



An exploratory study on the use of sexually transmitted infection prevention and contraception methods among women and men who use unprescribed opioids

Joy D. Scheidell^{a,b,*}, Sophia Dakoulas^a, Teresa Chueng^c, Katrina Ciraldo^d, Belén Hervera^{c,e}, Muthoni Mahachi^f, Luther C. Elliott^{b,f}, Alex S. Bennet^{b,f}

^a Department of Health Sciences, College of Health Professions and Sciences, University of Central Florida, Orlando, FL, USA

^b Center for Drug Use and HIV/HCV Research, School of Global Public Health, New York University, New York, NY, USA

^c Division of Infectious Diseases, Department of Medicine, University of Miami Miller School of Medicine, Miami, FL, USA

^d Department of Obstetrics, Gynecology, and Reproductive Sciences and Department of Family Medicine and Community Health, University of Miami, Miller School of Medicine, Miami, FL, USA

^e Department of Population Health Sciences, Weill Cornell Medical College, New York, NY, USA

^f Department of Social and Behavioral Sciences, School of Global Public Health, New York University, New York, NY, USA

HIGHLIGHTS

- Over half of participants did not use effective STI prevention and contraception
- Females reported more ineffective STI prevention in risky partnerships than males
- We must identify venues to offer sexual and reproductive care to this population

ARTICLE INFO

Key Words:

Sexually transmitted infection prevention
Contraception
Opioid use

ABSTRACT

Introduction: The dual epidemics of sexually transmitted infections (STIs) and unprescribed opioid use persist globally, including in the United States. This study addresses gaps in STI prevention and contraception among people who use unprescribed opioids in New York City (NYC), focusing on both men and women.

Methods: We conducted a cross-sectional substudy from November 2021–August 2022 assessing sexual health with a one-time survey within a longitudinal cohort study among people who use unprescribed opioids in NYC that collected baseline data during 2019–2020. We measured sociodemographic characteristics, substance use history, sexual partnerships and STI prevention and contraception categorized as providing effective prevention versus none/ineffective. We estimated the prevalence of lack of effective STI prevention and contraception and potential correlates among males and females.

Results: The analytic sample included 108 participants (54 % male, 46 % female) with a mean age of 46 years. No/ineffective STI prevention was most common among reproductive-age females (81 %) and lowest among males (67 %) and no/less effective contraception was reported by approximately 90 % of participants. No/ineffective STI prevention and contraception were differentially associated with factors such as sexual partnerships, substance use treatment, and healthcare utilization among males and females.

Discussion: Findings highlight the need for improved provision of effective STI and pregnancy prevention methods for both men and women who use drugs. There is a critical need to expand access to sexual and reproductive health services for people who use drugs, including integrating these services into diverse healthcare and drug-service settings.

* Correspondence to: 4364 Scorpius Street, Office 211, Orlando, FL 32816, USA.

E-mail address: Joy.Scheidell@ucf.edu (J.D. Scheidell).

<https://doi.org/10.1016/j.dadr.2025.100337>

Received 24 February 2025; Received in revised form 21 April 2025; Accepted 21 April 2025

Available online 22 April 2025

2772-7246/© 2025 The Authors. Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

Drug use, specifically non-medical use of opioids (i.e., prolonged use, misuse, and use without medical supervision), has contributed substantially to global morbidity and mortality. In 2019, over half a million deaths worldwide were attributed to drug use, with 80 % of deaths linked to opioids (World Health Organization, 2023). Concurrently, estimates suggest there were over 700 million incident cases of sexually transmitted infections (STIs) such as chlamydia, gonorrhea, and syphilis worldwide in 2019 (Zheng et al., 2022). For over a decade in the United States (US), STIs and adverse sequelae (e.g., congenital syphilis) have steadily risen alongside increasing rates of drug use-related adverse outcomes such as overdose. In 2022, some STI rates appeared to stabilize although gonorrhea, syphilis, and congenital syphilis continued to rise (Centers for Disease Control and Prevention, 2022), and the opioid-related overdose mortality rate, which represented a four-fold increase since 2002, was unchanged from 2021 (Centers for Disease Control and Prevention, 2024). Evidence suggests dual epidemics of drug use and STIs are linked, with drug use, including opioids and stimulants, increasingly reported by people diagnosed with an STI, especially among women (Carlson et al., 2023; Kidd et al., 2019; Strathdee et al., 2021). Lack of STI prevention may also co-occur with unintended pregnancy (Eshri Capri Workshop Group, 2014). Like STIs, unintended pregnancy is a risk factor for adverse reproductive outcomes (Guedes et al., 2023) and is prevalent among people who use drugs (Heil et al., 2011; Shafique et al., 2022). Unintended pregnancies, particularly among women who use drugs, result in substantial societal costs, including significant medical expenses and public spending (Cornford et al., 2015; Lee et al., 2024; Sonfield et al., 2011). It is essential to identify approaches to improve STI and pregnancy prevention for people who use drugs.

There are gaps in understanding of STI and pregnancy prevention (i.e., contraception) among the priority population of people who use drugs. First, most research on infectious disease in this population focuses on HIV and Hepatitis C virus (HCV) among people who inject drugs. There is comparatively little focused on non-viral STIs among the broader population of people who use drugs via non-injection routes of administration (i.e., smoking, snorting) (Strathdee et al., 2021). Second, while there has been extensive research regarding contraception among women who use drugs, men who use drugs are not frequently included (Hurley et al., 2023; Levander et al., 2023; Terplan et al., 2016). This is an important gap considering that women who use drugs often have male partners who also use drugs who play a role in STI transmission and conception within those partnerships (Flom et al., 2001; Friedman et al., 2017; Khan et al., 2013; Neaigus et al., 2011), and men who use drugs also need sexual and reproductive health services (Stoltman et al., 2022). Moreover, women who use drugs may experience gendered power dynamics in partnerships with men that may prevent health promotion behaviors (MacRae and Aalto, 2000; Stone et al., 2020; Zahnnow et al., 2018). Factors related to STI prevention and contraception among both men and women who use drugs are not well known and could illuminate additional intervention targets.

To address these gaps, we examined reported methods of STI prevention and contraception, including condom use within types of sexual partnerships, and multilevel correlates of STI prevention and contraception within a sample of men and women who use unprescribed opioids in New York City.

2. Methods

2.1. Study design and sample

From November 2021 to August 2022, we recruited participants from an ongoing longitudinal study among people who use unprescribed opioids in New York City ($n = 575$) (Elliott et al., 2021) to participate in a cross-sectional online survey substudy on sexual and reproductive

health and enrolled a convenience sample of 120 participants (Scheidell et al., 2023). We linked parent study baseline survey data and substudy survey data via shared identification numbers. In the current analyses, we excluded two participants lacking identification numbers, three missing gender data, and seven missing STI prevention and/or contraception data for a total analytic sample of 108. Study activities were approved by the NYU Grossman School of Medicine IRB.

2.2. Measures

Sociodemographic characteristics and substance use were measured in the parent study and included age; gender, categorized as male and female (no substudy participants identified as transgender); race and ethnicity; marital status; sexual orientation; number of children; adverse childhood experiences (ACEs); years using unprescribed opioids; past 30-day injection drug use; incarceration history; and current treatment with medications for opioid use disorder (MOUD), including methadone and buprenorphine.

The substudy survey measured past 12-month sexual and reproductive health indicators based on the Risk Assessment Battery and prior literature (Klaman et al., 2019; Navaline et al., 1994). These included multiple sexual partners (i.e., ≥ 2), partners' gender identity, and having main, sex trade, and/or casual partners. Among participants who reported having main, sex trade, and/or casual partners, additional questions asked about those partners' reported risk behaviors within each type of partnership, including the number of sex acts without a condom with those partners, if a condom was used the most recent time having sex with that type of partner, and whether those partners used drugs. Participants reported history of sexual violence/coercion; concern about STIs; whether they attended syringe services programs (SSPs) and opioid treatment programs (OTPs); whether they had attended family planning/sexual health clinics (e.g., Planned Parenthood); the settings in which they had received healthcare in the past 12 months, which was categorized as no healthcare received, clinical settings (i.e., doctor's office, health department), emergency settings (i.e., emergency department, urgent care), and other settings (i.e., correctional facility); and barriers to STI prevention/contraception including partner preference and price. Participants reported whether they believed on-site sexual and reproductive health services in drug-service settings would reduce concerns about stigma and if they would be comfortable receiving those services. Females reported pregnancy history, pregnancy intentions, and use of emergency contraception.

Separately for preventing STI and pregnancy, participants selected all methods used by themselves and/or any of their sexual partners in the past year from a list provided; the list of methods was the same for both although some methods would not provide prevention of both STIs and pregnancy. For STI prevention, we categorized responses as effective (i.e., internal or external condoms) versus no/ineffective (e.g., none, all other forms). For contraception, we categorized responses as effective/very effective (e.g., oral contraceptives, vaginal ring, sterilization) versus no/less effective (e.g., none, condoms, "pulling out", rhythm cycle). These categorizations of effectiveness are defined based on the rate of failure in the first year of use, with very effective having $< 1\%$ failure, effective having approximately 4–7 % failure, and less effective having approximately 13–27 % failure; given our modest sample size and low uptake of contraception in general, we combined effective and very effective (Bradley et al., 2023).

2.3. Analyses

Using Stata 17, we calculated the prevalence of forms of STI prevention and contraception, and combined indicators of no/ineffective STI prevention and no/less effective contraception. We used bivariate analyses to calculate the percentage of participants reporting no/ineffective STI prevention and no/less effective contraception by socio-demographic, substance use, and sexual and reproductive health

indicators. We stratified analyses among males, females, and for contraception-related outcomes, females of reproductive age (18–51 years); reproductive age range was defined as such due to eligible participants required to be at least 18 years of age and that the end of the reproductive span (i.e., menopause) occurs at approximately 50.3 years of age among US females (Nabhan et al., 2022). Analyses are exploratory and descriptive, though we indicate when p -values < 0.10 and < 0.05 were observed in tables, with the former chosen as a more conservative indicator of potentially significant differences considering the small sample size especially in stratified analyses.

3. Results

We previously reported detailed characteristics of the substudy sample ($n = 118$) (Scheidell et al., 2023). In the current analytic sample ($n = 108$), 54 % of participants were cisgender male and 46 % were cisgender female (among females, 62 % were reproductive age; data not shown in tables). Approximately 12 % of females and 84 % of males reported cisgender female sex partners, and 73 % of females and 7 % of males reported cisgender male partners. No females and 2 % of males reported transgender female partners, and 6 % of females and 2 % of males reported transgender male partners. Mean age was 46.0 years, and most participants were Hispanic (43 %), followed by approximately 30 % non-Hispanic White and non-Hispanic Black (Table 1, first column). Most were unmarried (70 %) and identified as heterosexual (87 %).

3.1. Forms of STI Prevention and Contraception

Most participants reported no STI prevention used in the past 12 months (Fig. 1, left panel; Supplemental Table 1) and the most common form was external condoms. The majority also reported no contraception (Fig. 1, right panel); males reported the lowest prevalence. Like STI prevention, external condoms were most reported.

3.2. STI Prevention and Contraception Effectiveness within Partnerships

Prevalence of no/ineffective STI prevention was highest among reproductive-age females (81 %) and lowest among males (67 %; Fig. 2). No/less effective contraception was reported equally among males and females (94 %) and slightly lower among reproductive-age females (91 %). The proportion of condomless sex acts with main partners was higher among females (87 %) than males (75 %). All sex acts with trade partners reported by females were condomless versus one-quarter among males, and approximately twice as many females with sex trade partners reported no condom was used at most recent sex versus males. Similarly, among females with casual partners, two-thirds of sex acts did not use a condom versus 18 % among males, and most females with casual partners reported no condom used at most recent sex versus 35 % of males.

3.3. Correlates of No/Ineffective STI Prevention

Among males and females, participants reporting no/ineffective STI prevention were older than those reporting effective methods (Table 1). Among females, White participants reported the lowest prevalence of no/ineffective STI prevention (53 %) compared to Black and Hispanic females. Among males, those with beyond a high school education reported the lowest prevalence (52 %) compared to those with lower education. Males who experienced ≥ 4 ACEs reported lower prevalence of no/ineffective prevention (56 %) compared to those with fewer (79 %). Among females the prevalence of no/ineffective prevention was higher among those reporting injection drug use and incarceration.

STI prevention varied by gender based on sexual partnerships. For example, among males, the prevalence of no/ineffective STI prevention was lower among those reporting multiple partnerships (44 %) than

those who did not have multiple partners (76 %), whereas among females, there was no difference. Among males, the prevalence of no/ineffective STI was lower among those reporting worrying “moderately/a lot” (40 %) compared to not worried (77 %); among females, the prevalence was the same regardless of worry. Females who attend an OTP and those currently treated with MOUD reported higher prevalence of no/ineffective STI prevention. All male participants who attended a family planning clinic reported no/ineffective STI prevention. Males who received healthcare in clinical setting reported lower prevalence of no/ineffective STI prevention (52 %) compared to those who received no care (71 %) or care in emergency (75 %) or other settings (100 %). Among males, 100 % of those reporting their partners’ preference was a barrier to using their choice prevention method reported no/ineffective STI prevention.

3.4. Correlates No/Less Effective Contraception

Among males and all females, those reporting no/less effective contraception were older; when restricted to reproductive-age females, those reporting no/less effective contraception were younger (Table 1). Prevalence of no/less effective contraception did not vary by socio-demographic characteristics. Of those reporting ≥ 4 ACEs, 100 % reported no/less effective contraception, which was significantly higher than those with fewer ACEs among females. Among females, the prevalence of no/less effective contraception was higher among those reporting injection drug use (100 %) compared to those who did not inject, especially among reproductive-age (57 %). Contraception did not vary by pregnancy-related factors including intention to become pregnant in the future. Reporting no/less effective contraception use was higher among females with main partners (approximately 97 %) than those without main partners. The prevalence of no/less effective contraception was high among reproductive-age females who used an SSP and among males and females who attended an OTP. Among females, the prevalence of no/less effective contraception was > 90 % among those reporting having healthcare coverage compared to 50 % among those without coverage.

3.5. STI Prevention and Contraception in Drug-Service Settings

Among participants who attended an SSP or OTP, few reported receiving STI prevention and contraception in those settings (data not shown). Approximately 40 % of participants visited an SSP, but only 12 % of those participants reported receiving condoms there and none reported non-prescription or prescription contraception, long-acting reversible contraception or emergency contraception. Approximately half of participants attended an OTP, and among those who did, approximately 18 % of males and 3 % of females reported receiving condoms; no other forms of STI prevention/contraception were reported. Around one-third of participants reported that they believe that on-site sexual and reproductive health services within drug-service settings could reduce concerns about stigma and over half reported that they would be comfortable receiving sexual and reproductive health services within those settings.

4. Discussion

In this sample of people who use unprescribed opioids in New York City, over half reported they did not use effective STI prevention and contraception in the past year. Females appeared to have elevated risk, especially those with history of trauma, injection drug use, and sex trade and casual partnerships. Our findings highlight the ongoing need to better reach people who use drugs with education and provision of effective forms of STI and pregnancy prevention.

Contraception practices among women who use drugs have been relatively well-described (Jia and Norman, 2021; Terplan et al., 2015). Our current finding that over half of women who use opioids reported no

Table 1

Characteristics Associated with No/Ineffective STI Prevention and No/Less Effective Contraception among Males and Females who use Illicit Opioids in New York City (n = 108).

Characteristics	Total Sample (n = 108) n (%) with Characteristic	STI Prevention		Contraception		
		Males (n = 58) % Using No/ Ineffective STI Prevention ^a	Females (n = 50) % Using No/ Ineffective STI Prevention ^a	Males (n = 58) % Using No/Less Effective Contraception ^a	Females (n = 50) % Using No/Less Effective Contraception ^a	Females Reproductive Age Only (n = 31) % Using No/Less Effective Contraception ^a
Age, mean (CI) ^b	45.9 (43.7, 48.1)	47.6 (43.9, 51.4)	45.8 (42.2, 49.5)	47.0 (43.8, 50.1)	45.4 (41.9, 48.8)	37.9 (34.5, 41.2)
Race and Ethnicity						
White	31 (28.7)	68.8	53.3**	93.8	93.3	92.3
Black	29 (26.8)	71.4	80.0	100.0	100.0	100.0
Hispanic	46 (42.6)	65.3	90.0	92.3	90.5	86.7
Education						
Less than HS	28 (25.9)	86.7*	84.6	93.3	100.0	100.0
HS Grad	42 (38.9)	70.0	68.2	90.0	95.6	93.3
>HS	38 (35.2)	52.2	80.0	100.0	86.7	80.0
Sexual Orientation						
Heterosexual	94 (87.0)	67.3	79.5	94.6	95.0	90.9
LGBTQIA	13 (12.0)	100.0	63.6	100.0	90.9	90.0
Marital Status						
Single	76 (70.4)	68.2	71.9	95.4	96.9	95.0
Married/Cohabiting	32 (29.6)	64.3	83.3	92.9	89.5	83.3
Has Children						
No	36 (33.3)	54.6	64.3	90.9	92.9	90.9
Yes	72 (66.7)	75.0	80.6	97.2	94.6	90.5
Adverse Childhood Experiences	48 (44.4)	79.3*	68.4	96.6	85.0**	72.7**
Less than 4	49 (45.4)	56.5	76.9	100.0	100.0	100.0
4 or More						
Number years using opioids, mean (CI)	23.2 (20.7, 25.8)	23.3 (19.1, 27.6)	23.2 (18.7, 27.7)	24.1 (20.4, 27.7)	23.1 (19.1, 27.1)*	16.7 (12.9, 20.4)
Injection Drug Use in Past 30 Days						
No	35 (32.4)	75.0	60.0*	100.0	81.2**	57.1**
Yes	73 (67.6)	63.2	82.9	92.1	100.0	100.0
Lifetime Incarceration						
No	24 (22.2)	66.7	60.0*	100.0	93.8	90.0
Yes	84 (77.8)	67.4	82.9	93.9	94.3	90.9
Ever Pregnant		—	—	—		
No	8 (16.0)				87.5	85.7
Yes	42 (84.0)				95.4	92.0
Ever Had Unintended Pregnancy		—	—	—		
No	30 (61.2)				93.6	88.9
Yes	19 (38.8)				94.7	92.9
Ever Used Emergency Contraception		—	—	—		
No	42 (85.7)				93.0	88.5
Yes	7 (14.3)				100.0	100.0
Want to Become Pregnant in the Future		—	—	—	—	
No	35 (71.4)					89.5
Yes	14 (28.6)					92.3
≥ 2 Partners in Past 12 Months						
No	82 (75.9)	76.2**	77.5	92.9	97.5	83.3
Yes	26 (24.1)	43.8	70.0	100.0	90.0	71.4
Had a Main Partner in Past 12 Months						
No	16 (14.8)	54.6	80.0	100.0	66.7**	0.0**
Yes	92 (85.2)	70.2	75.6	93.6	97.8	96.7
Main Partner Uses Drugs ^c						
No	40 (44.9)	61.5	85.7	88.5	92.9	88.9
Yes	49 (55.1)	79.0	70.0	100.0	100.0	100.0
Had Sex Trade Partner(s) in Past 12 Months						
No	93 (86.1)	72.9**	75.6	95.8	95.6	92.9
Yes	14 (13.0)	33.3	80.0	88.9	80.0	75.0
Sex Trade Partner(s) Use Drugs ^c						
No	9 (64.3)	60.0	75.0	80.0	75.0	66.7
Yes	5 (35.7)	0.0	100.0	100.0	100.0	100.0
Had Casual Partner(s) in Past 12 Months	84 (77.8)	78.0**	76.7	95.1	95.4	92.9
No	24 (22.2)	41.2	71.4	94.1	85.7	75.0
Yes						

(continued on next page)

Table 1 (continued)

Characteristics	Total Sample (n = 108) n (%) with Characteristic	STI Prevention		Contraception		
		Males (n = 58) % Using No/ Ineffective STI Prevention ^a	Females (n = 50) % Using No/ Ineffective STI Prevention ^a	Males (n = 58) % Using No/Less Effective Contraception ^a	Females (n = 50) % Using No/Less Effective Contraception ^a	Females Reproductive Age Only (n = 31) % Using No/Less Effective Contraception ^a
Casual Partner(s) Use Drugs ^c	15 (62.5)	50.0	66.7	91.7	66.7	0.0**
No	9 (37.5)	20.0	75.0	100.0	100.0	100.0
Yes						
Experienced Violence from Sex Partners						
No	73 (67.6)	66.0	69.2	93.6	92.6	83.3
Yes	35 (32.4)	72.7	83.3	100.0	95.8	95.0
Ever Coerced to have Sex	87 (80.6)	66.7	72.7	94.4	94.1	89.5
No	21 (19.4)	75.0	82.4	100.0	94.1	92.3
Yes						
Ever Physically Forced to have Sex						
No	83 (76.8)	66.7	72.4	94.4	93.3	87.5
Yes	25 (23.2)	75.0	81.0	100.0	95.2	93.8
Worry about STI						
Not at all/A little	86 (79.6)	76.7**	76.7	95.4	95.4	92.6
Moderately/ A lot	22 (20.4)	40.0	71.4	93.3	85.7	80.0
Attended an SSP in Past 12 Months						
No	62 (57.4)	70.6	71.4	94.1	89.7	80.0*
Yes	45 (41.7)	60.9	81.8	95.6	100.0	100.0
Attended an OTP						
No	25 (23.2)	80.0	50.0**	86.7*	81.8*	77.8
Yes	81 (75.0)	61.9	84.6	97.6	97.4	95.6
Currently Treated with MOUD						
No	49 (45.4)	67.9	57.1**	92.9	90.5	85.7
Yes	59 (54.6)	66.7	89.7	96.7	96.7	94.4
Has Healthcare Coverage						
No	5 (4.6)	33.3	0.0	100.0	50.0**	50.0**
Yes	102 (94.4)	70.4	79.2	94.4	95.9	93.3
Most Recent Check-Up						
Never/>1 Year	41 (38.0)	68.2	73.7	95.4	94.7	94.1
Within Past Year	66 (61.1)	65.7	77.4	94.3	93.8	86.7
Attended a Family Planning Clinic in Past 12 Months						
No	101 (93.5)	65.4	76.1	94.6	93.6	90.0
Yes	6 (5.6)	100.0	75.0	100.0	100.0	100.0
Settings Received Healthcare in Past 12 Months						
No Healthcare Received	37 (34.3)	71.4	81.2	100.0	88.2	83.3
Clinical Settings	32 (29.6)	52.4	72.7	85.7	100.0	100.0
Emergency Settings	28 (25.9)	75.0	75.0	100.0	93.8	90.0
Other Settings	9 (8.3)	100.0	71.4	100.0	100.0	100.0
Ever Experienced Barriers to SRH Care						
No	99 (91.7)	68.0	75.5	94.0	94.0	90.3
Yes	8 (7.4)	57.1	100.0	100.0	100.0	100.0
Partners Preference is a Barrier to Method of Choice						
No	102 (94.4)	66.1	78.3	94.6	93.6	89.7
Yes	5 (4.6)	100.0	50.0	100.0	100.0	100.0
Price is a Barrier to Method of Choice						
No	96 (88.9)	67.3	80.5	94.6	92.9	88.0
Yes	10 (9.3)	50.0	62.5	100.0	100.0	100.0

* indicates p-value < 0.10;

** indicates p-value < 0.05

^a Values represent the percent of participants reporting no/ineffective STI prevention and no/less effective contraception among participants within the strata of the characteristic^b Males using effective STI prevention mean age 44.8, females using effective STI prevention mean age 42.5; males using effective contraception mean age 42.0, females using effective contraception mean age 41.3 (reproductive age only 41.3)^c Among those with those types of partners

contraception is aligned with a systematic review reporting that approximately 55 % of women who use drugs did not use contraception (Terplan et al., 2015), underscoring the persisting need to identify ways to address this issue. Our study and the majority of those included in the

review focused on women who use opioids, although the few studies in the review as well as prior research has shown that those who use stimulants such as cocaine and methamphetamine have low uptake of contraception and that co-use of opioids with stimulants is associated

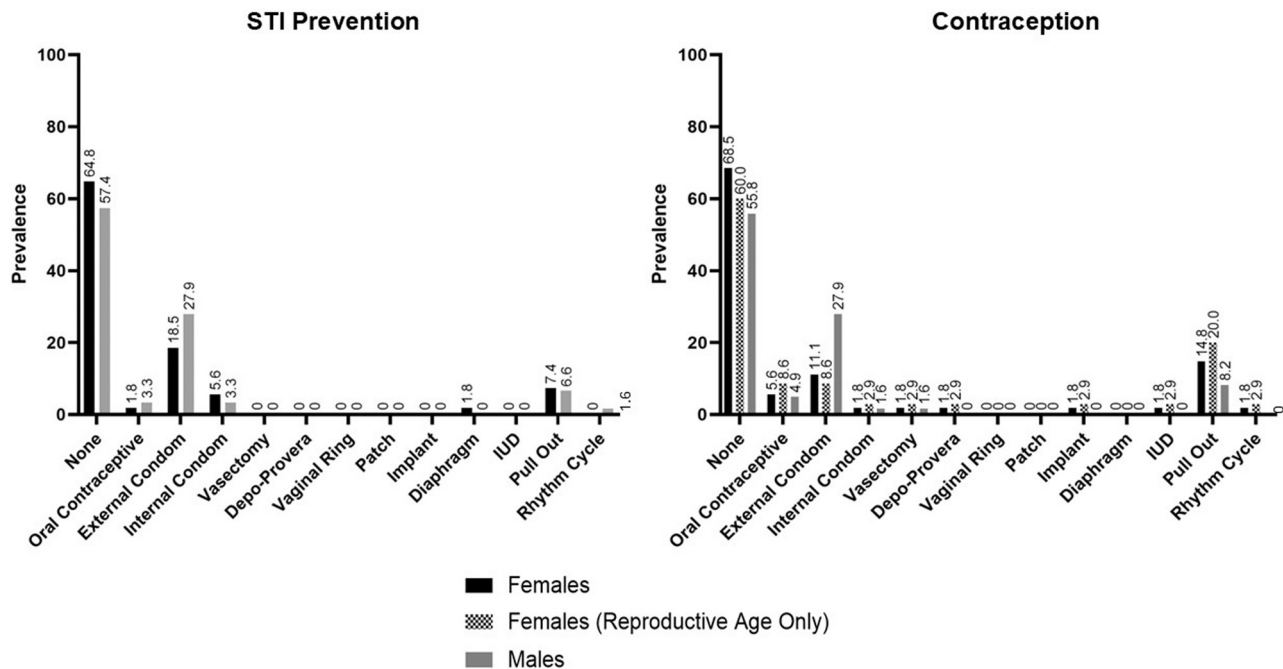


Fig. 1. Reported Forms of STI Prevention and Contraception Used in Past 12 Months among Participants (n = 108).

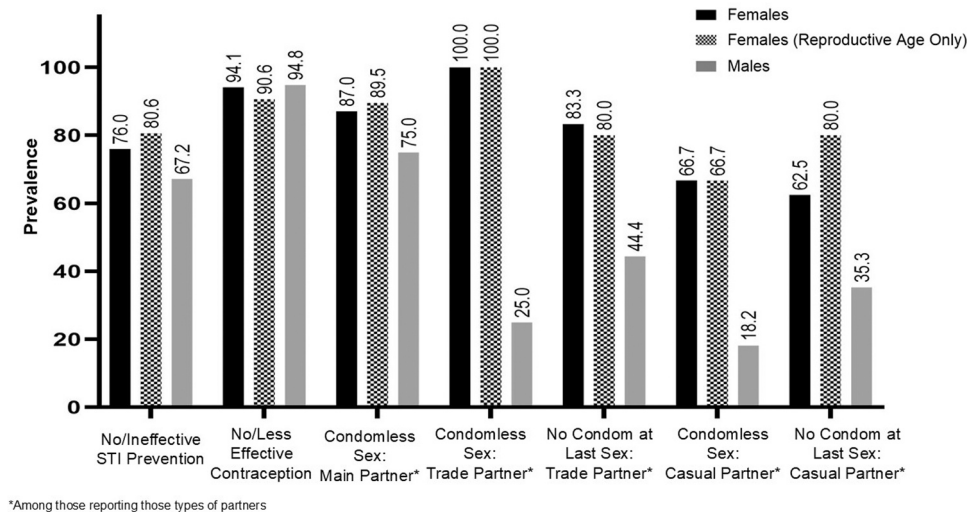


Fig. 2. Reported Effectiveness of STI Prevention and Contraception and Condom Use within Types of Sexual Partnerships in Past 12 Months among Participants (n = 108).

with lower prevalence of contraception use among women (Hurley et al., 2023; Levander et al., 2023; Terplan et al., 2015). The potentially different pathways that may link opioids to contraception compared to those of stimulants, alcohol, and polysubstance use should be explored to tailor intervention approaches.

Our study expands the research by examining STI prevention and contraceptive practices among men who use opioids, finding a high prevalence of lack of STI prevention or contraception within their sexual partnerships. One of the few other studies that included men who use drugs also found low levels of contraception and the most common method used was condoms (Stoltman et al., 2022). Yet, men in that study were as likely as women to report an interest in sexual and reproductive health services integrated into drug treatment settings, including contraception education and administration and STI testing (Stoltman et al., 2022). Similarly, we found that men and women in our sample were equally as likely to report that co-located sexual and

reproductive health services in drug-related service settings may reduce stigma and they would be comfortable receiving those services.

Currently most research examining implementation of co-located drug and sexual and reproductive health services has focused primarily on women's services within SSPs (Grieb et al., 2022; Hurley et al., 2023; Martin et al., 2022; Owens et al., 2020; Roth et al., 2021). However, we found that only around half of participants in our sample reported attending opioid use treatment and syringe services programs in the past year and very few reported receiving STI prevention and contraception resources from those drug-related services. Importantly, lack of effective STI prevention and contraception was high among participants who received health care across a range of settings, including family planning clinics and doctor's offices. Taken together, our findings suggest that there is a need to expand the focus of increasing access to sexual and reproductive health services to include the diverse range of settings, both traditional healthcare settings and those focused

on drug-related services, where we may better reach the broad population of people who use drugs.

Our study and others highlight that women who use drugs are disproportionately adversely affected (Blankenship et al., 2015; El-Bassel and Strathdee, 2015; Fonseca et al., 2021; Wechsberg et al., 2015). Lack of effective STI prevention was highest among females in our sample, and, compared to males, females were more likely to report condomless sex in partnerships in which STI risk may be high. Condom use is often less frequent with primary partners compared to sex trade and casual partners (Gamarel and Golub, 2019; Santelli et al., 1996), including among people who use drugs (Sherman and Latkin, 2001; Vanichseni et al., 1993). However, it appeared in our sample that women did not tailor condom use to the type of partner in the same manner as men. Further, males who reported moderate/high levels of concern about STI were less likely to report no/ineffective STI prevention but among females, STI prevention did not vary by level of concern and contraception did not vary by desire to become pregnant in the future. Power dynamics within the partnerships of women who use drugs influences their sexual and reproductive health risk (El-Bassel et al., 2003, 2011; Meyers et al., 2020). Couples-based interventions for people who use drugs are effective in reducing STI/HIV risk within partnerships (Jiwatram-Negron and El-Bassel, 2014), with intervention core components focused on skills-building in communication, problem solving, and negotiation and addressing power imbalances (El-Bassel et al., 2023). Because women who use drugs' experiences and risks are different than men, we must strive to center women's needs in research, prevention, treatment, and harm reduction services settings (Hurley et al., 2020; Iversen et al., 2015; Lum, 2017).

Results must be considered in light of the small, cross-sectional geographically-restricted sample of relatively older cisgender people who use unprescribed opioids and self-reported data on sensitive topics that may be subject to recall bias. Further, while we examined reported use of a variety of STI prevention and contraception methods with all partners in the past year, the use of methods within specific types of partnerships was limited to condoms and does not account for other forms of STI prevention and contraception that may have been used. Considering the limitations of p-values in modest sample sizes and the potential issue of multiple hypothesis testing (Nuzzo, 2014), the goal of this analysis was primarily descriptive and hypothesis generating for future research, thus the inclusion of p-values was intended to provide additional context and did not correct for multiple comparisons (Greenland, 2021; Sjolander and Vansteelandt, 2019).

STI prevention and contraception are just two components of the broader sexual and reproductive health needs that must be addressed and improved among people who use drugs. The sparse extant research in this population has shown there are needs spanning the array of sexual and reproductive health, including abortion care, pregnancy loss, and parenting (Dasgupta et al., 2018; Scheidell, Ataia, et al., 2022; Scheidell, Hoff, et al., 2022). We must apply Reproductive Justice as the framework to emphasize both access and choice to care to ensure that people who use drugs have the rights and ability to maintain their bodily autonomy, have children or not, and parent their children in communities that are safe and healthy (SisterSong). Future research should explore alternative settings and strategies to increase access to sexual and reproductive health services for people who use drugs, given that many do not engage with traditional substance use treatment services. Studies should investigate the effectiveness of providing these services through community-based organizations, non-traditional healthcare settings like pharmacies and mobile health units, and through peer-led initiatives. Evaluating these innovative service delivery models and conducting longitudinal and comparative studies will identify the most effective approaches to improve sexual and reproductive health outcomes for this population. Research should include diverse populations, focusing on people who use drugs regardless of route of administration, and examine the role of power dynamics and gender in health behaviors.

Author disclosures

All authors have no conflicts of interest to disclose.

CRediT authorship contribution statement

Hervera Belén: Writing – review & editing, Investigation. **Cirald Katrina:** Writing – review & editing, Investigation, Conceptualization. **Elliott Luther C:** Writing – review & editing, Methodology, Investigation, Funding acquisition, Data curation, Conceptualization. **Mahachi Muthoni:** Writing – review & editing, Project administration, Investigation, Data curation. **Bennett Alex S:** Writing – review & editing, Methodology, Investigation, Funding acquisition, Conceptualization. **Dakoulas Sophia:** Writing – review & editing, Investigation. **Scheidell Joy D:** Writing – review & editing, Writing – original draft, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Chung Teresa:** Writing – review & editing, Methodology, Investigation, Conceptualization.

Declaration of Competing Interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Joy Scheidell reports financial support was provided by National Institute on Drug Abuse. Joy Scheidell reports financial support was provided by New York University Center for Drug Use and HIV Research. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

This study was supported by the Center for Drug Use and HIV/HCV Research (P30DA011041) and by the National Institute on Drug Abuse (R01DA046653). Sexually transmitted infection testing was supported by the University of North Carolina at Chapel Hill Center for AIDS Research (P30AI050410). The authors sincerely thank all the participants who shared their insight, experiences, and expertise.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at [doi:10.1016/j.dadr.2025.100337](https://doi.org/10.1016/j.dadr.2025.100337).

References

- Blankenship, K.M., Reinhard, E., Sherman, S.G., El-Bassel, N., 2015. Structural interventions for hiv prevention among women who use drugs: a global perspective. *J. Acquir Immune Defic. Syndr.* 69 (2), S140–S145. <https://doi.org/10.1097/QAI.0000000000000638>.
- Bradley, S.E.K., Polis, C.B., Micks, E.A., Steiner, M.J., 2023. Effectiveness, safety and comparative side effects. In: Cason, In.P., Cwiak, C., Edelman, A., Kowal, D., Marrazzo, J.M., Nelson, A.L., Policar, M.S., Hatcher, R.A. (Eds.), *Contraceptive Technology*, 22nd ed.). Jones-Bartlett Learning.
- Capri Workshop Group, Eshri, 2014. Simultaneous prevention of unintended pregnancy and STIs: a challenging compromise. *Hum. Reprod. Update* 20 (6), 952–963. <https://doi.org/10.1093/humupd/dmu030>.
- Carlson, J.M., Tannis, A., Woodworth, K.R., Reynolds, M.R., Shinde, N., Anderson, B., Hobeidar, K., Praag, A., Campbell, K., Carpentier, C., Willabus, T., Burkhardt, E., Torrone, E., O'Callaghan, K.P., Miele, K., Meaney-Delman, D., Gilboa, S.M., Olsen, E. O., Tong, V.T., 2023. Substance use among persons with syphilis during pregnancy - Arizona and Georgia, 2018–2021. *MMWR Morb. Mortal. Wkly Rep.* 72 (3), 63–67. <https://doi.org/10.15585/mmwr.mm7203a3>.
- Centers for Disease Control and Prevention. (2022). *Sexually Transmitted Disease Surveillance 2022*. (<https://www.cdc.gov/std/statistics/2022/default.htm>)
- Centers for Disease Control and Prevention. (2024). *Drug Overdose Deaths in the United States, 2002–2022*. ([https://www.cdc.gov/nchs/products/databriefs/db491.htm#:~:text=Overall%2C%20the%20age%2Dadjusted%20rate,\)%20and%202022%20\(32.6\)](https://www.cdc.gov/nchs/products/databriefs/db491.htm#:~:text=Overall%2C%20the%20age%2Dadjusted%20rate,)%20and%202022%20(32.6))).
- Cornford, C.S., Close, H.J., Bray, R., Beere, D., Mason, J.M., 2015. Contraceptive use and pregnancy outcomes among opioid drug-using women: a retrospective cohort study. *PLoS One* 10 (3). <https://doi.org/10.1371/journal.pone.0116231>.

- Dasgupta, A., Davis, A., Gilbert, L., Goddard-Eckrich, D., El-Bassel, N., 2018. Reproductive health concerns among substance-using women in community corrections in New York City: understanding the role of environmental influences. *J. Urban Health* 95 (4), 594–606. <https://doi.org/10.1007/s11524-017-0184-8>.
- El-Bassel, N., Strathdee, S.A., 2015. Women who use or inject drugs: an action agenda for women-specific, multilevel, and combination hiv prevention and research. *J. Acquir Immune Defic. Syndr.* 69 2 (2), S182–190. <https://doi.org/10.1097/QAI.0000000000000628>.
- El-Bassel, N., Gilbert, L., Rajah, V., 2003. The relationship between drug abuse and sexual performance among women on methadone. *Height. risk Sex. Intim. Violence HIV. Addict. Behav.* 28 (8), 1385–1403. [https://doi.org/10.1016/s0306-4603\(02\)00266-6](https://doi.org/10.1016/s0306-4603(02)00266-6).
- El-Bassel, N., Gilbert, L., Witte, S., Wu, E., Chang, M., 2011. Intimate partner violence and HIV among drug-involved women: contexts linking these two epidemics—challenges and implications for prevention and treatment. *Subst. Use Misuse* 46 (2–3), 295–306. <https://doi.org/10.3109/10826084.2011.523296>.
- El-Bassel, N., Hunt, T., Goddard-Eckrich, D.A., Chang, M.W., McCrimmon, T.R., Mukherjee, T., Remien, R.H., Terlikbayeva, A., Primbetova, S., Davis, A., Jiwatram-Negrón, T., Benjamin, S.N., Witte, S.S., Wu, E., Gilbert, L., 2023. Couple-based behavioral HIV interventions by the social intervention group: progress, gaps, and future directions. *Res. Soc. Work Pract.* 33 (2), 147–177. <https://doi.org/10.1177/1049731522118850>.
- Elliott, L., Crasta, D., Khan, M., Roth, A., Green, T., Kolodny, A., Bennett, A.S., 2021. Validation of the opioid overdose risk behavior scale, version 2 (ORBS-2). *Drug Alcohol Depend.* 223, 108721. <https://doi.org/10.1016/j.drugalcdep.2021.108721>.
- Flom, P.L., Friedman, S.R., Kortiri, B.J., Neaigus, A., Curtis, R., Des Jarlais, D.C., Sandoval, M., Zenilman, J.M., 2001. Stigmatized drug use, sexual partner concurrency, and other sex risk network and behavior characteristics of 18- to 24-year-old youth in a high-risk neighborhood. *Sex. Transm. Dis.* 28 (10), 598–607. <https://doi.org/10.1097/00007435-200110000-00006>.
- Fonseca, F., Robles-Martinez, M., Tirado-Munoz, J., Alias-Ferri, M., Mestre-Pinto, J.I., Coratu, A.M., Torrents, M., 2021. A gender perspective of addictive disorders. *Curr. Addict. Rep.* 8 (1), 89–99. <https://doi.org/10.1007/s40429-021-00357-9>.
- Friedman, S.R., Mateu-Gelabert, P., Ruggles, K.V., Goodbody, E., Syckes, C., Jessell, L., Teubl, J., Guarino, H., 2017. Sexual risk and transmission behaviors, partnerships and settings among young adult nonmedical opioid users in New York City. *AIDS Behav.* 21 (4), 994–1003. <https://doi.org/10.1007/s10461-016-1672-7>.
- Gamarel, K.E., Golub, S.A., 2019. Closeness discrepancies and intimacy interference: motivations for hiv prevention behavior in primary romantic relationships. *Pers. Soc. Psychol. Bull.* 45 (2), 270–283. <https://doi.org/10.1177/0146167218783196>.
- Greenland, S., 2021. Analysis goals, error-cost sensitivity, and analysis hacking: Essential considerations in hypothesis testing and multiple comparisons. *Paediatr. Perinat. Epidemiol.* 35 (1), 8–23. <https://doi.org/10.1111/ppe.12711>.
- Grieb, S.M., Harris, R., Rosecrans, A., Zook, K., Sherman, S.G., Greenbaum, A., Lucas, G. M., Page, K.R., 2022. Awareness, perception and utilization of a mobile health clinic by people who use drugs. *Ann. Med.* 54 (1), 138–149. <https://doi.org/10.1080/07853890.2021.2022188>.
- Guedes, A.L.L., Guimaraes, D., Sarkis, D.J., Gabriel, T.T., Delgado, C.S., Campos, A.A.L., Nogueira, M.C., Ribeiro, L.C., 2023. Factors associated with women diagnosed with syphilis who received prenatal care in a primary healthcare unit. *Einst* 21, eAO0046. https://doi.org/10.31744/einstein_journal/2023AO0046.
- Heil, S.H., Jones, H.E., Arria, A., Kaltenbach, K., Coyle, M., Fischer, G., Stine, S., Selby, P., Martin, P.R., 2011. Unintended pregnancy in opioid-abusing women. *J. Subst. Abuse. Treat.* 40 (2), 199–202. <https://doi.org/10.1016/j.jsat.2010.08.011>.
- Hurley, E.A., Duello, A., Finocchiaro-Kessler, S., Goggin, K., Stancil, S., Winograd, R.P., Miller, M.K., 2020. Expanding contraception access for women with opioid-use disorder: a qualitative study of opportunities and challenges. *Am. J. Health Promot* 34 (8), 909–918. <https://doi.org/10.1177/0890117120927327>.
- Hurley, E.A., Goggin, K., Pina-Brugman, K., Noel-MacDonnell, J.R., Allen, A., Finocchiaro-Kessler, S., Miller, M.K., 2023. Contraception use among individuals with substance use disorder increases tenfold with patient-centered, mobile services: a quasi-experimental study. *Harm Reduct. J.* 20 (1), 28. <https://doi.org/10.1186/s12954-023-00760-7>.
- Iversen, J., Page, K., Madden, A., Maher, L., 2015. HIV, HCV, and health-related harms among women who inject drugs: implications for prevention and treatment. *J. Acquir. Immune Defic. Syndr.* 69, S176–S181. <https://doi.org/10.1097/QAI.0000000000000659>.
- Jia, L., Norman, W.V., 2021. Contraception practices among women on opioid agonist therapy. *J. Obstet. Gynaecol. Can.* 43 (2), 204–210. <https://doi.org/10.1016/j.jogc.2020.06.027>.
- Jiwatram-Negrón, T., El-Bassel, N., 2014. Systematic review of couple-based HIV intervention and prevention studies: advantages, gaps, and future directions. *AIDS Behav.* 18 (10), 1864–1887. <https://doi.org/10.1007/s10461-014-0827-7>.
- Khan, M.R., Berger, A., Hemberg, J., O'Neill, A., Dyer, T.P., Smyrk, K., 2013. Non-injection and injection drug use and STI/HIV risk in the United States: the degree to which sexual risk behaviors versus sex with an STI-infected partner account for infection transmission among drug users. *AIDS Behav.* 17 (3), 1185–1194. <https://doi.org/10.1007/s10461-012-0276-0>.
- Kidd, S.E., Grey, J.A., Torrone, E.A., Weinstock, H.S., 2019. Increased methamphetamine, injection drug, and heroin use among women and heterosexual men with primary and secondary syphilis - United States, 2013–2017. *MMWR Morb. Mortal. Wkly Rep.* 68 (6), 144–148. <https://doi.org/10.15585/mmwr.mm6806a4>.
- Klaman, S.L., Lorvick, J., Jones, H.E., 2019. Provision of and barriers to integrating reproductive and sexual health services for reproductive-age women in opioid treatment programs. *J. Addict. Med* 13 (6), 422–429. <https://doi.org/10.1097/ADM.0000000000000519>.
- Lee, E., Schofield, D., Dronavalli, M., Lawler, K., Uebel, H., Burns, L., Bajuk, B., Page, A., Gu, Y.Y., Eastwood, J., Dickson, M., Green, C., Dicaire, L., Oei, J.L., 2024. Health care needs and costs for children exposed to prenatal substance use to adulthood. *Jama Pediatr.* 178 (9), 888–898. <https://doi.org/10.1001/jamapediatrics.2024.2281>.
- Levander, X.A., Foot, C.A., Magnusson, S.L., Cook, R.R., Ezell, J.M., Feinberg, J., Go, V. F., Lancaster, K.E., Salisbury-Afshar, L., Smith, G.S., Westergaard, R.P., Young, A.M., Tsui, J.L., Korthuis, P.T., 2023. Contraception and healthcare utilization by reproductive-age women who use drugs in rural communities: a cross-sectional survey. *J. Gen. Intern Med* 38 (1), 98–106. <https://doi.org/10.1007/s11606-022-07558-6>.
- Lum, Z. (2017). *World's First Women-Only Safe Injection Site Opens In Vancouver*. Retrieved October from (https://www.huffpost.com/archive/ca/entry/worlds-first-women-only-safe-injection-site-opens-in-vancouver_n_16886004)
- MacRae, R., Aalto, E., 2000. Gendered power dynamics and HIV risk in drug-using sexual relationships. *AIDS Care* 12 (4), 505–515. <https://doi.org/10.1080/09540120050123909>.
- Martin, C.E., Parlier-Ahmad, A.B., Beck, L., Jain, V., Terplan, M., 2022. A comparison of sex-specific reproductive and sexual health needs between addiction medicine and primary care treatment settings. *Subst. Use Misuse* 57 (8), 1229–1236. <https://doi.org/10.1080/10826084.2022.2076873>.
- Meyers, S.A., Smith, L.R., Luisa Mittal, M., Strathdee, S.A., Garfein, R.S., Guise, A., Werb, D., Rafful, C., 2020. The role of gender and power dynamics in injection initiation events within intimate partnerships in the US-Mexico border region. *Cult. Health Sex.* 22 (9), 1080–1095. <https://doi.org/10.1080/13691058.2019.1651903>.
- Nabhan, A.F., Mburu, G., Elshafeey, F., Magdi, R., Kamel, M., Elshebiny, M., Abuelnaga, Y.G., Ghoni, M., Abdelhamid, M.H., Ghoni, M., Eid, P., Morsy, A., Nasser, M., Abdelwahab, N., Elhayatmy, F., Hussein, A.A., Elgabay, N., Sawires, E., Tarkhan, Y., Kiarie, J., 2022. Women's reproductive span: a systematic scoping review. *Hum. Reprod. Open* 2022 (2), hoac005. <https://doi.org/10.1093/hropen/hoac005>.
- Navaline, H.A., Snider, E.C., Petro, C.J., Tobin, D., Metzger, D., Alterman, A.I., Woody, G. E., 1994. Preparations for AIDS vaccine trials. An automated version of the Risk Assessment Battery (RAB): enhancing the assessment of risk behaviors. *AIDS Res Hum. Retrovir.* 10 2, S281–283. (<https://www.ncbi.nlm.nih.gov/pubmed/7865319>).
- Neaigus, A., Miller, M., Gyarmathy, V.A., Friedman, S.R., 2011. HIV heterosexual sexual risk from injecting drug users among HIV-seronegative noninjecting heroin users. *Subst. Use Misuse* 46 (2–3), 208–217. <https://doi.org/10.3109/10826084.2011.521473>.
- Nuzzo, R., 2014. Scientific method: statistical errors. *Nature* 506 (7487), 150–152. <https://doi.org/10.1038/506150a>.
- Owens, L., Gilmore, K., Terplan, M., Prager, S., Micks, E., 2020. Providing reproductive health services for women who inject drugs: a pilot program. *Harm Reduct. J.* 17 (1), 47. <https://doi.org/10.1186/s12954-020-00395-y>.
- Roth, A.M., Tran, N.K., Felsher, M., Gadegebeku, A.B., Picara, B., Fox, R., Krakower, D.S., Bellamy, S.L., Amico, K.R., Benitez, J.A., Van Der Pol, B., 2021. Integrating HIV preexposure prophylaxis with community-based syringe services for women who inject drugs: results from the project SHE demonstration study. *J. Acquir Immune Defic. Syndr.* 86 (3), e61–e70. <https://doi.org/10.1097/QAI.00000000000002558>.
- Santelli, J.S., Kouzis, A.C., Hoover, D.R., Polacek, M., Burwell, L.G., Celentano, D.D., 1996. Stage of behavior change for condom use: the influence of partner type, relationship and pregnancy factors. *Fam. Plann Perspect.* 28 (3), 101–107. (<https://www.ncbi.nlm.nih.gov/pubmed/8827145>).
- Scheidell, J.D., Hoff, L., Khan, M.R., Bennett, A.S., Elliott, L., 2022. Parenting and childcare responsibilities, harm reduction service engagement, and opioid overdose among women and men who use illicit opioids in New York City. *Drug Alcohol Depend. Rep.* 3. <https://doi.org/10.1016/j.dadr.2022.100054>.
- Scheidell, J.D., Ataiants, J., Lankenau, S.E., 2022. Miscarriage and abortion among women attending harm reduction services in Philadelphia: correlations with individual, interpersonal, and structural factors. *Subst. Use Misuse* 57 (6), 999–1006. <https://doi.org/10.1080/10826084.2022.2046100>.
- Scheidell, J.D., Elliott, L.C., Bennett, A.S., Mahachi, M., Lapple, D., Nelson, J.A., Hobbs, M.M., 2023. Evaluation of self-directed specimen collection for chlamydia and gonorrhea testing among people who use drugs, 9564624231215859 *Int J. STD AIDS.* <https://doi.org/10.1177/09564624231215859>.
- Shafique, S., Umer, A., Innes, K.E., Rudisill, T.M., Fang, W., Cottrell, L., 2022. Preconception substance use and risk of unintended pregnancy: pregnancy risk assessment monitoring system 2016–17. *J. Addict. Med* 16 (3), 278–285. <https://doi.org/10.1097/ADM.0000000000000886>.
- Sherman, S.G., Latkin, C.A., 2001. Intimate relationship characteristics associated with condom use among drug users and their sex partners: a multilevel analysis. *Drug Alcohol Depend.* 64 (1), 97–104. [https://doi.org/10.1016/s0376-8716\(00\)00236-2](https://doi.org/10.1016/s0376-8716(00)00236-2).
- SisterSong. *Reproductive Justice*. Retrieved April from (<https://www.sistersong.net/reproductive-justice>)
- Sjolander, A., Vansteelandt, S., 2019. Frequentist versus Bayesian approaches to multiple testing. *Eur. J. Epidemiol.* 34 (9), 809–821. <https://doi.org/10.1007/s10654-019-00517-2>.
- Sonfield, A., Kost, K., Gold, R.B., Finer, L.B., 2011. The public costs of births resulting from unintended pregnancies: national and state-level estimates. *Perspect. Sex. Reprod. Health* 43 (2), 94–102. <https://doi.org/10.1363/4309411>.
- Stoltman, J.J.K., Lander, L.R., Patrick, J.H., Terplan, M., Jones, H.E., 2022. Interest in co-located reproductive and sexual health services among women and men receiving medication for opioid use disorder in an outpatient treatment clinic. *Front Psychiatry* 13, 910389. <https://doi.org/10.3389/fpsy.2022.910389>.

- Stone, R.H., Griffin, B., Fusco, R.A., Vest, K., Tran, T., Gross, S., 2020. Factors affecting contraception access and use in patients with opioid use disorder. *J. Clin. Pharm.* 60 (2), S63–S73. <https://doi.org/10.1002/jcph.1772>.
- Strathdee, S.A., Bristow, C.C., Gaines, T., Shoptaw, S., 2021. Collateral damage: a narrative review on epidemics of substance use disorders and their relationships to sexually transmitted infections in the United States. *Sex. Transm. Dis.* 48 (7), 466–473. <https://doi.org/10.1097/OLQ.0000000000001341>.
- Terplan, M., Hand, D.J., Hutchinson, M., Salisbury-Afshar, E., Heil, S.H., 2015. Contraceptive use and method choice among women with opioid and other substance use disorders: a systematic review. *Prev. Med* 80, 23–31. <https://doi.org/10.1016/j.ypmed.2015.04.008>.
- Terplan, M., Lawental, M., Connah, M.B., Martin, C.E., 2016. Reproductive health needs among substance use disorder treatment clients. *J. Addict. Med* 10 (1), 20–25. <https://doi.org/10.1097/ADM.0000000000000175>.
- Vanichseni, S., Des Jarlais, D.C., Choopanya, K., Friedmann, P., Wenston, J., Sonchai, W., Sotharan, J.L., Raktham, S., Carballo, M., Friedman, S.R., 1993. Condom use with primary partners among injecting drug users in Bangkok, Thailand and New York City, United States. *AIDS* 7 (6), 887–891. <https://doi.org/10.1097/00002030-199306000-00020>.
- Wechsberg, W.M., Deren, S., Myers, B., Kirtadze, I., Zule, W.A., Howard, B., El-Bassel, N., 2015. Gender-specific HIV prevention interventions for women who use alcohol and other drugs: the evolution of the science and future directions. *J. Acquir Immune Defic. Syndr.* 69 2 (01), 128–139. <https://doi.org/10.1097/QAI.0000000000000627>.
- World Health Organization, 2023. Opioid overdose (<https://www.who.int/news-room/fact-sheets/detail/opioid-overdose>).
- Zahnow, R., Winstock, A.R., Maier, L.J., Levy, J., Ferris, J., 2018. Injecting drug use: gendered risk. *Int J. Drug Policy* 56, 81–91. <https://doi.org/10.1016/j.drugpo.2018.03.018>.
- Zheng, Y., Yu, Q., Lin, Y., Zhou, Y., Lan, L., Yang, S., Wu, J., 2022. Global burden and trends of sexually transmitted infections from 1990 to 2019: an observational trend study. *Lancet Infect. Dis.* 22 (4), 541–551. [https://doi.org/10.1016/S1473-3099\(21\)00448-5](https://doi.org/10.1016/S1473-3099(21)00448-5).