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Non-injection drug use and its association with structural HIV risk factors among women who exchange sex in 4 U.S. cities—2016

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An abstract of

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ABSTRACT

Non-injection drug use and its association with structural HIV risk factors among women who exchange sex in 4 U.S. cities—2016

By Zaena Tessema

Background

Exchange sex has been globally recognized to increase risk of HIV transmission, placing women who exchange sex (WES) for money or drugs at a disproportionately higher risk for HIV than women who do not. There are many behavioral, structural, environmental, and social risk factors contributing to this increased risk. The goal of this study is to quantify the association between non-injection drug use (NIDU) and structural risk factors among WES in the United States.

Methods

Using data from the 2016 High-Risk Women (HRW) project embedded within the National HIV Behavioral Surveillance (NHBS) heterosexually active person at increased risk cycle (HET), NIDU exposures of interest were methamphetamine, crack cocaine, downers, painkillers, and non-injected heroin, and structural outcomes of interest were incarceration, arrest for exchange sex, and experiences with homelessness. Bivariate and Multivariable analysis was completed using log-linked Poisson regression to calculate prevalence ratios (PRs) with 95% CIs and robust standard errors.

Results

Among our sample of 827 WES, most of our population was over the age of 40, African American, at or below the federal poverty line with a high school education or lower. Only non-injection heroin and crack cocaine remained significant in multivariable analysis. Non-injection heroin was associated with incarceration (PR 1.6, 95% CI: 1.1, 2.3) and arrest for exchange sex (PR 1.9, 95% CI: 1.2, 3.0), and crack cocaine was associated with incarceration (PR 1.7, 95% CI: 1.1, 2.4), arrest for exchange sex (PR 1.8, 95% CI: 1.1, 3.0), and homelessness (PR 1.3, 95% CI: 1.1, 1.7).

Conclusions

Based on our analysis, use of crack cocaine and non-injection heroin and structural risk factors are critical considerations for HIV prevention interventions tailored to WES. Further understanding how these risks present themselves in the lives of WES, as well as how they are associated with each other, will help in the development of tailored interventions that address the unique circumstances WES face and better inform community health workers providing health services to WES in the US.

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TABLE OF CONTENTS

Introduction

Exchange sex, defined as when sex is used as a mechanism of transaction to obtain money, drugs or other goods, has been globally recognized to increase risk of HIV transmission at an intersection of behavioral, structural, environmental and social risk factors [1, 2]. Although research on women who exchange sex (WES) in the United States is limited, it is estimated that approximately 17.3% of U.S. WES have HIV, which is significantly greater than the prevalence among women who do not exchange sex, and slightly higher than the global estimate of 10.4% [1, 3-5]. Much of the increased risk in HIV transmission among this priority population is associated with sexual behaviors, including condomless sex and multiple sex partners, however these risks can be compounded by factors such as substance abuse, stigma, criminalization affecting access to resources and services, experiences with violence, power dynamics and other socioeconomic and structural vulnerabilities [6, 7]

Among the multitude of factors interacting to increase risk of HIV infection among WES, injection drug use (IDU) plays an important role. Globally, about 4% of new HIV diagnoses are attributed to injection drug use, while the estimate is slightly higher at 6% in the United States [2, 8, 9]. Given the potential for direct blood-to-blood transmission that comes with IDU, through receptive needle sharing and using contaminated syringes, it is understandable that IDU would be of high concern, especially considering that this risk is in addition to the aforementioned risk factors associated with exchange sex. However, non-injection drug use (NIDU) is also associated with elevated risk of HIV infection when compared to those who do not report using drugs [10, 11]. Among WES, previous research suggests high prevalence of both IDU and NIDU [5, 10-12]. Blood-to-

blood exposure is possible with some NIDU given the presence of open sores, ruptured nasal passageways and compromised mucous membranes [12]. Additionally, NIDU may be associated with an increased risk of HIV infection due to mechanisms outside of direct blood-to-blood exposure, including increased risky sexual behaviors such as increased condomless sex, increase in number of partners, or, among WES, increased high-risk sex exchange for higher pay or more drugs [10, 13]. NIDU also poses a threat on the pathway to HIV transmission because certain non-injection drugs, such as cocaine, heroin and methamphetamines, may be associated with subsequent IDU initiation [14].

Given the criminalization associated with exchange sex, WES are in a unique crossroads of HIV risk influenced by a combination of behavioral, interpersonal and structural risk factors, along with the barriers imposed by them [3, 7]. There has been a large body of research in the US on the syndemic of substance use, violence, HIV and AIDS, also known as the “SAVA syndemic”. WES frequently exist at the apex of this syndemic, however the concept of co-occurring risk factors working together to impact the health of a population can also be witnessed at the structural level [15-17]. Although the focus of previous research among WES has typically focused on individual and interpersonal risk factors that help drive the SAVE syndemic, structural factors are also important to consider.

Structural factors such as incarceration, housing instability and social inequalities are associated with HIV infection by increasing risky sexual behaviors and contributing to the overall environment in which WES live and work [15, 16, 18]. Specific to incarceration and arrest, there is an element of disruption that occurs, especially among women who use drugs, where relationships and livelihoods are disrupted, therefore

increasing likelihood of multiple or overlapping sexual partners and decreasing likelihood of condom use [18-20]. Similarly, WES experience challenges around housing instability or homelessness. Lack of shelter places women in scenarios that increase their vulnerability to sexual violence, and limited economic opportunity increases likelihood of having multiple sex partners or willingness to engage in riskier sexual encounters for pay [18, 21]

WES are at elevated risk of HIV infection compared to women who do not exchange sex, and there are many factors contributing to this increased risk, including the structural risk factors outlined above With this understanding, research is needed to examine how NIDU risk factors and structural risk factors are associated with each other [22]. Using data from National HIV Behavioral Surveillance (NHBS), we quantify the association between select non-injection drugs and structural risk factors among WES in the United States. This work can improve intervention initiatives and better inform community health workers providing health services to WES in the US [4, 5, 8, 23, 24].

Methods

NHBS

The National HIV Behavioral Surveillance (NHBS) collects data in rotating annual cycles among three key populations. Data in this study comes from the heterosexually active person at increased risk cycle (HET). Embedded within the 2016 NHBS-HET cycle is the High-Risk Women (HRW) project. We analyzed data from 4 sites focused specifically on women who exchange sex for money or drugs (WES): Chicago, Detroit,

Houston, and Seattle [25]. Since WES are a hard-to-reach population, participants were recruited through respondent-driven sampling (RDS), where respective NHBS field site staff identify an initial sample of participants, or "seeds", to complete the survey [8, 20, 26]. These "seeds" were then asked to recruit a specific number of peers within their social network to take the survey. Recruits are then given the option to continue the referral chain by recruiting additional women[8, 20, 26]. Additional details on NHBS methods, including RDS, are published elsewhere [25, 27].

Measures

Our main outcomes of interest were structural HIV risk factors. Participants were asked about their individual experiences of incarceration, arrest, and experiences with homelessness. Incarceration was defined as having been in prison or jail for more than 24 hours in the past 12 months. Women who answered the question 'In the past 12 months, how many times have you been arrested because you exchange sex?' were classified as reporting zero arrests or reporting one or more arrests. To identify experiences of homelessness, women were asked if, in the past 12 months, they had lived 'on the street, in a shelter, in a Single Room Occupancy hotel (SRO), or in a car'.

Our exposures of interest were non-injection drug use. Specifically, participants were asked how many times they used the following drugs in the past 12 months: methamphetamine, crack cocaine, downers, painkillers, or non-injected heroin. For this analysis, we then dichotomized responses as having used each drug in the past 12 months or not.

Analytic Sample

Our analytic sample was restricted to women with a laboratory-confirmed HIV negative test who reported exchanging sex for money or drugs at least once in the past 12 months. Women who reported IDU in the past 12 months were excluded from the sample. IDU was determined by asking participants who had reported they had ever 'injected any drugs other than those prescribed' if they injected any drug within the past 12 months. The final sample consisted of 827 eligible women.

Ethics

NHBS activities were approved by local institutional review boards (IRB) in participating cities. The study protocol was also reviewed and approved by the Centers for Disease Control and Prevention (CDC).

Statistical Analysis

Descriptive analysis was conducted to evaluate overall prevalence of key demographic characteristics, structural outcomes, and NIDU exposures of interest. We then used log-linked Poisson regression, using PROC GENMOD in SAS v, 9.3, to calculate prevalence ratios (PRs) with 95% CIs and robust standard errors for both bivariate and multivariable analysis [28]. We first conducted bivariate analysis to examine the association between use of each individual non-injection drug and each individual structural HIV risk factor outcome of interest, generating unadjusted PRs. Exposure variables with PRs at a significance level $p < 0.05$ in bivariate analysis were then included in multivariable models for multivariable analysis. In multivariable analysis, controlling for project site, participant's age, and race/ethnicity, we conducted stepwise backward elimination by starting with a full model, then removing the least statistically significant variable in each

step until all NIDU exposure variables remaining in the model had a significance level $p < 0.05$[29].

Results

In our sample of 827 women, most were 40 years of age or older (63%), with 83% being Black/African American (Table 1.). Most women were living below the federal poverty level (85%) and had a high school education or less (74%), however large proportions had health insurance (79%) and had been to a health care provider in the past 12 months (85%). Over 90% of women in our sample had condomless sex in the past 12 months, while 48% reported getting HIV tested and 15% received an STI diagnosis in the past 12 months.

NIDU prevalence varied among the women in our sample. Methamphetamine was the least commonly reported non-injection drug used, with only 8% of women reporting use in the past 12 months, while approximately 41% of women reported using crack cocaine (Table 2). Around a quarter of women in our sample reported using downers, painkillers or heroin that is smoked or snorted in the past 12 months.

Incarceration

About one in five women in our sample (20%) reported incarceration in the past 12 months (Table 1). Use of methamphetamine (PR 1.50, 95% CI: 1.02, 2.21), crack cocaine (PR 1.39, 95% CI: 1.08, 1.80), and heroin that is smoked or snorted (PR 1.49, 95% CI: 1.13, 1.96) were associated with incarceration (Table 3). The use of downers and painkillers were not associated with incarceration. In multivariable analysis, controlling for city, age and race, after backwards elimination, crack cocaine (PR 1.65, 95% CI: 1.13,

2.40) and heroin use (PR 1.56, 95% CI: 1.07, 2.29) in the past 12 months remained in the model as significantly associated with increased prevalence of incarceration.

Arrest for exchange sex

Approximately 12% of women in our sample reported being arrested for exchange sex in the past 12 months (Table 1). Use of crack cocaine (PR 2.21, 95% CI: 1.52, 3.21), downers (PR 1.51, 95% CI: 1.05, 2.16) and heroin (PR 2.58, 95% CI: 1.82, 3.68) were associated with being arrested for exchange sex (Table 4). In multivariable analysis with backwards elimination, controlling for city, age and race, only crack cocaine (PR 1.84, 95% CI: 1.13, 3.00) and heroin use (PR 1.88, 95% CI: 1.16, 3.04) in the past 12 months remained in the model as significantly associated with arrest for exchange sex.

Homelessness

About half the women in our sample (49%) experienced homelessness in the past 12 months (Table 1). With the exception of methamphetamines, reported use of all measured non-injection drugs in the past 12 months were associated with experiencing homelessness in bivariate analysis (Table 5). Reported use of crack cocaine (PR 1.27, 95% CI: 1.11, 1.45), downers (PR 1.28, 95% CI: 1.12, 1.47), painkillers (PR 1.23, 95% CI: 1.06, 1.42) and heroin (PR 1.16, 95% CI: 1.01, 1.35) in the past 12 months were each found to be associated with increased prevalence of experiencing homelessness in our sample. In multivariable analysis with backwards elimination, controlling for city, age and race, only crack cocaine use (PR 1.33, 95% CI: 1.07, 1.65) in the past 12 months remained as significantly associated with experiencing homelessness.

Discussion

The goal of this analysis was to evaluate how NIDU is associated with structural HIV risk factors of incarceration, arrest for exchange sex, and experiencing homelessness, observed at the individual level. Through our analysis, all observed NIDU yielded significant associations in bivariate analysis with at least one outcome of interest. Crack cocaine and heroin, however, were the only NIDU that remained significant in multivariable analysis. In adjusted models, crack cocaine remained significant with all three outcomes of interest, and heroin remained significant with incarceration and arrest for exchange sex.

In our adjusted models, we found that incarceration was more common among women who reported using crack cocaine within the past 12 months than among women who did not. The same was observed for non-injection heroin, where reporting use was associated with an increased prevalence of incarceration compared to non-users. This is expected since WES who use NIDU experience criminalization not only for sex work but also for drug use or possession. Incarceration due to substance abuse overall has been found to disproportionately impact communities of color, especially low-income African Americans. Crack use, specifically, has a long history within the black community in the United States, which was hit hard by the cocaine epidemic of the 1980s and then faced the brunt of the country's response in the form of the 'War on Drugs' [30-35]. Given that the majority of our study sample are low-income and African American women, in thinking about the syndemics of drug use, HIV and disproportionate imprisonment surrounding our population of WES, understanding these structural disadvantages and

history faced by their communities helps provide context in which public health interventions will be implemented.

Similar to our findings with incarceration, in our adjusted models, we observed a higher prevalence of arrest for exchange sex among women reporting crack cocaine in the past 12 months when compared to women who did not report use. Non-injection heroin use in the past 12 months was also associated with an increased prevalence of arrest for exchange sex when compared to those who did not report use. While arrests are often used as a tactic to maintain order, targeting certain practices or people, policing of WES has been found to increase pressure during exchanges, increasing vulnerability to harmful encounters [36, 37]. This is again contributing to the syndemic through criminalization that may be disproportionately impacting WES, as well as substance abuse as a means of coping with the stress of this environment.

Homelessness appeared to have the largest number of significant associations with NIDU in bivariate analysis. However, homelessness had the smallest number of significant associations in adjusted models, with only crack cocaine use in the past 12 months indicating increased prevalence in homelessness among women compared to those who did not report use when controlling for other NIDU in the same model. Substance abuse has been found to hinder one's ability to exit homelessness [21, 38]. Understanding the scope of crack use within this population, it is possible crack use may be a major barrier to addressing homelessness and further compound the level of economic deprivation experienced by this population Addressing the vulnerabilities posed by homelessness that increase risk of HIV, therefore, may need to encompass both increasing economic opportunity, as well as interventions tailored for crack-cocaine treatment to minimize

both the barriers it poses to exiting homelessness, and the increased sexual HIV-risk behaviors associated with it.

While individual behavioral risk factors of condomless sex and injection drug use remain the most direct routes of transmission, there are many drivers influencing these behaviors at multiple levels. Structural risk factors such as incarceration, arrest and homelessness, contribute to the context in which women experience HIV risk factors, as well as the barriers they may face to address them [3]. Literature suggests experiences of incarceration and arrest lead to an increase in risky sexual behaviors, such as multiple partners and condomless sex [19, 20]. Similarly, homelessness seems to increase risk of HIV infection by increasing risky sexual behaviors [21]. As we saw in our analysis, there is an association between NIDU and structural HIV risk factors among WES. Syndemic disparities can be experienced by any population that faces disproportional burden at multiple levels, such as low-income or African American communities that experience high levels of policing or low levels of access to healthcare and support [17, 30, 39]. Our study sample resides at the intersection of multiple epidemics, and our findings will help further our knowledge of the SAVA syndemic currently affecting WES in the United States.

Recommendations

Per our findings, addressing crack and heroin use should be critical considerations for HIV prevention interventions tailored to WES. As the most consistent NIDU associated with prevalence of structural HIV risk factors, crack cocaine and heroin use may provide insight to the increased vulnerabilities faced by WES in the US. Their significance in our

analysis may be revealing of the processes and environments influencing the HIV risk of WES. The interconnectedness between crack cocaine and heroin with structural risk factors indicate these may be specific dugs of interest when considering multi-level interventions to address the syndemic.

While research on NIDU and HIV/AIDS is limited, especially among WES in the United States, our findings suggest that NIDU interventions should be incorporated into HIV prevention and vice versa. Some literature suggests that the most effective way to reduce incidence of injection-driven HIV infection is in preventing injection drug use (IDU) altogether, which is often preceded by NIDU [14, 40]. Among WES, interventions focusing on crack cocaine and non-injection heroin use may be key to interrupting transition to IDU. Since NIDU has been shown to be associated with increased high-risk sexual behaviors, by focusing on NIDU, interventions could indirectly address both main routes of HIV transmission – by IDU and condomless sex [13].

Within NIDU interventions, however, components focused on structural risk should be included to address barriers they cause for access to health and social services, as well as economic opportunity. Revised policies to reduce criminalization and promote social services may allow for mitigation of these effects [21]. The same would apply to structural level interventions, where in order to address incarceration, experiences with arrest or homelessness, risk posed by NIDU would need to be a crucial component. Incorporating risk posed by NIDU could mitigate the compounding effect NIDU may have on the impact of these structural risk factors, such as making it harder to exit homelessness or increasing one's chances or re-entering the criminal justice system [34, 41]. In taking into account the syndemics surrounding WES and the many ways in which

they experience HIV risk, interventions addressing multiple routes of risk may help in the long run and get to the root of many systemic issues facing this population. Further research on the extent each of these levels of HIV risk impact WES is needed to help further this knowledge and create more precise interventions down the road.

Limitations

This analysis has some limitations. Since we were unable to control for RDS related factors, given the nature of RDS and how participants were identified, there may be selection bias since participants likely recruited other participants who have similar demographics. Additionally, WES with limited network sizes were less likely to be reached. There may also be issues with generalizability since we were unable to control for network size, and since our data was only collected from four major US cities. Findings may not be a representative sample for other cities or areas. Since NHBS data is cross-sectional, we are unable to make causal inference since it is unknown whether the exposure of interest preceded the outcome. Given the nature of the data available and the selected analytic approach, we were not able to examine effect modification or mediation. Finally, we are evaluating structural level HIV risk factors, but we are only able to observe them at the individual level.

Conclusion

WES are at increased risk of HIV infection. The syndemic associated with exchange sex, as well as those associated with living below the poverty line and, for some WES, being African American in the US, all interact to put WES at elevated levels of vulnerability. NIDU of crack cocaine and non-injection heroin, along with the associated structural

level risk factors examined in this study of incarceration, exchange sex arrest, and homelessness are just a few risk factors that we have found to be associated with elevated HIV risk that disproportionately impact WES. Further understanding how these risks present themselves in the lives of WES, as well as how they are associated with each other, will help in the development of tailored interventions that address the unique circumstances they face. Appropriate and effective interventions for this population are needed, and the information in this study can help inform approaches to HIV prevention among WES to be more appropriate, effective and sensitive.

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TABLES

Table 1. Characteristics of women who exchange sex for money or drugs from National HIV Behavioral Surveillance-HET4 Project Sites of Chicago, Detroit, Houston and Seattle, 2016 (N= 827)[(a)]

	Total	
	N	**%**
Age (years)		
18-29	136	16
30-39	173	21
40-49	238	29
50-60	280	34
Race/Ethnicity[(b)]		
Hispanic/Latino	33	4
American Indian or Alaska Native	5	1
Asian	0	0
Black/African American	687	83
Native Hawaiian or Other Pacific Islander	1	0
White	60	7
Other	40	5
Highest level of education		
Less than high school	41	5
Some high school	245	30
Completed high school/GED	329	40
Some college	187	23
Completed college	22	3
Beyond Bachelor's	3	0
Poverty Status[(c)]		
At or below federal poverty level	703	85
Above federal poverty level	121	15
Experienced Homelessness in past 12 months		
Yes	408	49
No	419	51
Health insurance status		
Insured	650	79
Not insured	176	21
Been to a health care provider in the past 12 months		
Yes	701	85
No	126	15

Sex with no condom in past 12 months		
Yes	778	94
No	49	6
Non-injection, non-prescribed drug use in the last 12 months		
Yes	688	83
No	139	17
HIV tested in the past 12 months		
Yes	400	48
No	426	52
Diagnosed with STI like gonorrhea, chlamydia, or syphilis in past 12 months[(d)]		
Yes	122	15
No	704	85
Been to detention center, jail or prison for more than 24 hours in the past 12 months		
Yes	168	20
No	659	80
Arrested for exchanging sex		
Yes	98	12
No	722	88

(a) Numbers might not add to total because of missing or unknown data
(b) Categories are mutually exclusive and people who put more than one category are considered 'other', unless Hispanic. Hispanics/Latinos can be of any race.
(c) Based on household income and household size.
(d) Sexually transmitted infections referred to are Gonorrhea, Syphilis or Chlamydia.

Table 2. Prevalence of non-injection drug use risk factors among heterosexual women who exchange sex for money or drugs in Chicago, Detroit, Houston and Seattle, National HIV Behavioral Surveillance, United States, 2016 (N= 827)

	Total	
	N	**%**
Used methamphetamine in the last 12 months		
Yes	67	8
No	760	92
Used crack cocaine that is smoked or snorted in the last 12 months		
Yes	335	41
No	492	59
Used downers in the last 12 months		
Yes	228	28
No	599	72
Used pain killers in the last 12 months		
Yes	212	26
No	614	74
Used heroin that is smoked or snorted in the last 12 months		
Yes	201	24
No	626	76

Table 3. Associations between non-injection drug use risk factors and previous incarceration among heterosexual women who exchange sex for money or drugs in Chicago, Detroit, Houston and Seattle, National HIV Behavioral Surveillance, United States, 2016 (N = 827)

	Bivariate Analysis			Multivariable Analysis		
	PR	95% CI		PR	95% CI	
Used methamphetamine in the last 12 months	1.50	1.02	2.21			
Used crack cocaine that is smoked or snorted in the last 12 months	1.39	1.08	1.80	1.65	1.13	2.40
Used downers in the last 12 months	1.26	0.95	1.67			
Used pain killers in the last 12 months	1.18	0.88	1.58			
Used heroin that is smoked or snorted in the last 12 months	1.49	1.13	1.96	1.56	1.07	2.29

Table 4. Associations between non-injection drug use risk factors and previous arrest for exchange sex among heterosexual women who exchange sex for money or drugs in Chicago, Detroit, Houston and Seattle, National HIV Behavioral Surveillance, United States, 2016 (N = 827)

	Bivariate Analysis			Multivariable Analysis		
	PR	95% CI		PR	95% CI	
Used methamphetamine in the last 12 months	0.65	0.28	1.52			
Used crack cocaine that is smoked or snorted in the last 12 months	2.21	1.52	3.21	1.84	1.13	3.00
Used downers in the last 12 months	1.51	1.05	2.16			
Used pain killers in the last 12 months	1.17	0.78	1.77			
Used heroin that is smoked or snorted in the last 12 months	2.58	1.82	3.68	1.88	1.16	3.04

Table 5. Associations between non-injection drug use risk factors and experiences of homelessness among heterosexual women who exchange sex for money or drugs in Chicago, Detroit, Houston and Seattle, National HIV Behavioral Surveillance, United States, 2016 (N = 827)

	Bivariate Analysis			Multivariable Analysis		
	PR	95% CI		PR	95% CI	
Used methamphetamine in the last 12 months	1.23	1.00	1.53			
Used crack cocaine that is smoked or snorted in the last 12 months	1.27	1.11	1.45	1.33	1.07	1.65
Used downers in the last 12 months	1.28	1.12	1.47			
Used pain killers in the last 12 months	1.23	1.06	1.42			
Used heroin that is smoked or snorted in the last 12 months	1.16	1.00	1.35			