use with clients.[12] Therefore, it is possible that improvements in participants' economic well-being may be resulting from using drugs/alcohol with clients, but that this also places them at greater risk for engaging in riskier sexual behaviors for HIV/STI. Additionally, women report using substances in order to help them work more hours and have more clients.[13,27] But also, women may use substances while working with clients as a way to cope with their work and may also be a result of working in a context where substance use is so prevalent, and thus, in these cases, substance use may not be associated with increased financial return. Finally, the intersection of substance use and economic hardship on HIV/STI risk may be very different among women who trade sex for drugs compared to other groups of FSW; however, we were unable to assess these additional differences due to limitations in our sample size. Overall, the motivations associated with substance use with clients may be important to consider in future research on this topic area and may partially explain our complex findings.

Although we did not find an association between substance use with clients and STI risk among women who reported high levels of economic hardship, this group may be at risk for STI for a variety of reasons beyond that of substance use. FSW who experience poverty, food insecurity, and debt are more likely to report inconsistent condom use with clients[17,18,20,34]; therefore, women in dire economic situations may be engaging in HIV risk behaviors other than (or in conjunction with) substance use with clients that contribute to a greater extent to HIV/STI risk. Even if they are not paid more money, FSW may also be using drugs/alcohol with clients, and engaging in other risky behaviors, because they do not want to lose a paying customer. However, we were unable to explore these scenarios with the current data. More work is needed to determine whether economic hardship influences women's decision-making ability and likelihood of engaging in risky behaviors.

Limitations

This study was based on cross-sectional data; thus, we are unable to establish the temporality of these associations. Additionally, while our drug use variable was measured over 6 months, the measure for drug use with clients was measured over the past 30 days; future research is needed to include measures with similar and most recent timeframes. The 6-months timeframe used to measure substance use among FSW may not have accurately reflected recent behavior, limiting our ability to assess how current economic hardship was influenced by substance use. Moreover, findings are most applicable to FSW at the US-Mexico border and may not be generalizable to other populations of FSW. However, our findings build on previous work, including longitudinal studies and randomized controlled trials, which generally report that substance use increases HIV/STI risk.[32,33,35–41] Prior work has reported drug use, and specifically injection drug use, is highly stigmatized among FSW.[40] It is possible that social desirability bias occurred due to fear of stigmatization, resulting in under-reporting of injection drug use with clients. However, we found a high prevalence of past 6-months drug use, allowing us to see significant associations between drug use and testing positive for an STI. While the study conducted HIV testing, initial eligibility criteria restricted the study participants to those who were HIV negative and there were not sufficient numbers of participants testing positive for HIV at the 6 months follow-up survey to include in this analysis. Future studies are needed with larger samples over longer durations to better measure HIV risk specifically, rather than relying on STI testing as an indicator of HIV risk. Finally, a one-item self-report measure was used as a proxy for

economic hardship and there was little variation on this measure. Among participants who tested positive for an STI, the average economic hardship score was 3.4, versus 3.2 among participants who tested negative for an STI. However, our previous study found that this measure of economic hardship was associated with expected demographic and HIV risk variables, including older age, not being married, violence, and sexual risk behaviors for HIV.[42] Since women report engaging in a variety of risk behaviors in order to make more money, future studies may want to consider measuring economic hardship among FSW by asking about specific behaviors that may be connected to the urgency of their work (e.g. substance use to work longer hours, substance use with clients to make more money) women may engage in when attempting to improve their financial situation.

Conclusions

This study builds on previous work documenting the association between substance use and increased HIV/STI risk among FSW[33,40,41] by further considering the influence of economic hardship. Although a large body of research has previously postulated drug use increases HIV/STI susceptibility by interfering with condom use and increasing risk for violence,[11,16,30,31] findings from the current study indicate that there may be other mechanisms at play, including economic hardship. In an effort to decrease economic hardship, FSW may agree to use drugs with clients or engage in other risky behaviors; yet, these behaviors may interfere with the capacity to negotiate condom use or increase the likelihood of experiencing physical and sexual violence from clients. More work is needed to examine the underlying mechanisms contributing to the association between substance use with clients and elevated HIV/STI risk among FSW. While substance use may heighten economic hardship and altogether increase HIV/STI risk, it may also be that economic hardship results in increased substance use among FSW. Specifically, there is a need for more extensive research on how and under what circumstances economic factors shape substance use, particularly substance use with clients, and the ways in which these may increase HIV/STI among FSW. Findings have implications for the development of public health programs and interventions that account for the complex social and economic vulnerabilities that FSW face.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This research was funded by grants from the Center for AIDS Research at the University of California, San Diego (P30 AI036214) through an institution-based development award (PI: Elizabeth Reed) as well as by the National Institute on Drug Abuse (R01DA028692, PI: Kimberly Brouwer). Elizabeth Reed was also supported by grant #K01MH099969 from the National Institute of Mental Health.

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