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SAN DIEGO STATE UNIVERSITY

Drugs, Germs & Justice: Examining Police Practices and the HIV Risk Environment for  
People who Inject Drugs

A dissertation submitted in partial satisfaction of the  
requirements for the degree Doctor of Philosophy

in

Public Health (Global Health)

by

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Professor Eyal Oren

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2021

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The dissertation of Pieter Baker has been approved by the dissertation committee and co-chair and is acceptable in quality and form for publication on microfilm and electronically:

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2021

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## **ABSTRACT OF THE DISSERTATION**

Drugs, Germs & Justice: Examining Police Practices and the HIV Risk Environment for  
People who Inject Drugs

by

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Doctor of Philosophy in Public Health (Global Health)

University of California San Diego, 2021

San Diego State University, 2021

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**Background:** Interactions with police shape the HIV risk environment for people who inject drugs (PWID) by driving risky injection behaviors and harm reduction service avoidance. The SHIELD (Safety and Health Integration in the Enforcement of Laws on Drugs) police training in Tijuana, Mexico, is an intervention to improve PWID health by modifying police behavior. This dissertation 1) explores the global body of peer-reviewed literature on police practices and HIV risk among PWID and 2) examines police knowledge, attitudes, and behaviors relevant to PWID health in the context of the SHIELD training.

**Methods:** Chapter 2 constitutes a systematic review of published research with quantitative associations between police practices and HIV and/or risky injection

behaviors among PWID (n=8,201 abstracts, 175 manuscripts). Chapter 2 applies longitudinal logistic regression to examine the association between police knowledge of syringe possession law and extrajudicial arrests for syringe possession over 24 months following the SHIELD training in Tijuana (n=693). Chapter 3 uses log-binomial regression to identify police attitudes associated with support for officer-led referrals to drug treatment and syringe service programs (n=305).

**Results:** Chapter 2 identified 27 studies with data on police practices and risk of HIV infection among PWID (n=5), risky injection behaviors (n=21) and harm reduction service avoidance (n=9) from diverse global settings. Chapter 3 establishes that training with the SHIELD model can police improve knowledge of syringe law and reduce self-reported extrajudicial arrests for syringe possession up to 24 months following the training (adjusted odds ratio [AOR]:0.87,95% confidence interval [CI]:0.85,0.90). Officers with correct knowledge of syringe possession law were 37% less likely to arrest PWID for syringe possession (AOR:0.63,CI:0.44,0.89), after controlling for sex and patrol assignment location. Chapter 4 showed that officer-held beliefs that MMT programs reduce criminal activity and SSPs increase the risk of NSI among police were significantly associated with support for officer-led referrals to drug treatment (Adjusted Prevalence Ratio [APR]=4.66,CI=2.05,9.18) and SSPs (APR=0.44,CI=0.27,0.71), respectively.

**Conclusions:** Together, these findings highlight the deleterious role that drug law enforcement practices have on the HIV risk environment for PWID and sheds light on interventions to align police behavior with public health priorities.

## Chapter 1: Introduction

### OVERVIEW

Decades of a global ‘war on drugs’, ostensibly deployed to protect communities from the hazards of illicit drug consumption, has instead resulted in devastating impact on the health and human rights of vulnerable populations who use drugs and their communities. Despite a bevy of evidence-based interventions to reduce harm, injection drug use remains a key driver of bloodborne pathogen (i.e. human immunodeficiency virus [HIV], Hepatitis B virus [HBV], and Hepatitis C virus [HCV]) transmission and drug-related harms among people who inject drugs (PWID) worldwide. From prohibitionist policies to aggressive policing tactics, the implementation and enforcement of drug laws drive riskier injection behaviors, present barriers to essential harm reduction services, and constitute key structural determinants of health that shape HIV risk among PWID. Moving beyond the broader known harms of the global war on drugs and mass incarceration, this dissertation focuses on specific street policing practices at the point of police-PWID interaction that shape health among PWID.[1-6] It also examines a police training intervention using the SHIELD (Safety and Health Integration in the Enforcement of Laws on Drugs) model designed to align police practices with public health priorities in Tijuana, Mexico.

The purpose of this dissertation is to advance our understanding of 1) police practices that generate HIV risk among PWID in Tijuana, Mexico; and 2) police training as a public health intervention to reduce harms associated with drug law enforcement in Tijuana. This dissertation includes three original research manuscripts (Chapters 2,3,4) that address the three primary dissertation aims. Chapter 2, entitled “Policing Practices



and HIV risk among People who Inject Drugs – A Systematic Literature Review”, reviews the global body of scientific literature to provide a synthesis of policing practices acting as structural risk factors for HIV infection and injection-related risk behaviors among people who inject drugs. Chapter 3, entitled “Impact of Police Training on Knowledge of Syringe Law and Extrajudicial Arrests for Syringe Possession – Longitudinal Findings from the SHIELD Study in Tijuana, Mexico” examines the association between police knowledge of syringe law and extrajudicial arrests for syringe possession over time in Tijuana following the SHIELD police training intervention. Chapter 4, entitled “Municipal Police Officer Preferences for Harm Reduction Services in Referrals for People who Inject Drugs in Tijuana, Mexico”, evaluates police characteristics associated with willingness to include referrals to addiction treatment services and syringe service programs (SSP) in referrals for PWID.

The core dissertation aims (Chapters 2-4) are complementary and relate to one another in the following ways. The systematic review (Chapter 2) establishes the global evidence of drug law enforcement practices as they shape health, human rights and HIV risk among PWID. Chapter 3 acknowledges this structural risk and examines the longitudinal effect of SHIELD police training to modify police knowledge and arrest behaviors as they relate to syringe possession. Chapter 4 explores police attitudes and characteristics relevant for support of officer-led referrals of PWID to various health and harm reduction programs, representing a potentially positive element of police-PWID interaction in the context of HIV prevention. Chapter 5: Discussion provides a synthesis of the results, places the findings in the context of the literature, evaluates the strengths

and limitations of the dissertation, and provides direction for future research and public health interventions.

To accomplish the proposed dissertation aims, data from two primary sources were utilized: 1) a database of original peer-reviewed research with data on policing and HIV gathered by screening published articles from MEDLINE, sociological databases and the gray literature (Chapter 2) and 2) a longitudinal cohort of police officers in Tijuana that received the SHIELD training (R01DA039073, PIs: Strathdee, Beletsky) and were followed for two years (Chapters 3,4). A different methodological approach was implemented for each dissertation aim. I conducted a systematic literature review to evaluate the contribution of policing to HIV risk among PWID (Chapter 2), implemented generalized estimating equations to longitudinally analyze changes in syringe law knowledge and reductions in extrajudicial arrest over time in Tijuana following the SHIELD training (Chapter 3), and used log-binomial regression to model police characteristics and attitudes associated with officer support addiction treatment and SSP to be included in referrals (Chapter 4). The impact of this work will contribute to the development and improvement of structural interventions to reduce the deleterious impact of drug law enforcement practices on the health of PWID in Tijuana and other low resource settings.

## **BACKGROUND**

As the opioid crisis surges in North America and drug consumption patterns remain high worldwide, injection drug use (IDU) remains an urgent global health problem. IDU has been documented in 179 countries and there are an estimated 10-23 million PWID worldwide.[7] PWID are at an elevated risk of infection by HIV, HBV,

HCV, and other bloodborne pathogens due to sharing of syringes and injection equipment.[8] Globally, approximately 2.82 million disability adjusted life years due to HIV injection alone can be attributed to IDU and 13% of all PWID are estimated to be living with HIV.[9] In most global locales, HIV prevalence among PWID is significantly higher among than the general public.[10] While IDU remains a key driver of HIV transmission, effective evidence-based public health programs exist to reduce harm among PWID.

An extensive body of research has demonstrated that harm reduction interventions such as syringe service programs (SSP) and opioid agonist therapy are effective at reducing drug-related harms including HIV infection.[11-13] For example, syringe service programs can significantly reduce HIV transmission and are not associated with increased injection frequency or injection initiation.[14-16] A meta-analysis found that methadone maintenance may reduce the risk of HIV transmission among people who inject opioids by more than 50%.[17] In addition to their success at reducing HIV transmission, these interventions are also highly cost-effective.[18] Nonetheless, scale-up of effective harm reduction services has been lagging and fragmented from a global perspective, especially in low-income settings.[10, 19] In places like Tijuana, Mexico, significant structural barriers to harm reduction services persist, especially among highly vulnerable groups such as PWID.[20] Cost, geography/mobility, stigma, and disjointed systems of care all remain impediments to harm reduction access, but the legal environment presents acutely challenging barriers to care in addition to driving riskier drug consumption practices.[20-22]

Legal policies that criminalize possession of drugs, syringes, and/or drug paraphernalia have played an antagonistic role in the prevention and treatment of HIV among PWID.[10, 23-25] Such policies limit sterile syringe availability among PWID and restrict access to evidence-based harm reduction interventions.[25, 26] As the negative health and social consequences of drug criminalization have become recognized,[27] decriminalization efforts have been implemented in some settings.[28-30] Such efforts have produced scientific evidence to support a shift in priority from criminal sanctions to a public health approach.[31]

Notably, however, harmful policing practices can persist even when the drug policy environment is favorable to public health. For example, Mexico passed sweeping drug policy reforms in 2009 which partially decriminalized specified limits of drugs for personal use, but PWID in Tijuana experienced no positive impact due to continued aggressive drug law enforcement by police.[28, 30, 32] Successful implementation of drug policy is contingent upon the manner and extent to which police enforce the law. Therefore, drug policy reform alone may be necessary, but insufficient to extinguish the harms caused by drug criminalization. As such, alignment of policing practices with public health is a global research imperative that has not been adequately addressed, especially in low-income settings.

A central focus of this dissertation is law enforcement behavior that drives bloodborne pathogen risk and other drug-related harms for PWID. Police interactions constitute important structural determinants of health and infectious disease risk. Police are responsible for the enforcement of drug-related laws, which disproportionately affect marginalized populations such as PWID. Arrest and detention, regardless of whether it

is legally justified, serve as an entryway to carceral settings. As revealed in numerous large systematic reviews, incarceration is a major source of individual and public health harm.[33, 34] Often failing to provide humane conditions and adequate treatment, correctional settings expose individuals to disproportionately-elevated levels of infectious disease, such as HIV, hepatitis B and C viruses, and tuberculosis compared to the burden in the community.[34] Moreover, PWID are at a significantly elevated risk of acquiring blood-borne infections or experiencing an overdose within the first few weeks after release.[33, 35]

Street encounters with police can elevate PWID disease risk above and beyond what is conferred by incarceration. Syringe confiscation, harassment outside of harm reduction program locations, physical altercations and extrajudicial arrest are among the many practices that shape injection-related risk behaviors among PWID.[36-38] Behavioral responses to such practices include increased syringe sharing, reduced help-seeking at syringe service programs and opioid agonist therapy clinics, shooting gallery attendance and rushed or other risky injection practices.[39, 41, 42] Dissertation Aim 1 (Chapter 2) contributes to our understanding of police encounters as structural drivers of health by providing a synthesis from the scientific literature of policing exposures associated with HIV infection or risky injection-related behaviors among PWID.

Some police behaviors are not only detrimental to community health but also constitute human rights abuses. Human rights and public health are intricately connected, especially in the context of HIV. Crucially, the protection of human rights for PWID is a key component for the prevention and management of HIV infection.[43-45]

Police abuses such as beatings, bribes, and extrajudicial harassment are among the police behaviors that clearly violate specific provisions listed under the United Nations Universal Declaration of Human Rights (UNDHR) and may also drive HIV risk. Dissertation Aim 1 establishes the evidence base on the numerous policing behaviors that are associated with HIV risk, many of which constitute human rights abuses. In places like Tijuana where syringe possession is legal, extrajudicial arrests for syringe possession are not only significant risk factors for HIV infection and syringe sharing [36, 46] but also violate Article 9 of the UNDHR which states “No one shall be subjected to arbitrary arrest, detention, or exile”. Dissertation Aim 2 evaluates relevant police officer knowledge and attitudes associated with extrajudicial arrests for syringe possession, in the context of the SHIELD police training. While there are many drug law enforcement practices warranting evaluation, those that harm PWID while also violating their human rights are of particular public health importance given that human rights and HIV prevention are intrinsically connected.[44, 45, 47]

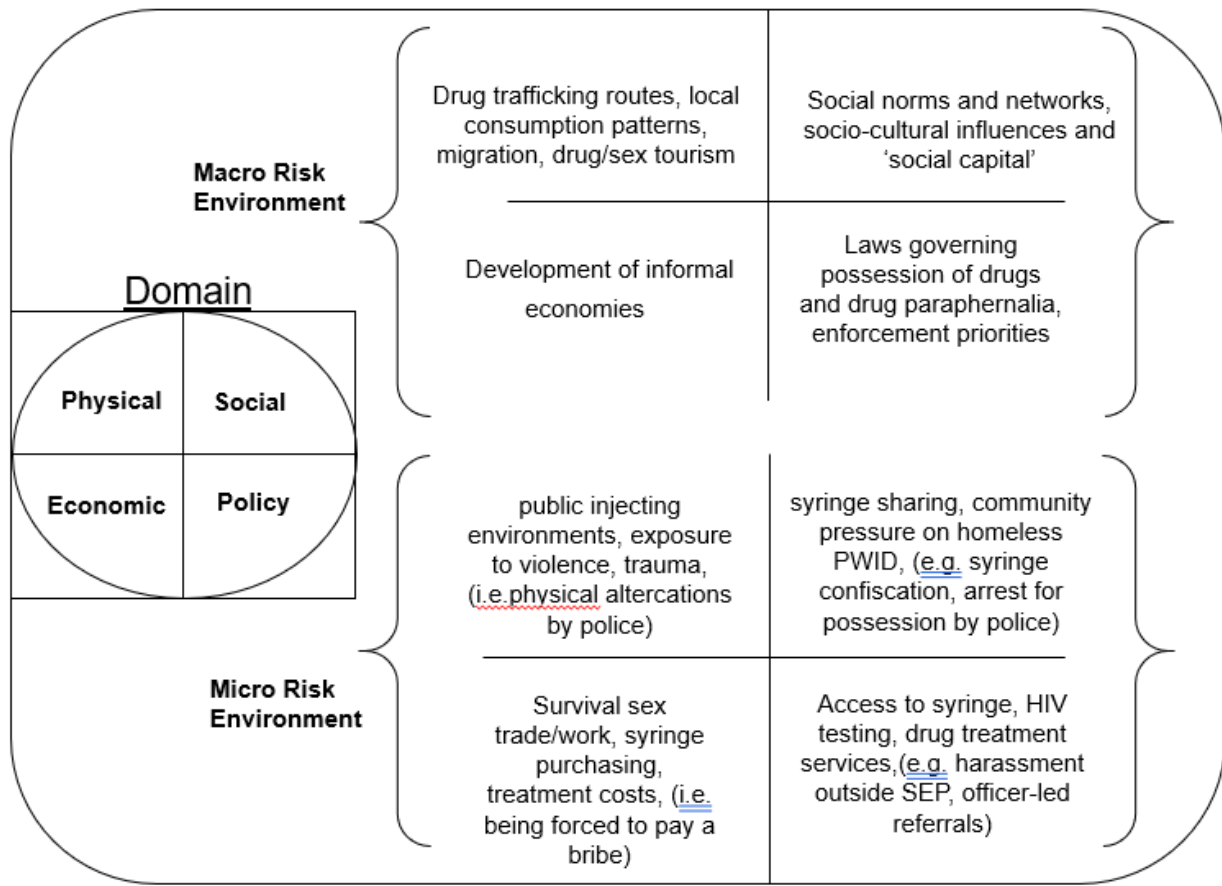
This discordance between formal law and enforcement practices may be due, in part, to inadequate legal knowledge and/or negative attitudes towards PWID. For example, police in Tijuana have demonstrated limited levels of knowledge of existing drug laws, including syringe possession legality.[29, 48] In addition to knowledge, police attitudes such as stigma and norms inconsistent with the human rights of PWID also play a role in officer behaviors while interacting with PWID.[48-50] Alternatively, some positive police behaviors like administering naloxone[51] or referring PWID to evidence-based treatment and/or harm reduction programs could potentially improve the health of PWID.[48, 52] Previous research among police in Tijuana has found that, much like

deleterious police practices, officer-led referrals may depend on officer-held attitudes towards PWID and harm reduction services.[48] Therefore, police knowledge and attitudes, in addition to behavior during encounters with PWID, constitute key structural factors shaping community health and the risk of drug-related harm.

Training interventions like the SHIELD model which target modifiable factors among police have been implemented in the past for the purpose of improving public health and HIV prevention in various global settings.[49, 53-55] Previous findings suggest that training may increase police legal and occupational knowledge, as well as attitudes towards syringe possession and harm reduction interventions.[29, 46, 56, 57] However, there remains a gap in the literature as to whether such police training can modify policing behavior and it remains unknown whether improvements in police knowledge, attitudes or behavior may be sustained over time after the training. Dissertation Aims 2 and 3 account for key knowledge and attitudinal factors that may influence police behaviors relevant to the public health and human rights of PWID. It is critical to study if and how police training interventions may modify such factors, and how these factors contribute to police behavior. Such an understanding could guide the future design and implementation of public health interventions to address structural determinants of health related to police conduct during drug law enforcement.

## **CONCEPTUAL FRAMEWORK**

This dissertation research is guided, at least in part, by the HIV Risk Environment framework for PWID as developed by Rhodes, et al.[23, 58] This framework places emphasis on the HIV 'risk environment' as the space, whether physical or social, in an individual's life where external forces converge to increase their vulnerability to HIV.



**Figure 1.1 The HIV Risk Environment Framework for People who Inject Drugs applied to examine role of drug law enforcement. Adapted from Rhodes et al**

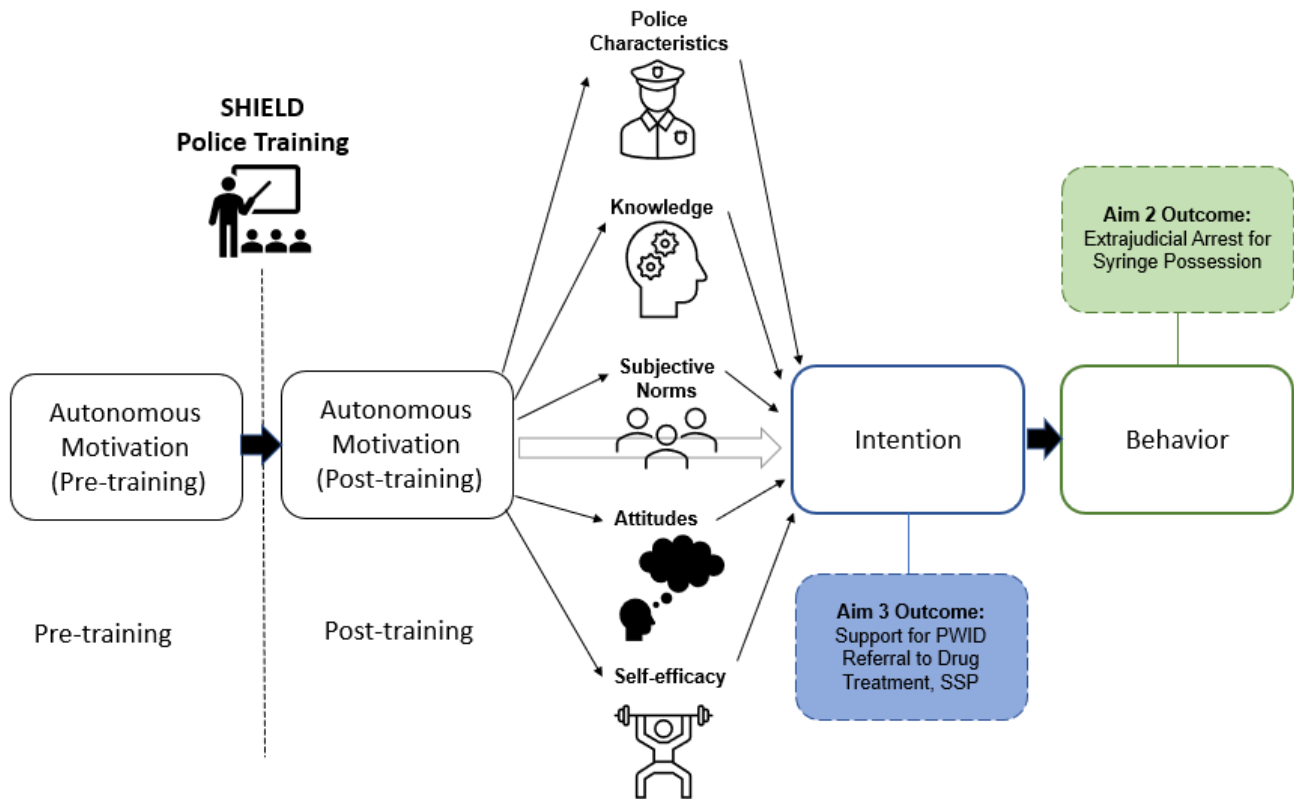
This shifts the focus from the 'moral failings' of individual PWID to the micro- and macro-level factors responsible for the social structural production of HIV risk. It also highlights the role of drug laws and policing as key factors in the production of HIV risk among PWID. Figure 1.1 presents a modified HIV risk environment framework for PWID as applied to examine the role of drug law enforcement practices.

This framework is particularly relevant for Dissertation Aim 1 (Chapter 2) where I review studies that treat exposures to policing behaviors as independent variables and explore their relationship to HIV-related outcomes among PWID. However, dissertation Aims 2 and 3 (Chapters 3 and 4, respectively) utilize police officers as the individual units of analysis and examine pathways for individual behavior change that were



targeted by an educational intervention using the SHIELD model. Therefore, an additional framework is necessary to account for police knowledge, attitudinal, and behavioral factors in the context of police training. Whereas Rhodes' HIV Risk Environment is an ideal framework for studying police exposures as producers of HIV risk among PWID, the Transcontextual Model is useful for examining pathways to officer behavioral change in the context of police training. This framework was applied when developing the SHIELD police training intervention and thus has relevance for dissertation aims 2 and 3 (chapters 3 and 4) as those analyses represent secondary analysis of the SHIELD parent study.

The SHIELD police training intervention was designed using an application of the Transcontextual Model (TCM), which had been previously used to evaluate police education programs with success in other contexts.[59] This conceptual model incorporates an emphasis on psychosocial factors affecting decision making (from the Theory of Planned Behavior) while highlighting the role of motivation and perceived autonomy (from the Social Determination Theory).[60] The TCM was validated in the field of occupational injury prevention and is innovative in this application as it allows for illumination of the pathways by which the training may lead to behavioral changes among police.[60] Understanding these pathways (police knowledge, attitudes, subjective norms, self-efficacy, etc.) may be key to producing behavioral outcomes among police that are directly linked to the health and human rights of PWID. This conceptual framework is appropriately applied in this dissertation as these modifiable pathways are the logical targets of the SHIELD training. Figure 2.2 provides a modified schematic of the TCM framework (adapted from Hagger and Chatzisarantis) as it



**Figure 1.2 Schematic demonstrating the Transcontextual model (adapted from Hagger and Chatzisarantis) as applied to the SHIELD police training and dissertation outcomes (Aims 1,2)**

relates to the SHIELD police training and this dissertation. Specific outcomes for dissertation aim 2 (extrajudicial arrest for syringe possession) and aim 3 (support for PWID referral to Drug Treatment, SSP) are indicated in the schematic and represent police behaviors and intentions, respectively, relevant to health, HIV and human rights among PWID.

## STUDY SETTING

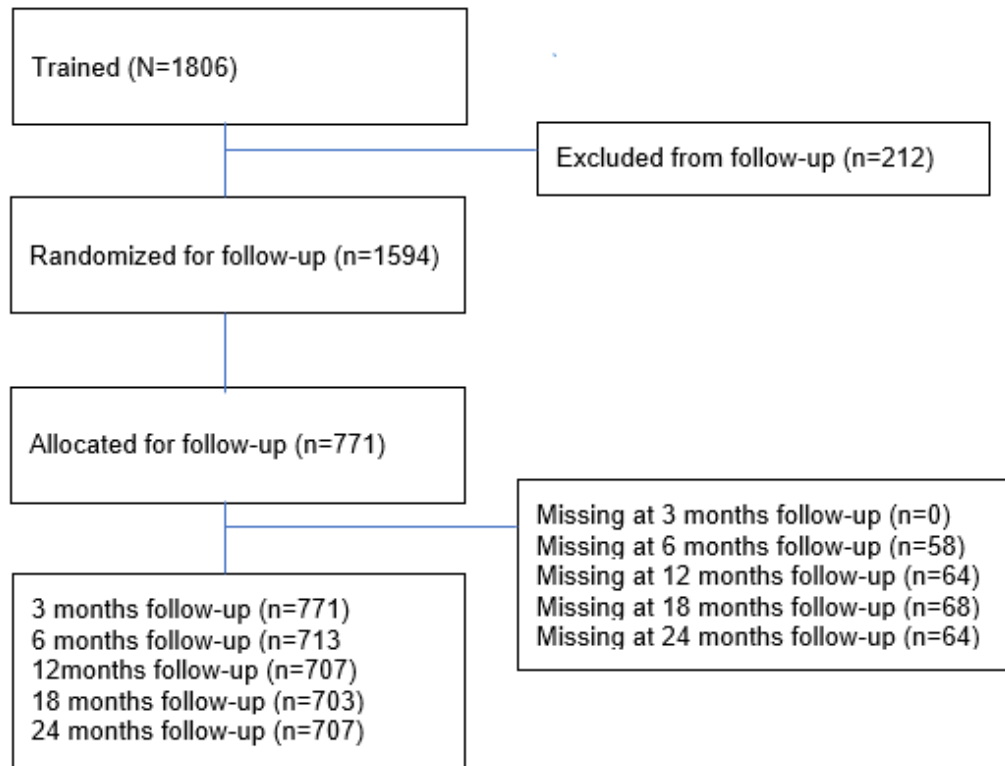
While Dissertation Aim 1 (Chapter 2) is an international systematic review of published research, Dissertation Aims 2 and 3 (Chapters 3 and 4, respectively) are rooted in the secondary analysis of data from a longitudinal cohort of police officers in Tijuana, Mexico (the SHIELD study, or *Proyecto Escudo* in Spanish). Tijuana is a vital

border hub and major drug trafficking node that has been heavily impacted by issues of substance use and drug-related harms such as HIV.[61] The high level of vulnerability faced by PWID in Tijuana has been continually exacerbated by aggressively harmful policing; drug law enforcement in particular.[24, 62-65] Therefore, in 2015, a police education program utilizing the SHIELD model was administered alongside the annual training activities of the Tijuana police academy.

## **INTERVENTION DESIGN**

The SHIELD study is an innovative police training intervention and quasi-experimental trial designed to improve occupational safety among police by reducing the risk of occupational needlestick injury while simultaneously addressing police knowledge, attitudes and behaviors that may affect the health of PWID in Tijuana. The training consisted of three primary modules covering: 1) basic epidemiology and prevention of HIV and other bloodborne pathogens, 2) legal provisions under current Mexican law related to drug and syringe possession, and 3) the nature of addiction and existing harm reduction strategies. Between February 2015 and May 2016, the entire police force (N=1,806) received the training over 38 class sessions comprised of 20 to 100 trainees per class. These baseline participants completed pre- and post-training surveys. Then, a random subset of the baseline cohort (n=771) was selected to complete follow-up surveys at months 3, 8, 12, 18, and 24 months (Figure 1.3). After supplemental funding was acquired to evaluate the topic of police referrals among this cohort, an additional survey was added to the 24-month visit that collected additional data on police preferences for referrals of PWID (including harm reduction services) and a potential incentive program related to police referrals. The SHIELD training and

longitudinal study is the product of a binational, interdisciplinary collaboration between University of California, San Diego; Universidad Xochicalco, Tijuana, and the Tijuana Municipal Police Department.



**Figure 1.3. CONSORT diagram for SHIELD study participants trained, randomized for follow-up, and analyzed in Tijuana, Mexico (2015-18).**

## AIMS & HYPOTHESES

The following constitute the primary research aims and hypotheses for this dissertation:

*Dissertation Aim 1.* To systematically review the scientific literature and provide a synthesis of the association between policing practices and HIV infection and injection-related risk behaviors among people who inject drugs.

*Dissertation Aim 2.* To evaluate the association between police characteristics (knowledge of syringe law and attitudes toward PWID and extrajudicial arrests for syringe possession over time in Tijuana following the SHIELD police training.

*Hypothesis 2.1.* Police knowledge of syringe possession law will be significantly associated with self-reported arrests for syringe possession over time following the SHIELD training. *Hypothesis 2.2.* Police attitudes towards PWID will be significantly associated with self-reported arrests for syringe possession over time following the SHIELD training.

*Dissertation Aim 3.* To identify police characteristics and occupational beliefs associated with willingness to include addiction treatment services and SSP in referrals of PWID.

*Hypothesis 3.1.* Officers that believe methadone programs reduce crime will be more likely to indicate addiction treatment services should be included in referrals. *Hypothesis 3.2.* Officers that believe SSP increase the risk of NSI will be less likely to indicate SSP should be included in referrals.

## **Chapter 2: Policing practices and risk of HIV Infection Among People Who Inject Drugs**

### **ABSTRACT**

Drug-law enforcement constitutes a structural determinant of health among people who inject drugs (PWID). Street encounters between police and PWID (e.g., syringe confiscation, physical assault) have been associated with health harms, but these relationships have not been systematically assessed. We conducted a systematic literature review to evaluate the contribution of policing to risk of human immunodeficiency virus (HIV) infection among PWID. We screened MEDLINE, sociological databases, and gray literature for studies published from 1981 to November 2018 that included estimates of HIV infection/risk behaviors and street policing encounters. We extracted and summarized quantitative findings from all eligible studies. We screened 8,201 abstracts, reviewed 175 full-text articles, and included 27 eligible analyses from 9 countries (Canada, China, India, Malaysia, Mexico, Russia, Thailand, Ukraine, and the United States). Heterogeneity in variable and endpoint selection precluded meta-analyses. In 5 (19%) studies, HIV infection among PWID was significantly associated with syringe confiscation, reluctance to buy/carry syringes for fear of police, rushed injection due to a police presence, fear of arrest, being arrested for planted drugs, and physical abuse. Twenty-one (78%) studies identified policing practices to be associated with HIV risk behaviors related to injection drug use (e.g., syringe-sharing, using a “shooting gallery”). In 9 (33%) studies, policing was associated with PWID avoidance of harm reduction services, including syringe exchange, methadone maintenance, and safe consumption facilities. Evidence suggests that

policing shapes HIV risk among PWID, but lower-income settings are underrepresented. Curbing injection-related HIV risk necessitates additional structural interventions. Methodological harmonization could facilitate knowledge generation on the role of police as a determinant of population health.

## **INTRODUCTION**

Globally, injection drug use remains a growing public health concern as there are an estimated 10 to 23 million people who inject drugs (PWID).[9] Injection drug use is widely distributed among at least 179 countries or territories.[7] The health consequences of injection drug use include overdose morbidity and mortality, blood-borne pathogen infection, endocarditis, and other harms.[8] Sharing of injection equipment remains a substantial cause of blood-borne virus transmission, including human immunodeficiency virus (HIV) and hepatitis C virus.[8] In 2013, injection drug use caused an additional 2.82 million disability adjusted life years resulting from HIV infection.[8] Although the HIV burden attributed to injection drug use is highest in low- and middle-income countries,[8] PWID remain highly vulnerable to HIV infection in U.S. and other upper-income settings.[66, 67] While effective, evidence-based harm reduction interventions are available to prevent and treat HIV infection among PWID, global coverage of such services remain low.[68] In regions experiencing notable crises of opioid dependence such as North America and Eastern Europe/Central Asia, injection drug use is a critical problem causing substantial harms to PWID.[66, 69, 70] The role of drug policy and its enforcement has been increasingly recognized as a structural force shaping HIV risk among PWID.[69]

Most PWID live in countries where drug use is highly criminalized.[25] Prohibitionist drug policy and the global War on Drugs have impacted societies in the forms of mass incarceration, police militarization, extrajudicial killings, and other human rights abuses.[31, 71-74] Drug law enforcement practices anchored in these policies significantly shape the HIV risk environment for PWID.[67] For example, laws that criminalized possession of syringes or other drug paraphernalia have had a negative impact on HIV risk and injection-related risk behaviors.[75] Thus, laws limiting syringe access and their operationalization through street-level policing of PWID run counter to evidence-based syringe distribution and other public health measures (e.g. syringe service programs) known to prevent HIV.

At a time when a new paradigm of “public health policing” is being heralded in response to drug and other health crises,[25, 76] there has not been a systematic accounting of the harms that cascade from police-PWID interactions. Police are responsible for the enforcement of drug-related laws, which disproportionately affect marginalized populations such as PWID. Detention, regardless of whether it is legally justified, serves as an entryway to carceral settings. As revealed in numerous large systematic reviews, incarceration is a major source of individual and public health detriment.[33, 34] Often failing to provide humane conditions and adequate treatment, correctional settings expose individuals to disproportionately-elevated levels of infectious disease, such as HIV, hepatitis B and C viruses, and tuberculosis compared to the burden in the community.[34] Moreover, PWID are at a significantly elevated risk of acquiring blood-borne infections within the first few months after release.[33]



Less attention has focused on the encounters with police that can elevate PWID disease risk above and beyond what is conferred by incarceration. Syringe confiscation, harassment outside of harm reduction sites, and extrajudicial arrest are among the many practices that shape injection-related risk behaviors among PWID.[1-3] Behavioral responses to such practices include increased syringe sharing, reduced help-seeking at syringe service programs and opioid agonist therapy clinics, shooting gallery attendance and rushed or other risky injection practices.[4-6, 42]

As the negative health and social consequences of drug criminalization have become recognized,[27] decriminalization efforts have been implemented in some settings.[29, 30, 53] Such efforts have produced scientific evidence to support a shift in priority from criminal sanctions to a public health approach.[31] Notably, however, harmful policing practices can persist even when the drug policy environment is favorable to public health. For example, Mexico passed sweeping drug policy reforms in 2009 which decriminalized possession of drugs for personal use, but PWID experienced little positive impact due to continued aggressive drug law enforcement by police.[28, 32] Successful implementation of drug policy is contingent upon the extent to which police enforce the law. Therefore, drug policy reform alone is necessary, but insufficient to extinguish the harms caused by drug criminalization. As such, the alignment of policing practices with public health is a relevant global research imperative that has not been adequately explored.

The objective of this systematic review is to provide a synthesis of policing practices that can act as structural risk factors for HIV infection and injection-related risk behaviors among PWID. We build on other systematic reviews that have focused

on the effect of drug criminalization on HIV and the role of police as a structural determinant of HIV among female sex workers.[25, 77] We provide additional insight by examining how individual-level policing encounters shape the HIV risk environment for PWID. To our knowledge, this is the first systematic literature review of its kind.

## **METHODS**

We conducted a systematic literature review in accordance with PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines that has been registered with PROSPERO, the international prospective register of systematic reviews (PROSPERO Registration #CRD42018105967). We screened abstracts from September 2017 to November 2018. Search terms for the abstract review were initially implemented in the MEDLINE database and were subsequently adapted for application in other research databases. Our search terms (Appendix A. Literature Review Database Search Terms) consisted of two distinct classes: 1) terms related to law enforcement, policing practices and criminal justice; and 2) terms related to injection drug use. We did not include terms related to incarceration as they are not direct policing exposures and therefore outside of the scope of this review. We applied the search terms to the following bibliographic databases: MEDLINE, Sociological Abstracts, Embase, PsycInfo, and SocINDEX. We also searched non-peer reviewed sources and grey literature, including reports produced by Harm Reduction International, Harm Reduction Coalition, Human Rights Watch, Amnesty International, United Nations Office on Drugs and Crime, Global Fund, Open Society Foundations (see supplementary materials for a complete list of search terms by database).

All abstracts and references were managed using EndNote software version 8.2 (Clarivate Analytics, Boston, Massachusetts) and duplicate abstracts were recorded but not included in the review. We screened abstracts from studies published in English between 1981 and May 2018 to ensure that we captured all abstracts that were published since the emergence of HIV in scientific literature.[78] Three researchers (LA, CV, and PB) conducted a review of the title and abstract. Quality assurance of the abstract review was conducted on approximately 5% of the reviewed abstracts and inter-reviewer reliability was assessed for each reviewer by taking a random subset of abstracts from each reviewer and having a second reviewer rescreen and determine whether the same abstracts were included or excluded. Overall, agreement among all reviewers was high with an inter-reviewer reliability greater than 90%.

We selected articles for full manuscript review if they quantitatively measured a valid association between exposures of interest (policing practices) and outcomes of interest (HIV serostatus [primary outcome] or injection-related HIV risk behaviors among PWID [secondary outcomes]). Policing practices were defined a priori as any interaction with police or law enforcement officials experienced by PWID at the individual level (e.g. confiscation of syringes, arrest, beaten, solicited a bribe, etc.). The primary outcome was HIV serostatus, measured by validated laboratory methods (rapid test, blood draw and confirmatory test). We included secondary outcomes of interest such as self-reported HIV positivity and several injection-related risk factors for HIV. We defined injection-related HIV risk behaviors as any practice exhibited by PWID that may increase their individual risk of HIV transmission through injection drug use (e.g. syringe sharing, avoiding opioid agonist therapy due to police presence, attending a shooting

gallery). Factors specifically related to sexual risk (e.g. condom usage, multiple sex partners) were not considered injection drug use -related HIV risk behaviors and were not included in the review.

We excluded studies that 1) only reported qualitative findings; 2) did not disaggregate between PWID and non-PWID; 3) studies where individual PWID were not the unit of analysis (e.g. ecological analyses) 4) consisted of only modeling, cost-effectiveness or analyses where PWID were not empirically investigated; or 5) did not present a valid association between a policing exposure and HIV or an HIV-related injection risk behavior.

Abstracts screened to be potentially eligible underwent full text review by four researchers (PB, CR, LA, JC) to determine whether they met all inclusion criteria. At least two reviewers abstracted relevant data from eligible studies using a standardized coding and data abstraction form that we developed (Appendix B. Data Extraction and Coding Form). Briefly, this form collated study specific data including study design, sampling methods, recruitment period, geographic location, study population, demographics, analytical sample size, and reported summary measures. When possible, we reconstructed bivariate summary measures using raw numbers and/or proportions as reported in the document (e.g. Odds Ratios [OR] and 95% Confidence Intervals [CI]) to confirm the measured value given the data provided. For each eligible article, we reported prevalence of policing exposure(s), prevalence of HIV serostatus and/or HIV risk factors, univariate summary measures and adjusted associations from multivariable models (including covariates), when available. We could not conduct a

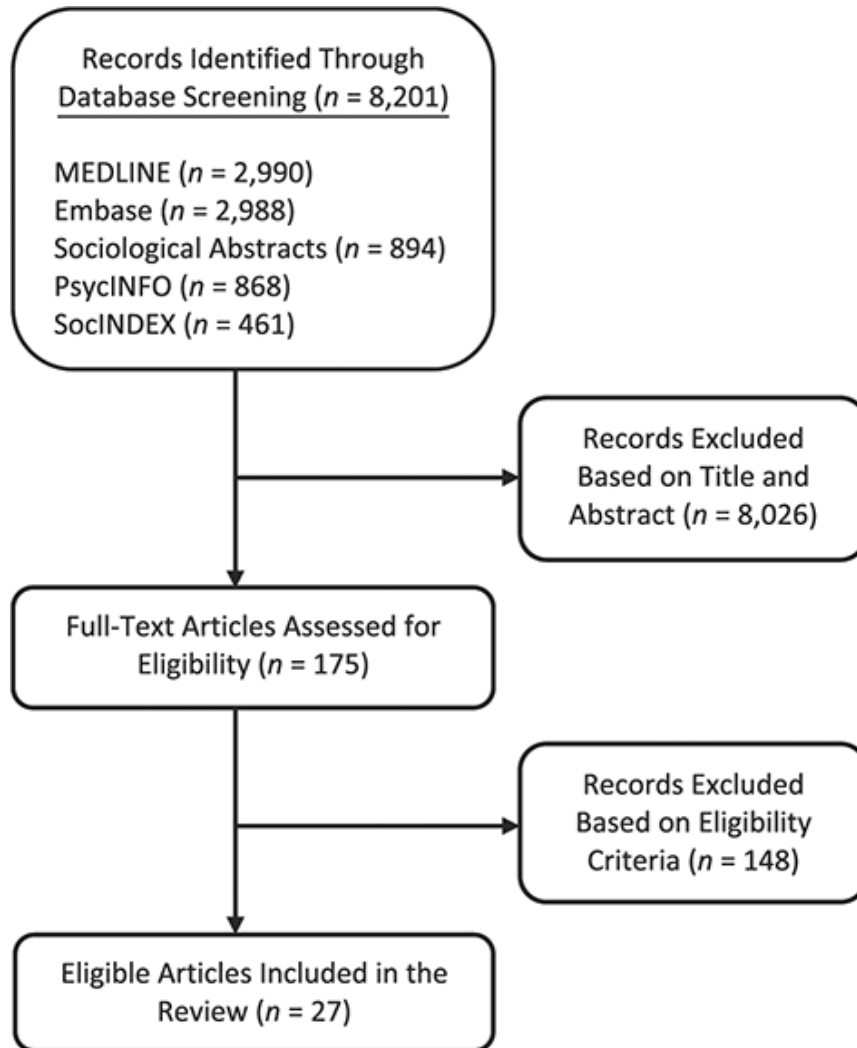
meta-analysis due to high heterogeneity of reported policing exposures HIV-related outcomes and inconsistent reporting timeframes for various measures.

Any discrepancies in the coding were discussed at weekly meetings with the review team, including the senior author (JC), to reach a consensus. For each article, we also applied a standardized assessment of bias form of 12 criteria (Appendix C. Assessment of Bias and Quality Rating Form) to evaluate the strength of the potential causal relationship between the reported exposures and outcomes among the studies included in the review. Each article was discussed by the coding authors and assigned a quality rating (good, fair or poor) based on how many of the criteria were met according to the assessment of bias form (Appendix C). To ensure that all potentially eligible studies could be included during the full text review, we reviewed the bibliography of all manuscripts included in the final review to identify any references relevant to the scope of the systematic review. Two reviewers (CV and LA) then determined whether these references had already been captured in our search. If not, then we conducted a full-text review to determine eligibility.

## **RESULTS**

Overall, we screened 8,201 unique abstracts (Figure 2.1). A total of 27 full text articles met our inclusion criteria and were included in the review (Appendix D). Eligible studies originated from nine different countries (Russia, Mexico, United States, Canada, Ukraine, Thailand, Malaysia, China and India) across various income levels (low, low-middle, upper middle, and high income). The region with the most included studies was North America (n=15), followed by Southeast Asia (n=5) and Eastern Europe (n=5). The

earliest article included in the review was published in 1999, though most (n=21) were published since 2013.



**Figure 2.1 Selection of studies for a systematic review of the literature on policing practices and risk of human immunodeficiency virus (HIV) infection among people who inject drugs, (1981-2018).**

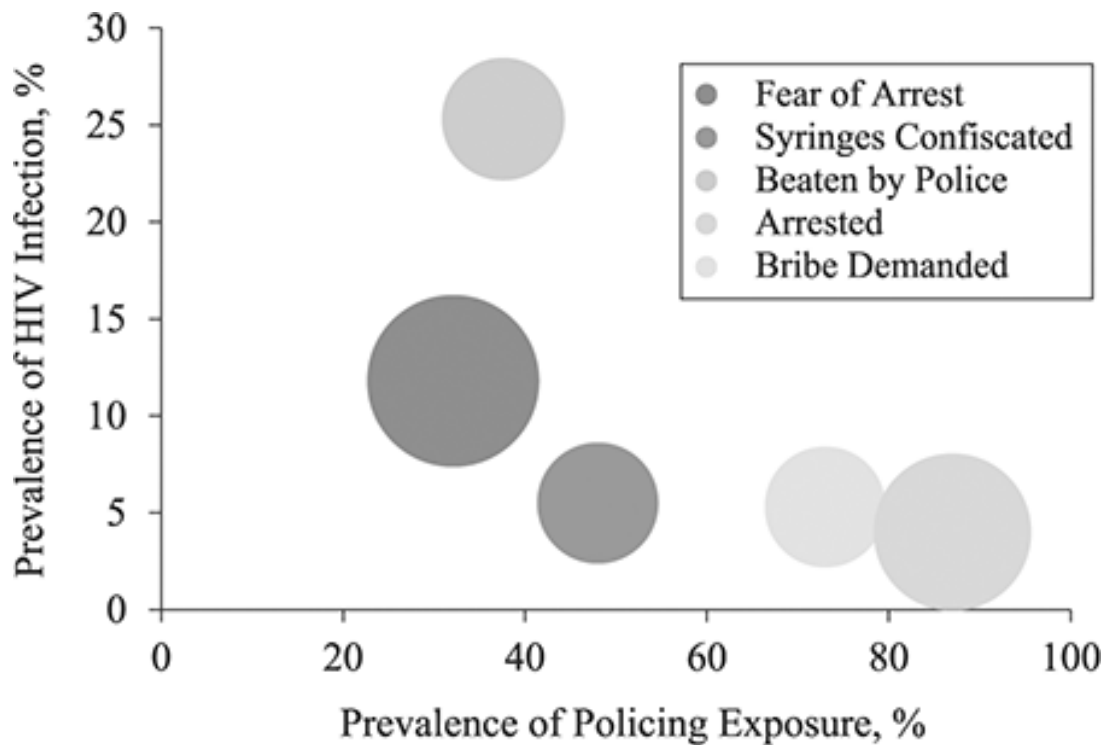
While each article included PWID in the study population, two included female sex workers who also injected drugs[79, 80] and another included PWID living with HIV who were heavy alcohol users.[3] The most common recruitment methods were respondent driven sampling (RDS), venue sampling, street outreach and snowball

sampling. The analytical sample sizes ranged from 133 to 1,613. Approximately half of the studies (n=15) reported race/ethnicity data and only one study reported transgender status.[2]

All manuscripts included in the review utilized a cross-sectional or serial cross-sectional analysis and no longitudinal analyses were identified in the review. Half of the studies (n=14) reported a single policing exposure while the remaining reported multiple policing exposures. The most commonly measured policing exposures were arrest, arrest for syringe possession, syringe confiscation, detained or frisked and beaten or sexually assaulted by police. Many of the articles (n=12) presented HIV seroprevalence data; however, only eight studies measured associations between prevalent HIV infection and at least one exposure to police practices. The most commonly measured HIV risk behaviors included syringe sharing (receptive and/or distributive), shooting gallery attendance, and avoiding harm reduction services (opioid agonist therapy or syringe service programs) due to police presence.

As reported in Appendix D, one study reported a policing-related exposure (fear of arrest) that was significantly associated with a reduced odds of HIV infection (OR=0.62, 95% CI=0.42,0.93). In six studies, numerous policing practices were found to be significantly associated with increased odds of prevalent HIV infection. HIV infection was significantly associated with fear of arrest (OR=0.62, CI=0.42, 0.93), syringe confiscation (last 6 months) (OR=2.04, CI=1.00,4.21 and OR=2.38, CI=1.17,4.81), confiscation of new syringe (ever) (OR=5.50, CI=1.80,16.60 ), not buying syringes for fear of police (OR=3.30, CI=1.40,7.60), avoiding carrying syringes for fear of police (OR=2.2, CI:1.10,4.40), rushing injections due to police presence (OR=20.6,

CI=10.00,42.70), pre-loaded syringe confiscation (OR=3.5, CI:1.90,6.40), being forced to buy back syringe from police (OR=2.90, CI=1.50, 5.40), being arrested for planted drugs (OR=3.00, CI:1.30,6.80), and being beaten or tortured (OR=3.10, CI=1.50,6.50 and OR=1.35, CI=1.08,1.67).



**Figure 2.2** Prevalence of policing exposure, prevalence of human immunodeficiency virus (HIV) infection, and relative sample size (bubble size) among 5 studies that found a valid association between HIV infection and at least 1 policing exposure in a systematic literature review, 1981–2018.

Among the studies with a valid association between HIV infection and at least one policing exposure, the reported prevalence of HIV infection in the sample populations varied from 4.0% to 54.5%. The policing exposures with the highest reported prevalence among these studies were being arrested (87.0%), demanded a bribe (73.0%) and having syringes confiscated (48.0%). Figure 2.2 demonstrates the relative prevalence of HIV infection and reported policing exposures for several studies with



valid associations, taking into account the relative sample size for each study (size of the bubble).[80-83]

Most studies (n=21) identified a significant association between at least one policing exposure and a HIV risk behavior related to injection drug use, of which syringe sharing was the most common. Syringe sharing was significantly associated with fear of arrest, injection equipment confiscation, syringe confiscation, arrest any, arrest for syringe possession, detained, beaten by police, tested for drugs by police, and having drugs planted by police. For example, in Bangkok, Thailand, the odds of sharing syringes were from 1.93 to 2.45 times higher among PWID who reported being beaten by police than those who did not.[84]

Several studies (n=9) also described associations between police practices and utilization of community harm reduction resources. Practices such as stop and frisk, confiscating syringes, being tested for drugs by police, worry about police arrest and being arrested for syringe possession were significantly associated with either opioid agonist therapy nonattendance, syringe service program avoidance and/or healthcare avoidance. For example, among PWID in Delhi, India, the odds of attending syringe service programs or opioid agonist therapy services in the past year were from 5% to 73% lower among those arrested for syringe or drug possession, when compared to PWID who were not arrested.[85]

## **DISCUSSION**

Overall, we found data from 27 studies across 9 countries reporting significant associations between policing practices and prevalent HIV infection or injection related

risk behavior among PWID. Our findings indicate that certain policing practices are overwhelmingly detrimental to the HIV risk environment of PWID. For example, we that found syringe confiscation was consistently associated with either higher HIV seroprevalence or riskier injection practices. Only one study showed a protective effect of policing as fear of arrest was associated with lower odds of HIV infection.[81]

The socioeconomic and geographical diversity in the settings identified suggests that this phenomenon is not limited to settings with poorly trained police officers nor weak judicial systems that enable officers who violate the civil and human rights of its citizens to act with impunity. Indeed, many of the studies we identified were from the U.S. or Canada, high income countries with institutions to ensure reasonable due process and legal recourse for individuals who may have had negative interactions with police. Importantly, over 179 countries have documented injection drug use.[7] Thus, despite a lack of published findings, the associations we analyzed in this review are likely relevant to these countries as well (Appendix E).

Our review extends findings from previous global systematic reviews and meta-analyses that have examined the role of criminal justice on public health. Footer and colleagues found that individual-level policing practices, such as arrest, extortion, and condom confiscation were commonly committed among female sex workers.[77] Indeed, some of these behaviors were also common in our review, illustrating that populations at heightened risk of HIV are regular targets of police. Female sex workers who also inject drugs are likely to be especially vulnerable due to injection and sexual risks.[29]

In a recent review by DeBeck and colleagues, laws criminalizing drug use were found to adversely affect PWID health and increase HIV risks.[25] While they did identify certain policing practices as a general contributor to these harms, they did not focus on specific policing practices at the individual level. This is an important distinction, as we have identified specific practices such as syringe confiscation (irrespective of their legality), arrest, bribery, violence/torture as behaviors that exacerbate HIV risk. Formal legal structures are widely recognized as drivers of individual risk environment, but it is the enforcement of the law on the ground by police officers that most directly impact PWID.

Previous research has demonstrated substantial treatment gaps and challenges for achieving success along the HIV care continuum for PWID.[82] As demonstrated in this review, street policing is a pervasive force in the lives of many PWID which bears the potential to interfere at each level of the prevention and treatment cascades. Additional evidence suggests that unofficial police detentions regularly interrupt opioid agonist therapy and antiretroviral therapy adherence, further exacerbating efforts to improve latter pillars of the HIV continuum of care for PWID such as viral suppression.[83, 86] Given the high frequency of these practices and associations with HIV risk, mitigating these specific practices through interventions such as police education programs are vital.

As previously noted, we did not focus on incarceration as the injection-related risks in incarcerated settings have been well characterized. For example, a recent meta-analysis found that the immediate post-release period was associated with an 81% increased risk of HIV seroconversion.[33] Also, the negative public health effects of

incarceration are conditional on arrest and detainment, which are often performed by street level police officers. Thus, officers often serve as the “gatekeepers” to the deleterious consequences of incarceration and are therefore critical agents in aligning public health with criminal justice involvement. Attempts to reform drug policy, including decriminalization and legalization, will need to allocate resources to ensure that police are knowledgeable of the reforms and have the resources to successfully implement them. Baseline findings from a police education program in Tijuana, Mexico, found that police knowledge of drug decriminalization laws was low, but the program was successful in improving knowledge of drug and syringe possession policy as well as intent to inform suspects of the laws.[29, 54, 87] Correct legal knowledge among police and access to public health resources, such as harm reduction, for PWID will be necessary to successfully implement any drug policy reform.

In several studies, we found that PWID did not attend or avoided harm reduction programs due to some form of police harassment, arrest or fear thereof. The perception that PWID should avoid these critical prevention programs due to police is problematic and complicates program implementation. The effectiveness of harm reduction is proportional to PWID self-efficacy to access these sites without experiencing a negative encounter with police. To ensure greater uptake and scale, harm reduction programs should be supported through appropriate policy environment where police are shown the role that harm reduction plays in public health.

Police also hold the capacity to play an enabling role to PWID to improve public health outcomes and reduce recidivism rates. For example, the Law Enforcement Assisted Diversion (LEAD) program has demonstrated that participants had 60% lower

odds of subsequent arrest than those that did not receive the intervention.[88] While we did not identify any studies documenting positive policing practices such as referral to harm reduction programs, future interventions and research should focus on facilitating and incentivizing police-initiated referrals.

Overall, we found a high degree of heterogeneity among the reported odds ratios. This is due, in part, to a lack of harmonization between of both policing variables and risk behavior factors, including reporting timeframes. Varying prevalence of both exposure and outcome variables across study settings may have also contributed to the odds ratio heterogeneity. Further, a number of analytical explanations should be considered and may be especially relevant among studies that report multivariable models. For example, the relative prevalence and statistical treatment of effect modifiers was not consistent. Also, the model selection process varied among the included studies.

We did not conduct a meta-analysis due to high heterogeneity of the various measures. The formulation of summary measures and forest plots would have provided additional insight but requires that variables are similar enough in construction to be combined. Future studies in this line of research should utilize standardized factors to allow for quantitative synthesis and meta-analysis. Additionally, future research should prioritize the inclusion of race, ethnicity and sex (including transgender) data to allow for insight into the relative impact of policing on particularly vulnerable groups.

Our review is not without limitations. First, we warrant caution on interpreting findings since all studies included in the review were cross-sectional and thus we cannot determine the temporality of the policing practices and HIV seroprevalence and

associated risk behaviors. Second, selection bias is a concern as individuals with more severe substance use disorders who engage in riskier injection behaviors could also be more likely to have a negative encounter with police. Despite this, we note that the prevalence of many policing practices was high (>50%), indicating that police most likely do not exclusively target particularly vulnerable high-risk groups (e.g. homeless PWID). As a systematic review, publication bias is a concern as studies may have neglected to publish non-significant findings. Due to heterogeneity of the constructs included in this review, we were unable to produce symmetry tests to make inferences regarding publication bias. However, many of the reported associations included in our review were not the primary analysis of the manuscript in which they were published. Therefore, we reason that publication bias may not have played a significant role in the reporting of these associations. Lastly, we did not include qualitative data in our review; however, we note the importance of formative qualitative data to contextualize these structural level factors.

## **CONCLUSION**

These results highlight robust evidence associating harmful policing practices with prevalent HIV infection and risky injection behaviors worldwide. The role of police should be viewed as a single agent within an intricate system of conflicting policy, public safety, and public health priorities. As such, success of public health programs for PWID will require coordination and cooperation from police agencies.

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### **Chapter 3: Impact of police training on knowledge of syringe law and extrajudicial arrests for syringe possession – longitudinal findings from the SHIELD study in Tijuana, Mexico**

#### **ABSTRACT**

*Objective:* To assess the impact of a police training program to improve knowledge of syringe laws and reduce extrajudicial arrests for syringe possession over time.

*Methods:* Tijuana police (n=1,806) received training on occupational safety, HIV and drug use during the SHIELD training. A randomized subset (n=770 officers) were followed for 24 months with semi-annual surveys. We used longitudinal logistic regression to assess the relationship between officers' knowledge of syringe law and extrajudicial arrests for syringe possession over time following the training.

*Results:* Correct knowledge improved from 56% (pre-training) to 94% (post-training) sustained through 24 months (75%) with a corresponding reduction in extrajudicial syringe possession arrests (adjusted odds ratio [AOR]:0.87,95% confidence interval [CI]:0.85,0.90). Officers with correct knowledge were 37% less likely to arrest people who inject drugs for syringe possession (AOR:0.63,CI:0.44,0.89), after controlling for visit (AOR:0.87,CI:0.85,0.87), female sex (AOR:0.65,CI:0.35,0.87), patrol assignment (AOR:6.71,CI:3.83,11.76) and precinct location (AOR:2.42,CI:1.56,3.77).

*Discussion:* Our findings highlight the link between police knowledge and extrajudicial arrest behavior and supports training with SHIELD model and promotion of gender diversity among police to address both.



## INTRODUCTION

As drug consumption patterns remain high worldwide, injection drug use (IDU) remains an exigent global health problem. IDU has been documented in 179 countries and there are an estimated 10-23 million people who inject drugs (PWID) worldwide.[7] PWID are at an elevated risk of acquiring Human Immunodeficiency Virus (HIV) and other blood-borne pathogens due to sharing of syringes and injection equipment.[8] Globally, approximately 2.82 million disability adjusted life years due to HIV infection alone can be attributed to IDU and 13% of all PWID are estimated to be living with HIV.[9]

Public health interventions such as syringe service programs and medications to treat opioid use disorder (e.g., methadone and buprenorphine maintenance) have demonstrated success in reducing drug-related harms such as HIV infection.[11, 12] However, legal policies that criminalize possession of syringes or drug paraphernalia have played an antagonistic role in the prevention and treatment of HIV among PWID.[25] The enforcement of such policies by police limits PWID access to these evidence-based harm reduction interventions.[26] Practices such as syringe confiscation and arrest/harassment for syringe possession act as structural determinants of HIV risk among PWID and have been associated with increased risk of HIV infection, riskier injection practices, and avoidance of harm reduction programs.[89]

Efforts to decriminalize syringes in places where drug paraphernalia possession is illegal have been promoted for decades[90] and recently there has been a global shift toward decriminalization and other drug policy reforms.[75] However, growing evidence

suggests that decriminalization may be necessary, but not sufficient, for reducing drug-related harms. For example, in 2009, Mexico passed federal '*Narcomenudeo*' drug policy reforms whereby small amounts of narcotics (including heroin) were decriminalized for personal use at the national level.[91] However, frequent police harassment and arrests for syringe and drug possession still occurred frequently in places with high per-capita IDU like Tijuana.[28, 92] The discordance between formal federal policy and local drug law enforcement practices might be due to conflicting directives at the municipal and federal level[93] in addition to inadequate legal knowledge of drug and syringe possession legality.[48]

Extrajudicial arrests violate specific provisions listed under Article 9 of the United Nations Universal Declaration of Human Rights (UNDHR) and are inconsistent with the International Guidelines on HIV/AIDS and Human Rights.[47] Extrajudicial arrests for syringe possession provide a clear example of how the global war on drugs has caused both health and human rights vulnerabilities, which are inextricably linked.[44] The protection of human rights among PWID is a necessary component in the prevention and management of HIV infection.[45] In places like Tijuana, where syringe possession has been decriminalized, extrajudicial arrests for syringe possession constitute human rights abuses in addition to significant risk factors for HIV infection and risky injection behavior among PWID.[46] Thus, police practices relevant to both PWID health and human rights (i.e. extrajudicial arrest for syringe possession) are dually problematic and should be priority targets of police training and public health intervention.

As a vital border hub and a major drug trafficking node, Tijuana has been heavily impacted by issues of substance use and drug-related harms.[61] The high level of

vulnerability faced by PWID in Tijuana has been continually exacerbated by policing behaviors that are misaligned with public health practices.[24, 50, 91] Within Tijuana, high-risk behaviors for HIV transmission are largely concentrated in high drug use red-light and border areas of Tijuana along the Tijuana River canal (i.e. *Zona Norte, El Bordo*).[94, 95] Previous research has identified aggressive routine and coordinated municipal police ‘crackdown’ operations in these spaces, driving riskier injection behaviors and HIV seroconversion.[93, 95, 96]

Police training interventions to improve public health, including HIV prevention, have been implemented in a variety of settings globally. Previous findings suggest that police training may significantly increase legal and occupational knowledge, as well as attitudes towards syringe possession and harm reduction interventions.[29, 46, 56, 57] However, there remains a gap in the literature as to whether police training interventions can improve police knowledge and retain behavior change over time. To date, no study has examined the effect of improving police legal knowledge on practices longitudinally. The purpose of this analysis was to evaluate whether training using the SHIELD (Safety & Health Integration in the Enforcement of Laws on Drugs) model was associated with improvements in knowledge of syringe law and reductions in self-reported extrajudicial arrest for syringe possession following receipt of the SHIELD training. We hypothesized that correct knowledge of syringe laws would be associated with a reduction in extrajudicial arrests for syringe possession over time following the SHIELD training in Tijuana.

## **METHODS**

### *Intervention Design*

The Tijuana Municipal Police Department is among the largest law enforcement organizations in Mexico. Approximately 80% of the force is male and the median age and number of years working in law enforcement are 38 years and 11 years, respectively.

In 2015, a police education program utilizing what came to be known as the SHIELD (*Escudo*, in Spanish) training was incorporated as an addendum to the annual training activities of the Tijuana police academy. Details of the protocol design for the training intervention have been detailed elsewhere.[59] The SHIELD training, as implemented in Tijuana, was an innovative police training intervention in that it included a random follow-up cohort to longitudinally evaluate police behaviors over time. It was designed to improve occupational safety among police by reducing the risk of occupational needlestick injury while simultaneously addressing police knowledge, attitudes and behaviors that may affect the health of PWID in Tijuana. The training consists of three primary modules covering: 1) basic epidemiology and prevention of HIV and other bloodborne pathogens, 2) legal provisions under current Mexican law related to drug and syringe possession, and 3) the nature of addiction and evidence-based harm reduction strategies.

The SHIELD intervention and clinical trial is the product of a binational, interdisciplinary collaboration between University of California San Diego, Universidad Xochicalco , and the Tijuana Municipal Police Department. Between February 2015 and May 2016, the municipal police force (N=1,806) received the training. The training and all instrumentation were adapted from previous police trainings and modified for relevance and cultural appropriateness by key stakeholders in the collaboration. It was

administered as a single day class session by trained instructors with 20 to 100 trainees in each class (n=38 class sessions). All participants signed voluntary informed consent documentation, received \$20 compensation for participating in data collection, and all study data were de-identified and protected. The study protocol and consent documentation were approved by the Human Research Protections Program of the University of California, San Diego, and by the Institutional Review Board at Universidad Xochicalco, Tijuana.

### *Data Collection*

At baseline, all participants completed self-administered pre- and post-training surveys immediately before and after the training. All baseline participants were asked if they were willing to participate in the longitudinal follow-up cohort. Among those willing to participate in the follow-up, a randomized subset of participants was selected for longitudinal analysis to complete self-administered follow-up surveys at 6, 12, 18 and 24 months. Participants with missing data on key variables (n=77) were omitted from the analysis. The survey covered relevant sociodemographic and occupational characteristics (sex, education, work experience, patrol assignment, etc.) in addition to legal knowledge of current drug policies, attitudes towards PWID, and self-reported policing behaviors.

### *Measures*

For this analysis, our dependent variable of interest was self-reported arrest for syringe possession in the previous six months. We measured this item on a four-point Likert scale with responses ranging from “Always” to “Never” but categorized the responses to create a dichotomous measure (Always/Sometimes/Rarely vs. Never) due

to cell size considerations. Our primary independent variable was correct knowledge of syringe possession law. This was measured by the question: "Under current Mexican law, how many syringes may a citizen legally possess". We created a dichotomous measure for this variable with the single correct response ("As many as they want") vs. all other responses ("1", "5", "7", "10", "none", etc.). We created a dichotomous measure for police attitudes towards PWID based on three possible responses to the following statement: "Drug users do not deserve to be treated as people". Those who disagreed were considered to have positive attitudes towards PWID whereas those who indicated they agreed/strongly agreed with the statement were considered to have negative attitudes. We treated age and number of years on the force as continuous variables while level of education (less than high school vs. at least high school), current assignment (patrol vs. administrative), current rank (officer vs. all else), district assignment location (high drug use area vs. low drug use area) were treated as categorical variables.

### *Statistical Analysis*

We first examined the baseline bivariate associations between self-reported arrests for syringe possession and knowledge of syringe possession law, attitudes towards PWID, sociodemographic factors, and policing characteristics. We used chi-square tests for comparisons involving categorical variables and non-parametric Mann-Whitney tests for comparisons involving continuous variables due to their skewed distributions. To determine the immediate effect of the training on officers' attitudes and knowledge, we compared the proportions of officers with correct knowledge of the law and positive attitudes towards PWID at pre- and post-training.

To evaluate the effect of the training over time, we used generalized estimating equations with an exchangeable correlation structure to fit a repeated measures logistic regression model including baseline and follow-up visits at months 6,12,18, and 24. We modeled the impact of the training on arrests for syringe possession, accounting for police knowledge of syringe law, attitudes towards PWID and police characteristics over time (visit). We performed relevant testing for confounding and assessed all logical interactions. All analyses were performed using SAS V9.4.

## RESULTS

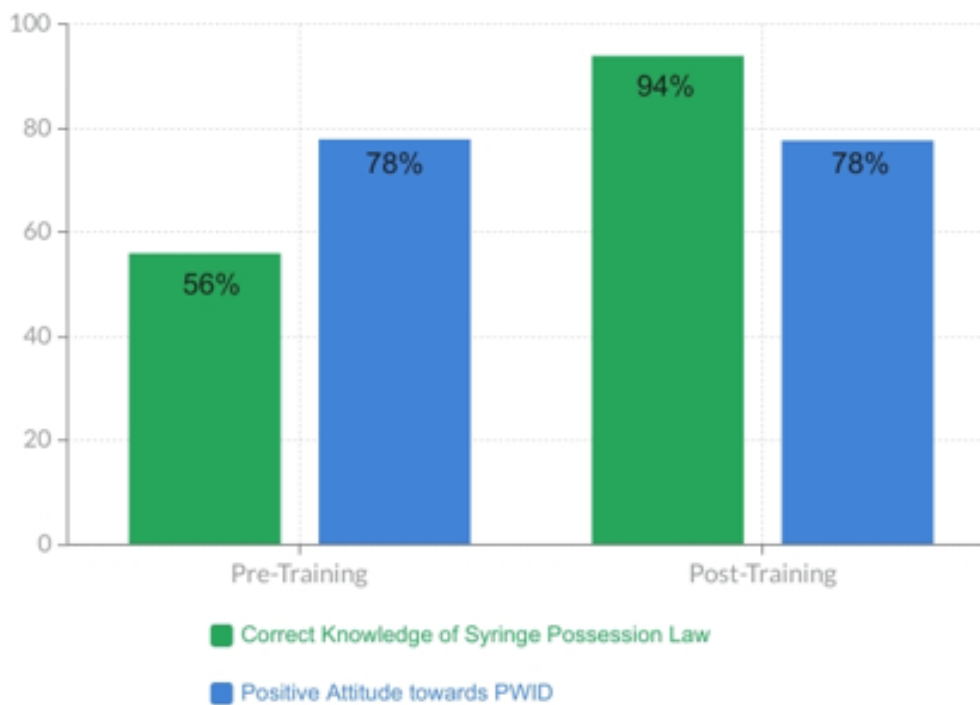
Out of the entire SHIELD longitudinal cohort (N=770), a total of 693 participants (n=3,523 observations) were included in this analysis. At baseline, the sample was predominantly male (84%), with a median age of 38 (Interquartile range [IQR]:33-43) years and 11 (IQR:7-18) years of experience working in law enforcement (Table 3.1). Further, 19% had less than high school education, most (88%) had patrol assignments (as opposed to administrative), and 23% had been assigned to a high drug use precinct.

**Table 3.1 Baseline Characteristics of Municipal Police Officers (n=693) by Self-reported Arrests for Syringe Possession (previous 6 months) in Tijuana, Mexico (2015-16).**

Variable	Total (N=693) n/median (%/IQR)	Arrest for Syringe Possession		p-value
		Yes (n= 444) n/median (%/IQR)	No (n=249) n/median (%/IQR)	
Female Sex (vs male)	105 (15.2)	52 (11.7)	53 (21.3)	0.0007
Age (years)	38 (33-43)	37 (32-43)	38 (33-44)	0.0970
Less than HS Education (vs more)	131 (18.9)	91 (20.5)	40 (16.1)	0.1529
Patrol Assignment (vs admin)	610 (88.2)	425 (95.7)	185 (74.6)	<0.0001
High Drug Use Precinct (vs low)	161 (23.3)	130 (29.4)	31 (12.5)	<0.0001
Work Experience (years)	11 (7-18)	10.8 (6.2-16.7)	11.2 (8.7-18.9)	0.1139
Correct Knowledge of Syringe Law (vs incorrect)	389 (56.1)	233 (52.5)	156 (62.7)	0.0096
Positive Attitude towards PWID (vs negative)	539 (78.0)	336 (75.7)	203 (82.2)	0.0477

A total of 444 (64%) officers reported having made arrests for syringe possession in the previous 6 months. Over half (56%) of the officers had correct knowledge of syringe law and 78% reported positive attitudes towards PWID.

On the day of the training, correct knowledge of syringe law improved from 56% (pre-training) to 94% (post-training; see Figure 3.1). Positive attitudes towards PWID did not significantly change as 78% reported positive attitudes before the training and a similar proportion reported positive attitudes after the training.



**Figure 3.1 Knowledge of syringe possession law and positive attitudes towards people who inject drugs among municipal police officers (n=693) at pre- and post-SHIELD training in Tijuana, Mexico (2015-16)**

The proportion of officers reporting arrest for syringe possession decreased by 23% between the baseline visit (64%) and the 6-month follow-up visit (41%) but no further decrease was observed during the subsequent follow-up visits (Figure 3.2). Compared to pre-training (57%), the proportion of officers with correct knowledge of



syringe law increased at the 6-month follow-up visit (85%) but decreased slightly between the 6 month visit through the 24 month visit (75%) (see Figure 3.2). Throughout the 24-month study period, officers reporting arrest for syringe possession were consistently more likely to have incorrect knowledge of the syringe law, be male, and be assigned to high drug use areas.



**Figure 3.2 Trends of arrest for syringe possession, knowledge of syringe law and attitudes towards people who Inject drugs among municipal police officers (n=693) in Tijuana, Mexico (2015-18).**

There was a 13% reduction in the odds of reporting extrajudicial arrest for syringe possession for each 6 months since the baseline visit (adjusted odds ratio [AOR]:0.87, 95% confidence interval [CI]:0.85,0.90) (Table 3.2). Further, officers with correct knowledge of syringe laws were 37% less likely to report arrest for syringe possession than those with incorrect knowledge (AOR:0.63, CI:0.44,0.89), after controlling for visit number, sex, patrol assignment and precinct location. Female officers were 35% less likely to report arrest for syringe possession (AOR:0.65 CI:0.35,0.87) when compared to

male officers and officers in high drug use precinct locations were more than twice as likely to report extrajudicial arrests (AOR:2.42 CI:1.56,3.77) than officers in other precincts. Officers with patrol assignments were more than six times more likely to report extrajudicial arrests for syringe possession (AOR:6.71, CI:3.83,11.76) than their counterparts with mostly administrative duties.

**Table 3.2 Logistic Regression Model of Self-reported Arrests for Syringe Possession (previous 6 months) among Municipal Police (n=693 officers, 3523 observations) over 24 months following SHIELD Training in Tijuana, Mexico (2015-18).**

Variable	Unadjusted Model		Adjusted Model	
	Odds Ratio	95% Confidence Interval	Adjusted Odds Ratio	95% Confidence Interval
Time (visit)	0.86	0.83, 0.88	0.87	0.85, 0.90
Female Sex (vs. male)	0.49	0.32, 0.75	0.56	0.35, 0.87
Age (years)	1.02	0.99, 1.03		
Less than HS Education (vs. more)	1.11	0.97, 1.26		
Work Experience (years)	0.89	0.82, 0.97		
Correct Knowledge of Syringe Law (vs. incorrect)	0.51	0.44, 0.59	0.63	0.44, 0.89
Positive Attitudes towards PWID (vs. negative)	1.33	1.14, 1.55		
Patrol Assignment (vs. administrative duty)	3.01	2.02, 4.48	6.71	3.83, 11.76
High Drug Use Precinct (vs. low)	1.90	1.57, 2.31	2.42	1.56, 3.77

Note : GEE approach with an Exchangeable Correlation Structure.

## DISCUSSION

These findings highlight the critical link between police officers' knowledge of syringe possession law and extrajudicial arrests of PWID for syringe possession. It also demonstrated that the SHIELD police training intervention was associated with improvements in knowledge of syringe law and reductions in the proportion of officers reporting extrajudicial arrests of PWID for syringe possession. Moreover, this study

brings to the forefront other police characteristics (i.e. gender, patrol assignment, precinct location) that may play a role in police behaviors such as extrajudicial arrests for syringe possession. These results have implications for future public health interventions to decrease human rights abuses and drug-related harms among PWID.

Previous studies have established that police training interventions may significantly improve officers' knowledge, from pre- to post-training.[29, 49, 53] Here, we expand upon those findings and demonstrate that police training was associated with improved knowledge of syringe possession laws through 24 months of follow-up. Predictably, correct knowledge appeared to peak immediately following the training, and gradually waned over time. Future research is warranted to explore if modifications to the intervention or refresher trainings could be implemented to sustain improvements in knowledge.

The ability of the training to improve knowledge is particularly relevant, given that knowledge of syringe laws was associated with a 18% decrease in arrests for syringe possession throughout the study period. In concert with improvements in officers' knowledge, self-reported arrests for syringe possession were significantly lower throughout the follow-up period. To our knowledge, this study is the first to suggest that police training can lead to longstanding modifications of police behavior. Findings also suggest that the reduction in arrests for syringe possession may be explained, at least in part, by the improvements in knowledge of syringe laws. Therefore, police knowledge of the law constitutes a key consideration for drug policy reform and other public health efforts to improve health among PWID and reduce human rights violations.

Knowledge of current drug and paraphernalia law among PWID may also be relevant in the case of extrajudicial arrests stemming from police-PWID interactions. Previous research has identified significant gaps in legal knowledge, including syringe possession laws, among PWID in Tijuana.[91] Our findings on police knowledge of syringe laws complement previous research involving the SHIELD cohort which identified improvements in officers' intent to communicate syringe legality to PWID following the training.[53] Improving officers' knowledge of the law and self-efficacy to communicate syringe legality to PWID could address, at least in part, deficiencies in knowledge of current law among PWID.

Gender was a significant factor as female officers were 35% less likely than male officers to report extrajudicial arrest for syringe possession throughout the study period. This is consistent with a growing body of literature suggesting that female police officers practice policing behaviors that align better with public health and human rights priorities,[97] such as less aggressive policing and use of force.[53, 98, 99] Our findings support the broader argument that, apart from promoting gender equity in fields where women and underrepresented, gender diversity in law enforcement is a public health imperative. Future research should examine strategies to reduce barriers for female officers to enter the police workforce.

The police training showed no significant effect on attitudes toward PWID and attitudinal variables were not significantly associated with arrest for syringe possession. It could be that these police attitudes were relatively high prior to the training so there was little room for practical improvement. Alternatively, it may be that our variables were ineffective in measuring police attitudes as constructed and that a more robust,

validated police attitudinal scale is warranted for this line of research. We also note that age and number of years on the force were not significant factors and that improvements in correct knowledge of syringe possession law were seen among officers of all ages and levels of experience. This suggests that police trainings should be targeted to all officers and not limited to incoming recruits.

Patrol assignment and precinct location were identified as significant predictors of arrest for syringe possession. While it is not surprising that patrol officers were more likely to arrest PWID than their administrative counterparts, officers of all assignment type reported this detrimental practice. It is important to note that in the event of large police crackdown operations, even primarily administrative officers are deployed and may assist with largescale arrests of PWID. In Tijuana, such crackdowns typically occur in high drug-use precincts, where police-PWID interactions are commonplace, and can be particularly harmful for PWID.[95, 100][94] Therefore, even officers with primarily administrative roles should be included in police training interventions that address police-PWID interactions. Further, additional interventions are warranted to address particularly harmful drug law enforcement that occurs in areas with highly prevalent drug use.

This study is not without limitations. First, since the outcome was self-reported, social desirability bias could be a concern. However, as the surveys were self-administered, this might have been mitigated. Second, we could not control for large scale exogenous factors that may have occurred during the follow-up period (i.e. large crackdown operations or changes in department priorities/quotas over time). Third, given the unique nature of Tijuana as a border locale, these findings may not be

generalizable to other municipal settings. Finally, given that the entire police force received the training, there was no control group and the baseline sample of the SHIELD cohort was not randomized. However, the follow-up cohort was randomized to reduce systematic differences among those participants included in the longitudinal subsample.

## **CONCLUSION**

Knowledge of syringe possession law may play a significant role in reducing extrajudicial arrests for syringe possession in places like Tijuana. Police training with the SHIELD model may address both officer knowledge and problematic behaviors like extrajudicial arrests, which impact PWID health and human rights. Precinct location, patrol assignment and female sex likely also shape policing in this context and should be accounted for in public health research and practice. Our results also provide further evidence that gender diversity should be prioritized among police to reduce problematic drug law enforcement behaviors.

## **ACKNOWLEDGEMENTS**

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## **Chapter 4: Municipal police officer preferences for harm reduction services in referrals for people who inject drugs in Tijuana, Mexico**

### **ABSTRACT**

*Background:* Police constitute a structural determinant of health and HIV risk for people who inject drugs (PWID) and negative encounters with law enforcement present significant barriers to PWID access to harm reduction services. Conversely, police may facilitate access via officer-led referrals, potentiating prevention of HIV, overdose, and drug-related harms. We aimed to identify police characteristics associated with support for officer-led referrals to addiction treatment services and syringe service programs (SSP). We hypothesized that officers who believe harm reduction services are contradictory to policing priorities in terms of safety and crime reduction will be less likely to support police referrals.

*Methods:* Between January and June 2018, police officers (n=305) in Tijuana, Mexico, completed self-administered surveys about referrals to harm reduction services during the 24-month follow-up visit as part of the SHIELD police training and longitudinal cohort study. Log-binomial regression was used to estimate adjusted prevalence ratios and model policing characteristics and attitudes related to officers' support for including addiction treatment and SSP in referrals.

*Results:* Respondents were primarily male (89%), patrol officers (86%) with a median age of 38 years (IQR:33-43). Overall, 89% endorsed referral to addiction services, whereas 53% endorsed SSP as acceptable targets of referrals. Officers endorsing addiction services were less likely to be assigned to high drug use districts

(Adjusted Prevalence Ratio [APR]=0.50, 95%CI=0.24,1.08) and more likely to agree that methadone programs reduce crime (APR=4.66, 95%CI=2.05,9.18) than officers who did not support addiction services. Officers endorsing SSPs were younger (Adjusted Prevalence Ratio [APR]=0.96 95%CI=0.93,0.98), less likely to be assigned to high drug use districts (APR=0.50, 95%CI=0.29,0.87), more likely to believe that methadone programs reduce crime (APR=2.43, 95%CI=1.30,4.55) and less likely to believe that SSPs increase risk of needlestick-injury for police (APR=0.44, 0.27,0.71).

*Conclusions:* Beliefs related to the occupational impact of harm reduction services in terms of officer safety and crime reduction are associated with support for referral to related harm reduction services. Efforts to deflect PWID from carceral systems towards harm reduction by frontline police should include measures to improve officer knowledge and attitudes about harm reduction services as they relate to occupational safety and law enforcement priorities.

## **BACKGROUND**

Alongside rising global drug consumption patterns, drug-related harms such as overdose, Human Immunodeficiency Virus (HIV), and Hepatitis C virus (HCV) infection related to injection drug use (IDU) remain significant public health problems. North America has been particularly affected as unintended overdose is now recognized as the leading cause of accidental death in the United States.[70, 101] However, the global burden of disease due to opioid dependence is substantial.[9] There are an estimated 15.6 million people who inject drugs (PWID) worldwide, the global prevalence of HIV among PWID is 18%, and localized HIV outbreaks among PWID have been observed in numerous settings.[7, 66] Colliding syndemics of IDU, HIV, HCV and



overdose have been further exacerbated by social and economic harms caused by the COVID-19 pandemic and mitigation strategies.[102-105] Resultant shifts in drug distribution and consumption patterns, in addition to augmented barriers to health and social services, make access to essential care for PWID a timely priority.[102-105] While the global burdens of substance use and related risk remain high, effective evidence-based public health interventions exist to reduce drug-related harms among people who inject drugs (PWID).[19]

Syringe service programs (SSP) are important public health interventions that are widely recognized to reduce the spread of bloodborne pathogens through IDU.[16, 19] Drug treatment paradigms vary greatly from abstinence-only programs to opioid agonist therapy (OAT) such as methadone maintenance therapy (MMT) and buprenorphine. In addition to reducing HIV risk through IDU cessation[19], retention in OAT is associated with reductions in all cause and unintended overdose mortality.[12] SSP and OAT represent effective and cost-effective harm reduction interventions to reduce the burden of drug-related harms among PWID.[12, 14, 16-19] However, PWID access to such services are precluded by significant barriers including cost,[21, 106-109] mobility,[21, 110] migration/deportation,[62, 111] stigma,[21, 112] childcare/family needs,[106] cultural and religious pressures,[113] and police interference and/or harassment.[2, 24]

The public health impact of policing has become increasingly recognized as a critical structural determinant of health, especially among PWID.[89] The harmful impact of incarceration on subsequent HIV risk has been well documented,[25, 33, 114] but police also hold a significant role in the risk environment for HIV and drug-related harms outside the context of incarceration.[23, 58, 63] Abusive police-PWID interactions have

been shown to drive HIV risk, risky injection behaviors, and harm reduction avoidance.[89] For example, police harassment, arrests and/or assaults outside of MMT or SSP sites may limit PWID willingness to utilize such sites.[2, 6, 24, 89, 115, 116] Given that prohibitive cost is already a barrier to accessing MMT for many PWID[109], being forced to pay a bribe to police may be particularly damaging to MMT utilization.[24] Police practices such as syringe confiscation may limit syringe access and discourage SSP utilization, leading to unsafe syringe sharing.[3, 5, 89] Additionally, in some settings, arrests may result in forced abstinence while in police custody or during coerced drug treatment, leading to an increased risk of overdose.[35]

Tijuana, Mexico, provides an illustrative example of how drug law enforcement can be acutely harmful to the health of PWID populations. As a high-traffic border city, Tijuana is a nexus of drug trafficking, local drug consumption, and drug/sex tourism.[62, 64, 106, 117-120] An estimated 12,000 PWID reside in Tijuana where HIV prevalence is approximately 4.2%, a burden of disease approximately ten times the national average.<sup>14</sup> Robust local research has described a blighted history of abusive drug law enforcement practices including large-scale police ‘crackdown’ operations, routine spatial regulation of homeless PWID, human rights abuses by police, forced drug detoxification, in addition to aggressive policing near harm reduction services.[4, 24, 50, 63, 65, 95, 107, 115, 118, 121, 122]

Police, as gatekeepers to the criminal justice system, also have the capacity to help deflect individuals in need of vital services to essential drug treatment and harm reduction services in lieu of arrest and incarceration. Due to frequent interactions with PWID, police behaviors can be leveraged to either cause public health harm or

potentially deliver a positive public health impact. In referring PWID to evidence-based harm reduction services, police have the capacity to reduce drug-related harm. Additionally, as first responders, police may play a role in overdose reversal using naloxone.[123] Ideally, interventions to address drug law enforcement would serve to minimize the harms of abusive police practices while promoting positive outcomes stemming from police-PWID interaction (i.e. referrals).

While significant gaps in the literature remain on the topic of harm reduction training for police,[124] educational programs targeting the interface between police and PWID have been successfully deployed to address public health harms caused by drug law enforcement. For example, the LEAD (Law Enforcement Assisted Diversion) program in Seattle, Washington, has demonstrated efficacy in diverting people into case management and supportive services in lieu of incarceration.[123] This analysis is rooted in the context of police training with the SHIELD (Safety and Health Integration in the Enforcement of Laws on Drugs) model that was implemented in Tijuana between 2015-2018. Details of the SHIELD training design and conceptual framework have been previously published (ClinicalTrials.gov Identifier: NCT02444403).[55] In short, the intervention was designed using the Transcontextual Model (which incorporates elements of Theory of Planned Behavior and Social Determination Theory) to highlight and target pathways to behavioral change among police.[55, 60] During the training, officers received training on needlestick injury (NSI) prevention, HIV/HCV epidemiology and prevention, federal decriminalization reforms to drug policy, and elements of drug addiction and harm reduction strategies.

The SHIELD policing training model has been deployed in a number of settings and has demonstrated efficacy in improving police attitudes, knowledge, and intentions relevant for improving police-PWID interactions.[49, 53, 54, 125, 126] While the SHIELD training addresses the topic of harm reduction services, no officer-led referral programs exist in Tijuana and PWID are often forced into non-evidence-based drug treatment programs that may have negative consequences for some PWID, including unintended overdose after release.[35] Mixed methods research in Tijuana has identified moderate support for officer-involved referrals to harm reduction services among police and PWID alike.[52] Officer-held beliefs and attitudes regarding harm reduction services may shape, at least in part, their preference for including such services in a referral. However, there remains a gap in knowledge regarding relevant police characteristics and specific attitudes associated with referrals for harm reduction services.

The objective of this analysis was to evaluate police officer preferences for referrals of PWID to harm reduction services, including drug treatment and SSP, and to identify characteristics and attitudes associated with such preferences. We hypothesized that 1) officers that believe methadone programs reduce crime will be more likely to indicate addiction treatment services should be included in referrals; and 2) officers that believe SSP increase the risk of needlestick injury will be less likely to indicate SSP should be included in referrals.

## **METHODS**

### *Study Design*

Between February 2015 and May 2016, 1,808 active-duty municipal police officers in the Tijuana municipal police force were trained as part of an innovative police

training utilizing the SHIELD model. All participants signed written informed consent and the study protocol was approved by the UCSD Human Research Protections Program (HRPP) and the Institutional Review Board of the Xochicalco University, Mexico.

### *Data Collection*

Officers completed self-administered pre- and post-training surveys in Spanish and a subset of officers (n=771) were randomly selected for 24-months of follow-up. These participants attended follow-up visits in the field or private settings convenient to the participant at 3, 6, 12, 18 and 24 months. We designed the questionnaire based on previous training interventions<sup>20</sup>, adapted it for cultural considerations and clarity, piloted it alongside officers from the Tijuana Police Academy, and incorporated feedback. We collected data on socio-demographics, recent self-reported policing behaviors (e.g. syringe confiscation [last 6 months], physical altercation [last 6 months]) as well as current knowledge and attitudes related to drug policy, PWID, and drug addiction. Midway through the 24-month follow up survey, and only at the 24-month visit, we administered a supplemental study which included additional survey items (analytical sample n=305). These survey items covered police referral practices related to PWID, preferred services for referrals (including harm reduction services) and potential incentives for officers to facilitate referrals.

### *Outcome Measures*

At the 24-month survey, officers were asked “Which services should be included in a referral” and responded either “Yes” or “No” to the following list of 11 individual referral services: drug/alcohol addiction services, syringe service programs, HIV or other infectious disease testing, HIV treatment, overdose prevention, wound care and

other health care, dental clinic, food assistance, legal or immigration assistance, housing assistance, employment assistance, laundry, showers, or other personal care services. Our primary outcomes of interest for this analysis were officers' preferences for referral to drug/alcohol addiction services or syringe service program services.

### *Explanatory Variables*

To understand which factors were associated with officers' preferences for harm reduction services inclusion in a referral, we also examined the following factors: self-efficacy to conduct a referral, perceived supervisory support, patrol assignment location (High drug use area vs. low drug use area) perceived role as a police officers and several attitudinal factors related to PWID, harm reduction services, and policing. The primary independent variables relevant for hypothesis testing were office-held beliefs related to the occupational impact of SSP and methadone. Beliefs regarding SSP were measured by the survey item "Syringe exchange programs increase the risk of NSI among police" and beliefs regarding methadone were measured by the survey item "Methadone maintenance programs help reduce criminal activity". We measured these and all other explanatory variables on a 3-point Likert scale (Agree/Neutral/Disagree) and dichotomized them (Agree vs Neutral/Disagree) to distinguish between "positive" and "negative" perceptions of methadone and syringe service programs.

### *Statistical Analysis*

In this cross-sectional analysis, we report descriptive statistics for the 24-month follow-up sample who completed the additional referral questionnaire. We excluded subjects with missing data for either of the outcomes (n=8, 2.6%). We conducted bivariate analyses between all relevant factors and each of the two dependent variables

(endorsing referral to drug addiction services and SSP). We then used log-binomial regression to estimate prevalence ratios and model policing characteristics and attitudes associated with officer support for including addiction treatment and SSP in referrals. To test our hypotheses, we created multivariable models in a stepwise fashion, one by one from smaller to higher p-values, incorporating factors that were significantly associated with the outcome in bivariate analyses ( $p < 0.05$ ) and evaluating Akaike information criterion. We report two adjusted models, one for each dependent variable (drug addiction services and SSP).

## **RESULTS**

### *Sample Characteristics*

A total of 305 officers were eligible for this analysis as they had completed the additional referral questionnaire at the 24-month study visit and had complete outcome data (Table 4.1). The sample was predominantly male (89%), had at least a high school level of education (82%) and a median age of 38 years (Interquartile Range [IQR]=33-43). As opposed to holding supervisory roles, most respondents held the rank of officer (86%) with a median of 12 years working on the force (IQR=9-18) and 25% were assigned to high drug-use districts along the Tijuana River Canal ( $n=77$ ). Respondents reported high levels of referral self-efficacy ( $n=282$ , 92%) and supervisory support (66%) and most perceived it was their role as police to refer PWID to health & social services (83%). As for attitudes related to harm reduction, 81% agreed that methadone maintenance programs helped reduce criminal activity while 51% disagreed that SSP increased the risk of NSI among police.

### *Referral to Drug Addiction Services*

Most respondents (86%) indicated that drug addiction services should be included in a police referral. In the unadjusted bivariate models (Table 4.2), officers assigned to high drug use districts were 54% (Prevalence Ratio [PR]=0.46, 95% Confidence Interval [CI]=0.22,0.95) less likely to support referral to drug addiction services than officers assigned to low drug use districts. Officers that agree methadone maintenance programs help reduce criminal activity were nearly five times more likely (PR=4.55, CI=2.17,9.56) to endorse referral to drug addiction services. In the adjusted model, the prevalence of indicating that drug addiction services should be included in a referral was 4.66 times higher (Adjusted Prevalence Ratio [APR]=4.66, CI=2.05,9.18) among officers who agreed that methadone maintenance programs help reduce criminal activity than those who did not agree, after controlling for district assignment location.

### *Referral to SSP Services*

More than half of the respondents indicated that SSP services should be included in a referral (53%). In the bivariate models (Table 2), support for referral to SSP services was significantly associated with age (PR=0.98, CI=0.97,0.99), district assignment location (PR=0.54, CI=0.32,0.91), agreeing that methadone maintenance programs help reduce criminal activity (PR=2.33, CI=1.29,4.21) and agreeing that SSPs *increase* the risk of NSI among police (PR=0.46, CI=0.29,0.73). In the adjusted model, the prevalence of indicating that SSP services should be included in a referral was 4% lower for each 1 year increase in age (APR=0.96 per year, CI=0.93,0.98), 50% lower among officers assigned to high drug use districts along the Tijuana River Canal (APR=0.50, CI=0.29,0.87), 2.43 times higher (APR=2.43, CI=1.30,4.55) among officers



who agreed that methadone maintenance programs help reduce criminal activity and 56% lower among those who agreed that SSPs increase the risk of NSI among police (APR=0.44, CI=0.27,0.71).

**Table 4.1 Descriptive Characteristics of Municipal Police Officers in 24-month sample of SHIELD Cohort in Tijuana, Mexico (n=305).**

Police Characteristics		n/median	%/IQR
	Age (years)	38	33.0-43.0
	# Years on Force	12	9.1-18.5
Gender	Female	33	10.8
	Male	272	89.1
Rank	Officer	255	86.1
	Supervisor/Deputy/Chief	50	16.4
Location	High drug use district	77	25.3
	Low drug use district	228	74.7
Education	< High School	56	18.4
	≥ High School	249	81.6
<b>Police Support for Harm Reduction Referral Service</b>			
Which service locations should be included in a police referral?			
	Addiction Services (“Yes” vs “No”)	270	88.5
	SSP (“Yes” vs “No”)	161	52.8
<b>Police Attitudes</b>			
	My supervisor would commend me for referring PWID (Agree vs. Neutral/Disagree)	200	65.6
	If I wanted to refer PWID to a health program, I would know how (Agree vs. Neutral/Disagree)	282	92.4
	It is the role of police to refer PWID to health & social services (Agree vs. Neutral/Disagree)	252	82.6
	Likelihood that PWID will go to service location if referred (Always vs. Sometimes/Rarely/Never)	85	27.9
	Methadone maintenance programs help reduce criminal activity (Agree vs. Neutral/Disagree)	247	81.0
	Syringe exchange programs increase the risk of NSI among police (Agree vs. Neutral/Disagree)	148	48.5
	People addicted to drugs do not care about their health (Agree vs. Neutral/Disagree)	146	47.9
	Drug Addiction is a disease (Agree vs. Neutral/Disagree)	283	92.8

**Table 4.2 Unadjusted and adjusted models of municipal police officers' support for drug addiction treatment services and syringe service programs in officer-led referrals, Tijuana, Mexico (n=305)**

Police Characteristics	Drug Addiction Treatment Services ("Yes")			Syringe Service Programs ("Yes")		
	Unadjusted Model	Adjusted Model	Adjusted Model	Unadjusted Model	Adjusted Model	Adjusted Model
Age (Years)	Prevalence Ratio	95% CI	Adjusted Prevalence Ratio	Prevalence Ratio	95% CI	Adjusted Prevalence Ratio
# Years on Force	0.99	0.95, 1.03	0.5	0.98*	0.97, 0.99	0.96*
Gender (Female vs Male)	1.00	0.96, 1.05	0.5	0.98	0.97, 1.01	0.96*
Rank (Officer vs Supervisor/Deputy/Chief)	0.54	0.21, 1.42	0.5	0.82	0.40, 1.69	0.50*
Location (high drug use vs Elsewhere)	0.75	0.29, 1.94	0.5	0.96	0.49, 1.85	0.50*
Education (< High School vs ≥ High School)	0.46*	0.22, 0.95	0.5	0.54*	0.32, 0.91	0.50*
	0.73	0.32, 1.71	0.5	0.61	0.34, 1.09	0.50*
<b>Attitudes (Agree vs Neutral/Disagree)</b>						
My supervisor would commend me for referring PWID	1.56	0.56, 2.40		0.84	0.52, 1.36	
If I wanted to refer PWID to a health program, I would know how	0.33	0.04, 2.53		0.86	0.36, 2.02	
It is the role of police to refer PWID to health & social services	1.77	0.78, 4.04		1.59	0.88, 2.90	
Likelihood that PWID will go to service location if referred	0.81	0.37, 1.74		1.01	0.61, 1.68	
Methadone maintenance programs help reduce criminal activity	4.55*	2.17, 9.56	4.66*	2.33*	1.29, 4.21	2.43*
Syringe exchange programs increase the risk of NSI among police	0.78	0.38, 1.57		0.46*	0.29, 0.73	0.44*
People addicted to drugs do not care about their health	0.65	0.32, 1.33		1.12	0.72, 1.76	
Drug Addiction is a disease	1.23	0.35, 4.40		1.38	0.58, 3.31	

\*Significant at alpha<0.05

## DISCUSSION

Most officers indicated that drug addiction services should be included in a police referral while about half indicated SSP services. Preference for drug addiction services was associated with the belief that MMT programs help reduce criminal activity. Preference for SSP services was associated with age, assignment to high drug use districts along the Tijuana River Canal and positive attitudes regarding the occupational impact of MMT and SSP. These findings support our hypothesis that police support for SSP and drug addiction treatment services are associated with officer-held beliefs regarding the occupational impact of harm reduction services (i.e. MMT and SSP).

Our findings suggest that the perceived occupational impact of harm reduction programs may shape, at least in part, officer willingness to refer PWID to certain programs. Its logical that police, as with workers in any occupation, would support programs they perceive to make their job easier (reduce crime) and reject those they perceive as unsafe (increased risk of NSI). Further, it is logical to hypothesize that these occupational beliefs about such services may also shape officer behavior around harm reduction sites and their clientele. Recent qualitative research among police has suggested that educating police about harm reduction operations such as safe consumption sites could improve relationships between police and harm reduction programs.[127] Highlighting the occupational benefits of harm reduction programs to police should be prioritized in efforts to align public health and police work, including training and officer-led referral programs.

Officers assigned to high drug use districts along the Tijuana River canal were less likely to indicate that drug treatment or SSP services should be included in a

referral. This is consistent with previous research in Tijuana suggesting police attitudes and behaviors towards PWID among officers assigned to these districts may be more negative than those of officers assigned to low drug use districts.[50] Officers assigned to such areas in Tijuana were more likely to arrest PWID for syringe possession, arrest for heroin possession and confiscate syringes.[48, 50]

Previous geospatial research has identified hotspots of self-reported arrest for any offense, police stops, and extrajudicial police encounters in these areas of Tijuana.[94, 115, 128] It is possible that lived experience working in high drug use areas may alter officer perceptions of PWID, addiction, and harm reductions services differently than officers assigned to lower drug use areas. Police burnout may play an outsized role among police assigned to these areas, leading to more pessimistic attitudes than their counterparts in spaces with less prevalent drug use.[129, 130] Policing in these areas may also present an elevated risk of occupational hazards such as needlestick injury, a factor associated with harmful police practices like syringe confiscation and negative attitudes toward harm reduction services such as SSP.[130] Alternatively, it could be the case that officers are specifically selected for assignment to high drug areas because of these existing characteristics and attitudes. Notably, before the training, officers assigned to the *Zona Centro* district (a high drug use neighborhood) were more likely to refer PWID to health or social programs than officers assigned elsewhere.<sup>22</sup> This may be due to a higher number of opportunities to refer given the clustering of PWID and drug treatment centers in this area.[108, 109]

Previous research with this cohort has demonstrated that these attitudes towards PWID are not necessarily associated with an increased likelihood of referral behavior.<sup>22</sup>

Qualitative has examined structural barriers to referrals such as perceived dysfunction of drug treatment centers and fear of resentment from PWID.[95] In this analysis, none of the attitudes specifically related to referral self-efficacy, supervisory support or perceived role to refer were associated with either outcome. Using baseline data (pre-training) in this cohort, we had previously demonstrated that officers who agreed it was their role to refer PWID to health and social services were 3.32 times more likely to refer PWID in the last 6 months.[48] It may be that attitudes related to their role influence referral behaviors among police, but do not influence which services officers perceive should be included in a referral. Also, it may be difficult to distinguish between voluntary referrals (as specified in the referral survey completed for this analysis) and coerced referrals in this context as forced admissions to drug treatment, typically abstinence-based programs, is common.[35, 93, 95]

Research in other settings has successfully demonstrated that police referral programs may be feasible to implement with a degree of acceptability among PWID.[131] However, fragmented treatment systems remain a barrier to long-term recovery among participants. Police referrals alone, without scale-up and coordination with evidence-based harm reduction interventions, may result in coerced admission to detoxification and/or abstinence-based programs. In such instances, police referrals constitute an additional source of damage as coerced detox “treatment” paradigms have been associated with harm among PWID, including higher likelihood of experiencing non-fatal overdose.[35, 132]

This research is relevant to arguments supporting the deflection of police responsibilities and power in favor of more effective and cost-effective interventions to

address drug-related harms and PWID. Our findings suggest that police willingness to refer PWID to harm reduction services depends on police characteristics (assignment location, occupation-related attitudes towards harm reduction services). These are factors which may be heavily shaped by law enforcement institutional norms, therefore, efforts to increase referrals in this context must promote correct understandings and more positive perceptions of harm reduction services. However, this issue also supports arguments outside the scope of this analysis which suggest that law enforcement personnel are not ideal candidates for street-level interventions with PWID, including referrals. Given police officers' carceral legal tools and vocational norms, the role of referral to harm reduction services may best be carried out by actors and systems of support (including integrated service facilities) alternative to law enforcement. Considering the known harms of street drug law enforcement practices, including the potential for harmful and/or coerced police referrals, the role of police in drug-treatment referral remains somewhat precarious. We suggest the following two-fold strategy to mitigate the public health harms of drug law enforcement with regards to harm reduction: 1) decrease routine interaction between PWID and police when possible and 2) shift PWID-police interactions from a source of potential harm (i.e. arrest leading to incarceration) to that of assistance.

There are several limitations for this study. Since the sample consisted of officers in the SHIELD cohort who had been exposed to an educational intervention, the results may not be generalizable to officers that have not received relevant police training or officers working in other settings. Also, some officers may not have differentiated between drug addiction and alcohol addiction services in selected referral service

preferences. There is potential for social desirability bias if officers responded to the surveys in a way to be perceived favorably by the study staff, however, self-administered surveys were implemented to reduce such bias. Finally, as a cross-sectional study with hypothetical outcomes, no inferences regarding causality or referral behavior can be made.

## **CONCLUSION**

Officers' willingness to indicate drug treatment services in referrals was associated with positive attitudes toward MMT whereas willingness to indicate SSP was associated with age, patrol location and positive attitudes towards MMT and SSP programs. Referrals to evidence-based harm reduction services carry potential to reduce drug-related harms among PWID but may rely on shifting police perspectives. Interventions designed to improve PWID-police interactions such as police trainings should target officer beliefs and attitudes toward harm reduction services. Positive perceptions of harm reduction services must be promoted alongside the expansion of evidence-based services.

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## **Chapter 5: Discussion**

### **OVERVIEW**

The following sections of this discussion will contextualize the main findings of this dissertation, illustrate the relevant strengths and weaknesses, and highlight implications for future public health research and practice. Taken together, the primary chapters of this dissertation advance our understanding of drug law enforcement behaviors as structural determinants of HIV risk. This work also sheds light on modifiable factors such as police knowledge and attitudes that are targeted by SHIELD police training and are associated with police behaviors and intentions pertinent to the health, safety and human rights of PWID. Together, these findings emphasize the public health consequences of harmful policing practices. Additionally, they speak to potentially beneficial police-PWID interactions in the form of harm reduction referrals and illuminate elements of police training as an intervention targeting street-level interactions between police and PWID in order to reduce HIV risk.

### **SUMMARY OF MAIN FINDINGS**

Chapter 2 (Aim 1) identified robust global literature with quantitative research cataloguing law enforcement behaviors that may drive HIV infection, risky injection behaviors, and harm reduction avoidance. This phenomenon was identified in settings with diverse socioeconomic and geographic contexts, suggesting poverty, lack of development or accountability within the justice system alone may not explain it. It was also found in differing drug policy environments, suggesting drug policy reform or decriminalization alone may not be sufficient to address problematic policing. Despite injection drug being prevalent in many global locales, there remain 170 countries with

documented with limited or no published research on the quantitative relationship between policing exposures and HIV risk among PWID.

Chapter 3 (Aim 2) demonstrated that training with the SHIELD model could produce sustained improvements in officers' knowledge of syringe law and reductions in self-reported extrajudicial arrests for syringe possession. The proportion of officers reporting correct knowledge of syringe law improved from pre-training to post-training, with sustained improvements lasting through 24 months. This coincided with significant reductions in the proportion of officers reporting extrajudicial arrests for syringe possession between the baseline and 6-month visits, with sustained reductions through 24 months. As hypothesized, correct knowledge of syringe law was significantly associated with a sustained reduction in extrajudicial arrest for syringe possession following police training with the SHIELD model. Female officers were less likely to report extrajudicial arrest for syringe possession than males throughout the study period. Overall, officers with correct knowledge of the syringe law were 37% less likely to report arrest for syringe possession than those with incorrect knowledge, after controlling for visit number, sex, patrol assignment and precinct location.

Chapter 4 (Aim 3) demonstrated that officer-held beliefs regarding the occupational impact of certain harm reduction services (SSP and drug addiction treatment) were associated with officers' willingness to include such services in referrals of PWID. Most officers (86%) indicated that drug addiction services should be included in a police referral while 47% indicated SSP services. As hypothesized, officer support for drug addiction services was associated with the belief that MMT programs help reduce criminal activity whereas support for SSP was negatively associated with the

belief that SSPs increase the risk of NSI among police, after controlling for age, gender, and assignment location.

## **IMPLICATIONS FOR GLOBAL HEALTH RESEARCH AND PRACTICE**

The research findings included in this dissertation have direct implications on numerous global health priorities including drug policy reform, police training, and interventions to prevent HIV among PWID. Despite the fact the PWID are not the unit of, preventing HIV and drug-related harm among this population is a central concern in this dissertation work. Public health interventions to prevent HIV must account for law enforcement experiences that shape HIV risk among highly vulnerable populations such as PWID. Findings from the systematic review (Chapter 2) suggest this may be important for HIV prevention efforts in every global context where IDU takes place, regardless of the economics or drug policy setting.

The types of policing exposures relevant to HIV risk are broad, ranging from minor harassment and intimidation to overt sexual and/or physical violence. They include both acute and chronic experiences ranging from recent (past 30 days, last 6 months) to lifetime exposures. These problematic police behaviors are pervasive in the lives of PWID and impact all four quadrants (physical, social, economic, and policy) of the HIV risk environment for PWID.[23, 58, 63] They also range from real to perceived experiences as constructs like ‘fear of arrest’ and “avoided carrying syringes due to police presence” were identified as police exposures significantly associated with HIV infection and riskier injection behaviors. Merely the perception of arrest or abuse by police may shape reality among PWID and drive deleterious drug consumption and risky injection behaviors. This speaks to the historical weight of the individual and

collective harms inflicted by drug law enforcement and experienced by communities of PWID. HIV research and prevention efforts must recognize and account for the broadly ranging and widespread police practices that contribute to the HIV risk environment for PWID.

The diverse nature of these reported policing practices highlights an important point about the nature of law enforcement: police have a broad range of tools, both legal and otherwise, to use according to their own discretion. Findings from Chapter 2 illustrate examples of police applying both legal tools (i.e. arrest, citations) and extralegal means (i.e. planting drugs, confiscating syringes, soliciting bribes, physical/sexual assault) during street interactions with PWID. Examples of both legal and extralegal police behaviors were shown to be associated with HIV risk, riskier injection practices and harm reduction avoidance. Therefore, in the absence of complementary public health interventions, legal approaches like drug policy reform and decriminalization may be limited in their ability to address many of the harmful experiences that PWID routinely have with police. Drug policy reform is a necessary global health imperative as laws criminalizing drug use adversely affect PWID health and increase HIV risks[25] and enable human rights abuses[31]; however, policy reform alone is insufficient to address the public health harms of policing.

This work highlights the fact that the “laws on the street” do not always reflect the “laws on the books”. In other words, when formal laws change due to policy reform, there is not necessarily a corresponding change in how police work is conducted at the street level. This was shown in Mexico after sweeping drug policy reforms in 2009 failed to correct many of the systemic abuses experienced by PWID on the streets in

Tijuana.[29, 91] The discordance between formal law and police practices may be a result of police discretion and/or institutional norms and influences. It may also be explained, at least in part, by deficiencies in police knowledge of current law where incorrect knowledge of the law translates to extrajudicial police behaviors. Correct knowledge of formal law was initially low in the SHIELD cohort[54] but was improved by the training[29]. This work demonstrates that, in case of syringe possession law, improvements in knowledge of formal law may be sustained over time following SHIELD training and are associated with positive changes in officer behavior. Police knowledge of formal law is a natural target for police training, among other modifiable police factors.

This work underscores two police factors that warrant additional consideration: patrol assignment location and officers' sex. Officers assigned to high drug use areas were more likely to report extrajudicial arrest for syringe possession (Chapter 3), had less favorable views on the occupational impact of SSP and MMT (Chapter 4), and were less willing to indicate SSP or addiction treatment services as targets of PWID referrals (Chapter 4). This is consistent with previous work among this context suggesting that harmful policing practices are largely clustered into high drug-use neighborhoods along the Tijuana River canal, where injection drug use and homelessness are highly present and visible.[24, 94, 115, 128] It may be that repetitive interactions with PWID in neighborhoods with high-visibility drug use lead to negative attitudes towards PWID and related essential services.

Its also possible that police burnout[129, 133] may play an outsized role among police assigned to these areas, resulting in negative attitudes and behaviors that may

be less common among their counterparts in spaces with less prevalent drug use. Policing in these areas may also present an elevated risk of occupational hazards such as needlestick injury, a factor associated with harmful police practices like syringe confiscation and negative attitudes toward harm reduction services such as SSP.[130] While further examination is warranted on the effect of high-drug use neighborhoods, future public health research and interventions to reduce the public health harms of drug law enforcement should account for this phenomenon.

This dissertation contributes to a growing body of evidence demonstrating that female officers conduct their policework more in line with public health than their male counterparts.[50, 53, 54, 125, 134] Chapter 2 demonstrated that female officers were about 50% less likely to report extrajudicial arrest for syringe possession, 24 months after SHIELD training, even after controlling for patrol and district assignment. This is consistent with previous research showing that female officers may have better knowledge and learning outcomes than their male counterparts[53, 54] and apply more appropriate force in terms of suspect interactions, arrests and physical altercations[50, 98, 99, 125, 135]. Female officers in the SHIELD cohort were also less likely to confiscate syringes after controlling for district assignment and work experience.[50, 125] These positive policing attributes demonstrated by female officers, taking into account their underrepresentation in law enforcement[136], support the argument that police diversity is a law enforcement and public health priority that could improve health outcomes for the police force and the community.[137]

For HIV prevention and harm reduction service delivery operations, it is important to account for police interruptions and potential harassment of clientele. The

effectiveness of harm reduction services is proportional to PWID self-efficacy to access these sites without fear or experience of a negative encounter with police. Consistent with published qualitative and GIS research[24, 94, 115, 128], findings from Aim 1 provide a synthesis of quantitative evidence showing that police exposures are associated with and contribute to harm reduction avoidance among PWID.[89] However, findings from Aim 3 suggest a potential opportunity to address and improve police harassment around harm reduction facilities. It was found that police willingness to refer PWID to services like SSP and drug addiction treatment depends, at least in part, on officer-held beliefs about the occupational impact of such services. This is consistent with recent qualitative research among police which suggests that demystifying and educating police about harm reduction operations such as safe consumption sites could improve relationships between police and harm reduction programs.[127] While further research on this issue is warranted, it is logical to hypothesize that occupational beliefs about such services may inform officer behaviors around harm reduction sites and their clientele. It may benefit such programs to dispel myths and promote the idea that harm reduction services are consistent with police objectives, crime reduction and occupational safety in particular.

In addition to attitudes and beliefs, the occupational experiences of police officers are also relevant to harm reduction program effectiveness and PWID health. A recent study found that officers who had previously experienced an occupational needlestick injury were more critical of SSPs.[130] Prior research with this cohort found that officers with previous experience of needlestick injury were more likely to confiscate syringes from PWID.[48] Thus, needlestick prevention among police is an issue relevant to harm

reduction program effectiveness and PWID health, in addition to police occupational safety. Police training with the SHIELD model is a relevant intervention as it provides a platform to address police occupational safety in the form of needlestick prevention[126] in addition to modifiable police factors like knowledge of formal law and attitudes towards essential services for PWID. While harm reduction and HIV prevention efforts may function most effectively in the complete absence of law enforcement, the well-being and role of police cannot be ignored.

## **FUTURE DIRECTIONS**

There are rich opportunities for future research at the intersection of drug law enforcement and infectious disease. First, this dissertation was focused on police practices most relevant for HIV prevention and injection-related practices. However, research in Tijuana and abroad has suggested that police practices may also influence a number of positions along the HIV continuum of care for PWID including HIV testing, access to antiretroviral therapy, and adherence[138, 139]. For example, people living with HIV in Ukraine report frequent police interference resulting in significant interruptions to medication adherence including antiretroviral therapy and opioid agonist therapy.[140] Additional work could be done to synthesize global literature on the impact of drug law enforcement and harmful police practices along the HIV continuum of care for PWID.

The problem of abusive policing is further complicated by pre-existing structural vulnerability among PWID. Mixed methods research in the United States has found that, in addition to the direct risks that these factors may present to PWID, experiencing homelessness, involvement in sex work, and living in a rural zip code are independently



associated with police abuse.[141] Further, this structural vulnerability to harmful policing is highly intersectional (with regards to race, class, gender, occupation and other aspects of identity), with higher degrees of vulnerability associated with increased odds of experiencing police abuse.[141] Therefore, future interventions to protect vulnerable groups such as PWID should incorporate systems to measure, prevent and respond to abusive policing.

Future work on drug law enforcement and/or PWID vulnerability must do more to account for the outsized role of race and ethnicity in shaping police-PWID interactions that produce harm. This is especially true in places like the United States where policing and racism are mutually constitutive as black populations disproportionately experience brutality stemming from the war on drugs in a myriad of forms.[142-144] A requisite de-escalation and discontinuation of aggressive tactics like stop and frisk and deployment of tactical teams to address low-level drug offenses is warranted given their futility in reducing street-level drug activity while causing disparate harm to minorities.[145-149] Legal, social, and economic interventions are warranted to mitigate the impact of racist policing and protect vulnerable PWID. Future research and public health interventions among police, including training with adapted SHIELD model, must address issues of race and racism.

Future research evaluating policing exposures and PWID outcomes should also work to standardize key constructs and variables. The systematic review (Chapter 2) demonstrated the wide heterogeneity of measurements, including timeframes, found in the published literature. For example, policing exposures related to syringes ranged from very broad constructs with wide timeframes (e.g. “police confiscated injecting

equipment”, “ever”) to specific constructs with narrow timeframes (e.g. “confiscation of sterile syringes”, “previous 6 months”). The same heterogeneity in terms of construct variability and reporting timeframes was identified among the PWID outcomes reported in the literature (e.g. “syringe sharing”, “ever”; vs. “receptive syringe sharing”, “last month”). Construct harmonization could add value to this line of research and pave the way for future meta-analysis. Additionally, a standardized scale to measure police attitudinal factors relevant to HIV and PWID health would greatly benefit future research among drug law enforcement.

While some of the literature examined had collected data on key sociodemographic characteristics, some studies lacked detailed information on race, sex and gender. Inclusion of key variables for race and sex, including transgender populations, is critical to future research analyzing attitudes and behaviors among police as well as health outcomes using PWID as the unit of analysis. While some modeling and mixed methods research has sought to assess the health impact of policy reform among PWID in Tijuana[91, 100, 150], additional work is required to identify the impact of the SHIELD training on relevant PWID outcomes. This dissertation is consistent with recent literature showing how police interventions like the SHIELD training can result in sustained improvements in officers’ knowledge and behavior. Yet, future work is warranted to triangulate and measure the community health benefit of police training. Additionally, future work could examine the potential for officer-led referrals to connect PWID to evidence-based harm reduction services in lieu of coerced detoxification or introduction to carceral settings.

## LIMITATIONS

This dissertation has notable strengths but is not without limitations. First, much of this work relied on the collection of self-reported data. Some of the reviewed literature in Chapter 2 relied on self-reported serostatus and HIV risk behavior data from PWID, whereas the data from Chapter 2 and 3 relied on self-reported data on police behavior. It's possible that social desirability bias might have influenced how police or PWID completed the survey responses, skewing self-reported attitude and behavior responses towards what respondents assumed were more socially desirable to the researchers. However, the SHIELD study (and many of the studies included in the systematic review in chapter 2) utilized self-administered surveys to in order reduce social desirability bias. Also, many of the included studies in Chapter 1 with self-reported data on HIV infection among PWID also implemented confirmatory HIV testing, mitigating social desirability bias with regards to serostatus reporting.

The findings related to Chapters 2 and 3 are limited to municipal police officers in the context of the SHIELD police training in Tijuana, Mexico. Thus, these findings may have limited generalizability to police in other geographic locales, socioeconomic settings or assignments at different levels of jurisdiction (local state, federal, etc). However, the systematic review (Chapter 1) identified deleterious law enforcement behaviors common among officers from widely variable settings, suggesting this phenomenon is generalized and not limited to certain contexts.

It's important to emphasize that the SHIELD training intervention was administered to all municipal police through routine departmental training, thus, the intervention itself was not randomized. Therefore, no inferences regarding causality can

be determined. The longitudinal cohort, however, was allocated and randomized for follow-up. While it's possible that there was some systematic difference among officers who refused to participate in or were lost to follow up, very high participation and retention rates for the follow-up cohort suggest this was not an issue.

## **CONCLUSIONS**

Chapter 1 highlighted global research on PWID demonstrating the scope of the problem of problematic drug law enforcement. Chapter 2 findings suggest SHIELD training may be a useful public health tool improve officers' legal knowledge and reduce harmful behaviors like extrajudicial arrest for syringe possession that harm PWID human rights and HIV risk. Chapter 3 identified officer characteristics associated with support for PWID referral to harm reduction services. Together, these analyses support and illustrate the following summary conclusions. Street interactions between police and PWID negatively impact public health and should be averted whenever possible. When unavoidable, the impact of such interactions can and must be shifted from sources of substantial harm, towards reduced harm, and even to potentially positive outcomes. Police training, despite its many limitations, is a useful platform to study policing as a structural determinant of HIV risk and holds potential for improving police-PWID interactions by targeting key pathways to behavioral change.

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## APPENDIX A. LITERATURE REVIEW DATABASE SEARCH TERMS

DATABASE	SEARCH STRINGS
<p><b>PubMed</b></p> <p><b>Dates Searched:</b> <b>10/22/2017 – 04/02/2018</b></p> <p><b>Number of Results: 2,935</b></p>	<p>1. ((((((("People who inject drugs"OR "Injection drug users" OR "Injecting drug users" OR PWID OR IDU OR inject drugs[tw] OR injection drug use[tw] OR substance abuse[tw] OR injecting drug use[tw] OR intravenous drug use*[tw] OR injection drug use*[tw] OR injector[tw] OR IVDU[tw] OR injecting drug abuse[tw] OR injection drug abuse[tw] OR shooting gallery[tw] OR parenteral*[tw])) AND (Police[Mesh] OR "Law Enforcement"[Mesh] OR police*[tw] OR policing[tw] OR "law enforcement"[tw] OR "law enforcement officer"[tw] OR officer*[tw] OR cop[tw] OR structural determinant*[tw] OR structural factor*[tw] OR "criminal justice"[tw] OR "drug policy"[tw] OR "Social Justice"[Mesh] OR "Civil Rights"[Mesh] OR justice[tw] OR civil right*[tw] OR "Human Rights"[Mesh] OR "crime prevention"[tw] OR decriminali*[tw])) AND ( "1981/01/01"[PDat] : "2017/12/31"[PDat] ))) AND ( "1981/01/01"[PDat] : "2017/12/31"[PDat] ))</p>
<p><b>Sociological Abstracts</b></p> <p><b>Dates Searched:</b> <b>04/27/2018 – 06/26/2018</b></p> <p><b>Number of Results: 909</b></p> <p><b>After Removing Duplicates: 857</b></p>	<p>1. SU.EXACT ("injection drug use") OR SU.EXACT("People who inject drugs") OR SU.EXACT("Injection drug users") OR SU.EXACT("Injecting drug users") OR PWID OR IDU OR SU.EXACT("inject drugs") OR SU.EXACT("substance abuse") OR SU.EXACT("injecting drug use") OR SU.EXACT("intravenous drug use") OR SU.EXACT("injection drug use") OR injector OR IVDU OR SU.EXACT("injecting drug abuse") OR SU.EXACT( "injection drug abuse") OR SU.EXACT( "shooting gallery") OR parenteral</p> <p>2. SU.EXACT("Law Enforcement") OR police OR policing OR SU.EXACT("law enforcement") OR SU.EXACT("law enforcement officer") OR officer* OR cop OR</p>

	<p>SU.EXACT("structural determinant")  OR SU.EXACT( "structural factor") OR  SU.EXACT( "structural factors") OR  SU.EXACT( "criminal justice") OR  SU.EXACT( "drug policy") OR  SU.EXACT( "Social Justice") OR  SU.EXACT("Civil Rights") OR justice  OR SU.EXACT("civil right") OR  SU.EXACT( "Human Rights") OR  SU.EXACT("crime prevention") OR  decriminali*</p> <p><b>3. #1 AND #2</b></p>
<p><b>Embase</b></p> <p><b>Dates Searched:</b></p> <p><b>06/30/2018 – 09/14/2018</b></p> <p><b>Number of Results: 3,040</b></p> <p><b>After Removing Duplicates: 1,717</b></p>	<p><b>1.</b> "injection drug use" OR "People who inject drugs" OR "Injection drug users" OR "Injecting drug users" OR PWID OR IDU OR "inject drugs" OR "substance abuse" OR "injecting drug use" OR "intravenous drug use" OR "injection drug use" OR injector OR IVDU OR "injecting drug abuse" OR "injection drug abuse" OR "shooting gallery" OR parenteral OR (inject* NEXT/1 drugs) OR (intravenous NEXT/1 drugs):ab,ti</p> <p><b>2.</b> "police"/exp OR "law enforcement"/exp OR "criminal justice"/exp OR (policing OR "law enforcement" OR "law enforcement officer" OR officer* OR cop OR "structural determinant" OR "structural factor" OR "structural factors" OR "criminal justice" OR "drug policy" OR "Social Justice" OR "Civil Rights" OR justice OR "civil right" OR "Human Rights" OR "crime prevention" OR decriminali*):ab,ti</p> <p><b>3.</b> (1981:py OR 1982:py OR 1983:py OR 1984:py OR 1985:py OR 1986:py OR 1987:py OR 1988:py OR 1989:py OR 1990:py OR 1991:py OR 1992:py OR 1993:py OR 1994:py OR 1995:py OR 1996:py OR 1997:py OR 1998:py OR 1999:py OR 2000:py OR 2001:py OR 2002:py OR 2003:py OR 2004:py OR 2005:py OR 2006:py OR 2007:py OR 2008:py OR 2009:py OR 2010:py OR 2011:py OR 2012:py OR 2013:py OR 2014:py OR 2015:py OR 2016:py OR 2017:py OR 2018:py)</p> <p><b>4. #1 AND #2 AND #3</b></p>

<p><b>PsycInfo</b></p> <p><b>Dates Searched:</b> <b>09/30/2018 – 10/20/2018</b></p> <p><b>Number of Results: 1,067</b></p> <p><b>After Removing Duplicates: 723</b></p>	<ol style="list-style-type: none"> <li>1. "injection drug user" OR "injecting drug" OR "intravenous drug" OR "injecting drugs" OR "intravenous substance" OR "people who inject drugs" OR "inject drugs" OR "injection drug use" OR "shooting gallery" OR "parenteral drug use" exp intravenous drug abuse/ OR exp intravenous drug use/ OR exp injection drug use/ OR IDU\$1 OR IVDU\$1 OR PWID\$1</li> <li>2. "Law Enforcement" OR police OR policing OR "law enforcement" OR "law enforcement officer" OR officer* OR cop OR "structural determinant" OR "structural factor" OR "structural factors" OR "criminal justice" OR "drug policy" OR "Social Justice" OR "Civil Rights" OR justice OR "civil right" OR "Human Rights" OR "crime prevention" OR exp law enforcement/ OR exp criminal justice</li> <li>3. #1 AND #2</li> </ol>
<p><b>SocINDEX</b></p> <p><b>Dates Searched:</b> <b>11/02/2018 – 11/12/2018</b></p> <p><b>Number of Results: 461</b></p> <p><b>After Removing Duplicates: 251</b></p>	<ol style="list-style-type: none"> <li>1. ("injection drug user" OR "injecting drug" OR "intravenous drug" OR "injecting drugs" OR "intravenous substance" OR "people who inject drugs" OR "inject drugs" OR "injection drug use") OR ("shooting gallery") OR ("parenteral drug use") OR (IDU OR IVDU OR PWID)</li> <li>2. ("Law Enforcement" OR police OR policing OR "law enforcement" OR "law enforcement officer" OR officer* OR cop) OR ("structural determinant" OR "structural factor" OR "structural factors") OR ("criminal justice") OR ("drug policy") OR SU("Social Justice" OR "Civil Rights" OR justice OR "civil right" OR "Human Rights" OR "crime prevention")</li> <li>3. #1 and #2</li> </ol>
<p><b>Human Rights Watch</b></p> <p><b>Dates Searched:</b> <b>12/09/2018 – 12/13/2018</b></p> <p><b>Number of Results: 24</b></p>	<ol style="list-style-type: none"> <li>1. "intravenous drug" OR "injection drug user" OR "people who inject drugs" and "criminal justice" OR "law enforcement" OR police</li> </ol>

<b>After Removing Duplicates: 24</b>	
<b>Amnesty International</b>  <b>Dates Searched:</b> <b>12/13/2018 – 12/14/2018</b>  <b>Number of Results: 15</b>  <b>After Removing Duplicates: 15</b>	1. "intravenous drug" OR "injection drug user" OR "people who inject drugs" and "criminal justice" OR "law enforcement" OR police

**APPENDIX B. DATA EXTRACTION AND CODING FORM**

**Study ID**

**Date**

\_\_\_\_\_

\_\_\_\_\_

**Initials of coder:** \_\_\_\_\_

**Decision on Data Abstraction (check one):**

Valid association between policing practices and HIV serostatus/risk behaviors among PWID \_\_\_\_\_ (eligible)

No valid association between policing practices and HIV serostatus/ risk behaviors among PWID \_\_\_\_\_ (ineligible)

Invalid study design (modeling, cost-effectiveness, ecological)\_\_\_\_\_ (ineligible)

No disaggregation between PWID and Non-PWID\_\_\_\_\_ (ineligible)

Qualitative data only \_\_\_\_\_ (ineligible)

**I. MANUSCRIPT DETAILS**

(1) First Author: \_\_\_\_\_  
title: \_\_\_\_\_

(2) First five words of

(3) Year published: \_\_\_\_\_

(4)

Journal: \_\_\_\_\_

**II. STUDY CHARACTERISTICS**

**a. Dates data collected:** \_\_\_\_\_  
**country:** \_\_\_\_\_

**b. Location (city,**

**c. Study population (circle all that apply):**

PWID Non-PWID FSW-PWID MSM-PWID FSW MSM

Other: \_\_\_\_\_

**d. Study design (circle one):**

Cross-sectional

Case control

Prospective cohort

Retrospective cohort

Randomized controlled trial      Ecological      Modeling      Economic Analysis  
Other: \_\_\_\_\_

**e. Name of study (if any):** \_\_\_\_\_

**f. Recruitment methods (select all that apply)**

Respondent driven sampling    Convenience sample    Snowball sampling  
Street outreach      Flyers/posted advertisements    Clinical outreach  
Mobile van      Other: \_\_\_\_\_

**g. Total sample size:** \_\_\_\_\_

**h. Analytical sample size:** \_\_\_\_\_

**i. HIV testing (circle all that apply):**

Rapid test      Blood draw (vein)      Dried blood spot      Confirmatory test

Self-report      No HIV test

**j. Sex**

Male: \_\_\_\_\_ (N,%)

Female: \_\_\_\_\_ (N,%)

Transgender: \_\_\_\_\_ (N,%)

**k. Race/ethnicity**

Race/ethnicity (1): \_\_\_\_\_ (N,%)

Race/ethnicity (2): \_\_\_\_\_ (N,%)

Race/ethnicity (3): \_\_\_\_\_ (N,%)

Race/ethnicity (4): \_\_\_\_\_ (N,%)



### III. HIV serostatus and risk behaviors (overall)

	A. Time frame (ever, past month, etc.)	B. N (%)
(1) HIV seroprevalence		
(2) HIV self-reported prevalence		
(3) HIV incidence		
(4) HCV prevalence		
(5) HCV incidence		
(6) HIV/HCV co-infection		
(7) Shared syringe		
(8) Shared syringe at last injection		
(9) Receptive syringe sharing		
(10) Distributive syringe sharing		
(11) Shooting gallery attendance		
(12) Syringe exchange program attendance		
(13) Safe injection facility attendance		
(14) OST attendance		
(16) Frontloaded or backloaded syringe		
(17) Other:		

#### IV. Policing behaviors (overall)

	A. Time frame (ever, past month, etc.)	B. N (%)
(1) Clean syringe confiscated		
(2) Used syringe confiscated		
(3) Stopped		
(4) Arrested		
(5) Arrested for syringe possession		
(6) Arrested near syringe exchange program		
(7) Arrested near pharmacy		
(8) Arrested near OST clinic		
(9) Arrested for planted drugs		
(10) Beaten/hit		
(11) Paid police a bribe		
(12) Detained but not arrested by police		
(13) Other harassment		
(14) Referral to voluntary drug treatment or other health program		
(15) Referral to compulsory drug treatment or other health program		
(16) Didn't buy syringes due to fear		
(17) Avoided carrying syringes due to fear		
(18) Planted drugs		
(19) Police forced to buy back syringe		
(20) Police confiscation of ART and/or other medications		
(21) Rushed injection due to police presence		

**V. HIV risk by policing behaviors (frequencies only)**

**NB: Row number must align with row number in Table IV!**

	HIV seroprev	HIV self-reported	HIV incidence	Shared syringe	Shared syringe	Receptive syringe	Distributive	Shooting gallery	Syringe exchange	Safe injection	OST attendan	Shared injecting	Frontloading	Other
<b>1</b>														
<b>Comp.</b>														
<b>Ref</b>														
<b>2</b>														
<b>Comp.</b>														
<b>Ref</b>														
<b>3</b>														
<b>Comp.</b>														
<b>Ref</b>														
<b>4</b>														
<b>Comp.</b>														
<b>Ref</b>														
<b>5</b>														
<b>Comp.</b>														
<b>Ref</b>														
<b>6</b>														
<b>Comp.</b>														
<b>Ref</b>														
<b>7</b>														
<b>Comp.</b>														
<b>Ref</b>														
<b>8</b>														
<b>Comp.</b>														
<b>Ref</b>														
<b>9</b>														
<b>Comp.</b>														
<b>Ref</b>														
<b>10</b>														
<b>Comp.</b>														
<b>Ref</b>														
<b>Notes/comments (specify comparator and referent groups)</b>														

**VI. HIV risk by policing behaviors (unadjusted odds ratio only and 95% CI)**

**NB: Row number must align with row number in Table IV!**

	HIV seroprev	HIV self-reported	HIV incidenc	Shared syringe	Shared syringe	Receptiv e	Distributi ve	Shooting gallery	Syringe exchange	Safe injection	OST attendan	Shared injectin	Frontloadin	Or
<b>1</b>														
<b>Comp.</b>														
<b>Ref</b>														
<b>2</b>														
<b>Comp.</b>														
<b>Ref</b>														
<b>3</b>														
<b>Comp.</b>														
<b>Ref</b>														
<b>4</b>														
<b>Comp.</b>														
<b>Ref</b>														
<b>5</b>														
<b>Comp.</b>														
<b>Ref</b>														
<b>6</b>														
<b>Comp.</b>														
<b>Ref</b>														
<b>7</b>														
<b>Comp.</b>														
<b>Ref</b>														
<b>8</b>														
<b>Comp.</b>														
<b>Ref</b>														
<b>9</b>														
<b>Comp.</b>														
<b>Ref</b>														
<b>10</b>														
<b>Comp.</b>														
<b>Ref</b>														
<b>Notes/comments (specify comparator and referent groups)</b>														

**VII. HIV risk by policing behaviors (adjusted odds ratio only and 95% CI)**

**NB: Row number must align with row number in Table IV!**

	HIV seroprevalence	HIV self-reported	HIV incidence	Shared syringe	Shared syringe at	Receptive syringe	Distributive syringe	Shooting gallery	Syringe exchange	Safe injection	OST attendance	Shared injecting	Frontloading or backloading	Other
1														
Comp.														
Ref														
2														
Comp.														
Ref														
3														
Comp.														
Ref														
4														
Comp.														
Ref														
5														
Comp.														
Ref														
6														
Comp.														
Ref														
Notes/comments (for multivariable models, specify other variables that were adjusted)														

## APPENDIX C. ASSESMENT OF BIAS & QUALITY RATING FORM

### Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies

Criteria	Yes	No	Other (CD, NR, NA)*
1. Was the research question or objective in this paper clearly stated?			
2. Was the study population clearly specified and defined?			
3. Was the participation rate of eligible persons at least 50%?			
4. Were all the subjects selected or recruited from the same or similar populations (including the same time period)? Were inclusion and exclusion criteria for being in the study prespecified and applied uniformly to all participants?			
5. Was a sample size justification, power description, or variance and effect estimates provided?			
6. For the analyses in this paper, were the exposure(s) of interest measured prior to the outcome(s) being measured?			
7. Was the timeframe sufficient so that one could reasonably expect to see an association between exposure and outcome if it existed?			
8. For exposures that can vary in amount or level, did the study examine different levels of the exposure as related to the outcome (e.g., categories of exposure, or exposure measured as continuous variable)?			
9. Were the exposure measures (independent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?			
10. Was the exposure(s) assessed more than once over time?			
11. Were the outcome measures (dependent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?			
12. Were the outcome assessors blinded to the exposure status of participants?			
13. Was loss to follow-up after baseline 20% or less?			
14. Were key potential confounding variables measured and adjusted statistically for their impact on the relationship between exposure(s) and outcome(s)?			

Quality Rating (Good, Fair, or Poor)

Rater #1 initials:

Rater #2 initials:

Additional Comments (If POOR, please state why):

\*CD, cannot determine; NA, not applicable; NR, not reported

## Guidance for Assessing the Quality of Observational Cohort and Cross-Sectional Studies

The guidance document below is organized by question number from the tool for quality assessment of observational cohort and cross-sectional studies.

### Question 1. Research question

Did the authors describe their goal in conducting this research? Is it easy to understand what they were looking to find? This issue is important for any scientific paper of any type. Higher quality scientific research explicitly defines a research question.

### Questions 2 and 3. Study population

Did the authors describe the group of people from which the study participants were selected or recruited, using demographics, location, and time period? If you were to conduct this study again, would you know who to recruit, from where, and from what time period? Is the cohort population free of the outcomes of interest at the time they were recruited?

An example would be men over 40 years old with type 2 diabetes who began seeking medical care at Phoenix Good Samaritan Hospital between January 1, 1990 and December 31, 1994. In this example, the population is clearly described as: (1) who (men over 40 years old with type 2 diabetes); (2) where (Phoenix Good Samaritan Hospital); and (3) when (between January 1, 1990 and December 31, 1994). Another example is women ages 34 to 59 years of age in 1980 who were in the nursing profession and had no known coronary disease, stroke, cancer, hypercholesterolemia, or diabetes, and were recruited from the 11 most populous States, with contact information obtained from State nursing boards.

In cohort studies, it is crucial that the population at baseline is free of the outcome of interest. For example, the nurses' population above would be an appropriate group in which to study incident coronary disease. This information is usually found either in descriptions of population recruitment, definitions of variables, or inclusion/exclusion criteria.

You may need to look at prior papers on methods in order to make the assessment for this question. Those papers are usually in the reference list.

If fewer than 50% of eligible persons participated in the study, then there is concern that the study population does not adequately represent the target population. This increases the risk of bias.

#### Question 4. Groups recruited from the same population and uniform eligibility criteria

Were the inclusion and exclusion criteria developed prior to recruitment or selection of the study population? Were the same underlying criteria used for all of the subjects involved? This issue is related to the description of the study population, above, and you may find the information for both of these questions in the same section of the paper.

Most cohort studies begin with the selection of the cohort; participants in this cohort are then measured or evaluated to determine their exposure status. However, some cohort studies may recruit or select exposed participants in a different time or place than unexposed participants, especially retrospective cohort studies—which is when data are obtained from the past (retrospectively), but the analysis examines exposures prior to outcomes. For example, one research question could be whether diabetic men with clinical depression are at higher risk for cardiovascular disease than those without clinical depression. So, diabetic men with depression might be selected from a mental health clinic, while diabetic men without depression might be selected from an internal medicine or endocrinology clinic. This study recruits groups from different clinic populations, so this example would get a "no."

However, the women nurses described in the question above were selected based on the same inclusion/exclusion criteria, so that example would get a "yes."

#### Question 5. Sample size justification

Did the authors present their reasons for selecting or recruiting the number of people included or analyzed? Do they note or discuss the statistical power of the study? This question is about whether or not the study had enough participants to detect an association if one truly existed.

A paragraph in the methods section of the article may explain the sample size needed to detect a hypothesized difference in outcomes. You may also find a discussion of power in the discussion section (such as the study had 85 percent power to detect a 20 percent increase in the rate of an outcome of interest, with a 2-sided alpha of 0.05). Sometimes estimates of variance and/or estimates of effect size are given, instead of sample size calculations. In any of these cases, the answer would be "yes."

However, observational cohort studies often do not report anything about power or sample sizes because the analyses are exploratory in nature. In this case, the answer would be "no." This is not a "fatal flaw." It just may indicate that attention was not paid to whether the study was sufficiently sized to answer a prespecified question—i.e., it may have been an exploratory, hypothesis-generating study.

#### Question 6. Exposure assessed prior to outcome measurement



This question is important because, in order to determine whether an exposure causes an outcome, the exposure must come before the outcome.

For some prospective cohort studies, the investigator enrolls the cohort and then determines the exposure status of various members of the cohort (large epidemiological studies like Framingham used this approach). However, for other cohort studies, the cohort is selected based on its exposure status, as in the example above of depressed diabetic men (the exposure being depression). Other examples include a cohort identified by its exposure to fluoridated drinking water and then compared to a cohort living in an area without fluoridated water, or a cohort of military personnel exposed to combat in the Gulf War compared to a cohort of military personnel not deployed in a combat zone.

With either of these types of cohort studies, the cohort is followed forward in time (i.e., prospectively) to assess the outcomes that occurred in the exposed members compared to nonexposed members of the cohort. Therefore, you begin the study in the present by looking at groups that were exposed (or not) to some biological or behavioral factor, intervention, etc., and then you follow them forward in time to examine outcomes. If a cohort study is conducted properly, the answer to this question should be "yes," since the exposure status of members of the cohort was determined at the beginning of the study before the outcomes occurred.

For retrospective cohort studies, the same principal applies. The difference is that, rather than identifying a cohort in the present and following them forward in time, the investigators go back in time (i.e., retrospectively) and select a cohort based on their exposure status in the past and then follow them forward to assess the outcomes that occurred in the exposed and nonexposed cohort members. Because in retrospective cohort studies the exposure and outcomes may have already occurred (it depends on how long they follow the cohort), it is important to make sure that the exposure preceded the outcome.

Sometimes cross-sectional studies are conducted (or cross-sectional analyses of cohort-study data), where the exposures and outcomes are measured during the same timeframe. As a result, cross-sectional analyses provide weaker evidence than regular cohort studies regarding a potential causal relationship between exposures and outcomes. For cross-sectional analyses, the answer to Question 6 should be "no."

Question 7. Sufficient timeframe to see an effect

Did the study allow enough time for a sufficient number of outcomes to occur or be observed, or enough time for an exposure to have a biological effect on an outcome? In the examples given above, if clinical depression has a biological effect on increasing risk for CVD, such an effect may take years. In the other example, if higher dietary sodium increases BP, a short timeframe may be sufficient to assess its association with BP, but a longer timeframe would be needed to examine its association with heart attacks.

The issue of timeframe is important to enable meaningful analysis of the relationships between exposures and outcomes to be conducted. This often requires at least several years, especially when looking at health outcomes, but it depends on the research question and outcomes being examined.

Cross-sectional analyses allow no time to see an effect, since the exposures and outcomes are assessed at the same time, so those would get a "no" response.

#### Question 8. Different levels of the exposure of interest

If the exposure can be defined as a range (examples: drug dosage, amount of physical activity, amount of sodium consumed), were multiple categories of that exposure assessed? (for example, for drugs: not on the medication, on a low dose, medium dose, high dose; for dietary sodium, higher than average U.S. consumption, lower than recommended consumption, between the two). Sometimes discrete categories of exposure are not used, but instead exposures are measured as continuous variables (for example, mg/day of dietary sodium or BP values).

In any case, studying different levels of exposure (where possible) enables investigators to assess trends or dose-response relationships between exposures and outcomes—e.g., the higher the exposure, the greater the rate of the health outcome. The presence of trends or dose-response relationships lends credibility to the hypothesis of causality between exposure and outcome.

For some exposures, however, this question may not be applicable (e.g., the exposure may be a dichotomous variable like living in a rural setting versus an urban setting, or vaccinated/not vaccinated with a one-time vaccine). If there are only two possible exposures (yes/no), then this question should be given an "NA," and it should not count negatively towards the quality rating.

#### Question 9. Exposure measures and assessment

Were the exposure measures defined in detail? Were the tools or methods used to measure exposure accurate and reliable—for example, have they been validated or are they objective? This issue is important as it influences confidence in the reported exposures. When exposures are measured with less accuracy or validity, it is harder to see an association between exposure and outcome even if one exists. Also as important is whether the exposures were assessed in the same manner within groups and between groups; if not, bias may result.

For example, retrospective self-report of dietary salt intake is not as valid and reliable as prospectively using a standardized dietary log plus testing participants' urine for sodium content. Another example is measurement of BP, where there may be quite a difference between usual care, where clinicians measure BP however it is done in their practice setting (which can vary considerably), and use of trained BP assessors using standardized equipment (e.g., the same BP device which has been tested and calibrated) and a standardized protocol (e.g., patient is seated for 5 minutes with feet flat on the floor, BP is taken twice in each arm, and all four measurements are averaged). In each of these cases, the former would get a "no" and the latter a "yes."

Here is a final example that illustrates the point about why it is important to assess exposures consistently across all groups: If people with higher BP (exposed cohort) are seen by their providers more frequently than those without elevated BP (nonexposed group), it also increases the chances of detecting and documenting changes in health outcomes, including CVD-related events. Therefore, it may lead to the conclusion that higher BP leads to more CVD events. This may be true, but it could also be due to the fact that the subjects with higher BP were seen more often; thus, more CVD-related events were detected and documented simply because they had more encounters with the health care system. Thus, it could bias the results and lead to an erroneous conclusion.

#### Question 10. Repeated exposure assessment

Was the exposure for each person measured more than once during the course of the study period? Multiple measurements with the same result increase our confidence that the exposure status was correctly classified. Also, multiple measurements enable investigators to look at changes in exposure over time, for example, people who ate high dietary sodium throughout the followup period, compared to those who started out high then reduced their intake, compared to those who ate low sodium throughout. Once again, this may not be applicable in all cases. In many older studies, exposure was measured only at baseline. However, multiple exposure measurements do result in a stronger study design.

#### Question 11. Outcome measures

Were the outcomes defined in detail? Were the tools or methods for measuring outcomes accurate and reliable—for example, have they been validated or are they objective? This issue is important because it influences confidence in the validity of study results. Also important is whether the outcomes were assessed in the same manner within groups and between groups.

An example of an outcome measure that is objective, accurate, and reliable is death—the outcome measured with more accuracy than any other. But even with a measure as objective as death, there can be differences in the accuracy and reliability of how death was assessed by the investigators. Did they base it on an autopsy report, death certificate, death registry, or report from a family member? Another example is a study of whether dietary fat intake is related

to blood cholesterol level (cholesterol level being the outcome), and the cholesterol level is measured from fasting blood samples that are all sent to the same laboratory. These examples would get a "yes." An example of a "no" would be self-report by subjects that they had a heart attack, or self-report of how much they weigh (if body weight is the outcome of interest).

Similar to the example in Question 9, results may be biased if one group (e.g., people with high BP) is seen more frequently than another group (people with normal BP) because more frequent encounters with the health care system increases the chances of outcomes being detected and documented.

#### Question 12. Blinding of outcome assessors

Blinding means that outcome assessors did not know whether the participant was exposed or unexposed. It is also sometimes called "masking." The objective is to look for evidence in the article that the person(s) assessing the outcome(s) for the study (for example, examining medical records to determine the outcomes that occurred in the exposed and comparison groups) is masked to the exposure status of the participant. Sometimes the person measuring the exposure is the same person conducting the outcome assessment. In this case, the outcome assessor would most likely not be blinded to exposure status because they also took measurements of exposures. If so, make a note of that in the comments section.

As you assess this criterion, think about whether it is likely that the person(s) doing the outcome assessment would know (or be able to figure out) the exposure status of the study participants. If the answer is no, then blinding is adequate. An example of adequate blinding of the outcome assessors is to create a separate committee, whose members were not involved in the care of the patient and had no information about the study participants' exposure status. The committee would then be provided with copies of participants' medical records, which had been stripped of any potential exposure information or personally identifiable information. The committee would then review the records for prespecified outcomes according to the study protocol. If blinding was not possible, which is sometimes the case, mark "NA" and explain the potential for bias.

#### Question 13. Followup rate

Higher overall followup rates are always better than lower followup rates, even though higher rates are expected in shorter studies, whereas lower overall followup rates are often seen in studies of longer duration. Usually, an acceptable overall followup rate is considered 80 percent or more of participants whose exposures were measured at baseline. However, this is just a general guideline. For example, a 6-month cohort study examining the relationship between dietary sodium intake and BP level may have over 90 percent followup, but a 20-year cohort study examining effects of sodium intake on stroke may have only a 65 percent followup rate.

#### Question 14. Statistical analyses

Were key potential confounding variables measured and adjusted for, such as by statistical adjustment for baseline differences? Logistic regression or other regression methods are often used to account for the influence of variables not of interest.

This is a key issue in cohort studies, because statistical analyses need to control for potential confounders, in contrast to an RCT, where the randomization process controls for potential confounders. All key factors that may be associated both with the exposure of interest and the outcome—that are not of interest to the research question—should be controlled for in the analyses.

For example, in a study of the relationship between cardiorespiratory fitness and CVD events (heart attacks and strokes), the study should control for age, BP, blood cholesterol, and body weight, because all of these factors are associated both with low fitness and with CVD events. Well-done cohort studies control for multiple potential confounders.

Some general guidance for determining the overall quality rating of observational cohort and cross-sectional studies

The questions on the form are designed to help you focus on the key concepts for evaluating the internal validity of a study. They are not intended to create a list that you simply tally up to arrive at a summary judgment of quality.

Internal validity for cohort studies is the extent to which the results reported in the study can truly be attributed to the exposure being evaluated and not to flaws in the design or conduct of the study—in other words, the ability of the study to draw associative conclusions about the effects of the exposures being studied on outcomes. Any such flaws can increase the risk of bias.

Critical appraisal involves considering the risk of potential for selection bias, information bias, measurement bias, or confounding (the mixture of exposures that one cannot tease out from each other). Examples of confounding include co-interventions, differences at baseline in patient characteristics, and other issues throughout the questions above. High risk of bias translates to a rating of poor quality. Low risk of bias translates to a rating of good quality. (Thus, the greater the risk of bias, the lower the quality rating of the study.)

In addition, the more attention in the study design to issues that can help determine whether there is a causal relationship between the exposure and outcome, the higher quality the study. These include exposures occurring prior to outcomes, evaluation of a dose-response gradient,

accuracy of measurement of both exposure and outcome, sufficient timeframe to see an effect, and appropriate control for confounding—all concepts reflected in the tool.

Generally, when you evaluate a study, you will not see a "fatal flaw," but you will find some risk of bias. By focusing on the concepts underlying the questions in the quality assessment tool, you should ask yourself about the potential for bias in the study you are critically appraising. For any box where you check "no" you should ask, "What is the potential risk of bias resulting from this flaw in study design or execution?" That is, does this factor cause you to doubt the results that are reported in the study or doubt the ability of the study to accurately assess an association between exposure and outcome?

The best approach is to think about the questions in the tool and how each one tells you something about the potential for bias in a study. The more you familiarize yourself with the key concepts, the more comfortable you will be with critical appraisal. Examples of studies rated good, fair, and poor are useful, but each study must be assessed on its own based on the details that are reported and consideration of the concepts for minimizing bias.

Source: <https://www.nhlbi.nih.gov/health-topics/study-quality-assessment-tool>

**APPENDIX D. SUMMARY OF ELIGIBLE STUDIES AND BIVARIATE ASSOCIATIONS BETWEEN POLICE EXPOSURES AND HIV OUTCOMES (N=27)**

First Author (publication date)	Country, city	Sample Size	Policing exposure	Time frame	Outcome	Time frame	Bivariate association (OR, 95% CI)	Multivariable association (aOR, 95% CI)
Bluthenthal (1999)	USA, San Francisco	1257	Fear of arrest	ever	HIV Positive	Current	0.62 (0.42, 0.93)	-
			Fear of arrest	ever	Shared syringe Shared injection	last 30 days	4.80 (3.32, 6.94)	-
Rhodes (2004)	Russia, Togliatti City	426	Fear of arrest Police confiscated injecting equipment	ever	Receptive Syringe sharing	last 30 days	2.37, 1.86, 3.02)	-
			Arrested	ever	Receptive Syringe sharing	last 4 weeks	2.6 (1.5, 4.5)	-
			Arrested/detained for drugs	ever	Receptive Syringe sharing	last 4 weeks	2.1 (1.2, 3.8)	-
			Arrested for syringe possession (used)	last time arrested	Receptive Syringe sharing	last 4 weeks	3.2 (1.7, 6.1)	-
Pollini (2008)	Mexico, Tijuana and Ciudad Juarez	426	Arrested for syringe possession (sterile)	ever	Receptive Syringe Sharing	last 6 months	2.44 (1.14, 5.21)	-
			Stopped, searched or detained	ever	Receptive Syringe Sharing	last 6 months	4.31 (2.75, 6.73)	2.87 (1.76, 4.69) <sup>a</sup>
			Stopped, searched or detained	last 6 months	Receptive Syringe Sharing	last 6 months	2.87 (1.84, 4.49)	2.05 (1.26, 3.36) <sup>b</sup>
Werb (2008)	Canada, Vancouver	485	Stopped, searched or detained	last 6 months	Distributive syringe sharing	last 6 months	1.77 (0.70, 4.42)	-
			Any Arrest	last 6 months	Receptive syringe Sharing	last 6 months	5.66 (2.23, 14.36)	3.18 (1.09, 9.30) <sup>c</sup>
Flath (2017)	USA, Baltimore	367	Arrested	last 6 months	Receptive syringe Sharing	last 6 months	1.36 (0.85, 2.18)	-
			Stopped but not arrested	last 6 months	Receptive syringe Sharing	last 6 months	2.13 (1.32, 3.45)	-
			Syringe confiscated	last 6 months	Receptive syringe sharing	last 6 months	1.74 (1.07, 2.85)	-
Beletsky (2013)	Mexico, Tijuana and Ciudad Juarez	624	Syringe confiscated	last 6 months	Receptive syringe sharing	last 1 month	0.92 (0.67, 1.27)	-
			Syringe confiscated	last 6 months	Injected in public	last 1 month	1.74 (1.28, 2.41)	-
			Syringe confiscated	last 6 months	Injection help from hit doctor	last 1 month	1.15 (0.84, 1.59)	-
Booth (2013)	Ukraine, Odessa	200	Syringe confiscated New syringes confiscated Arrested for carrying syringes Didn't buy syringes for fear of police	months months ever	HIV Positive	Current	2.04 (1.00, 4.21)	2.54 (1.11, 5.80) <sup>d</sup>
				ever	HIV Positive	Current	5.5 (1.8, 16.6)	-
				ever	HIV Positive	Current	2.4 (0.9, 6.5)	-
				ever	HIV Positive	Current	3.3 (1.4, 7.6)	-



Belitsky (2014)	USA, New York City	500	Avoided carrying syringes due to fear Rushed injection due to police presence Pre-loaded syringes confiscated Police forced to buy back syringe Arrested for planted drugs Demanded bribe Detained Beaten or tortured	ever ever ever ever ever ever ever ever last 12 months last 12 months last 12 months last 12 months last 12 months	HIV Positive HIV Positive HIV Positive HIV Positive HIV Positive HIV Positive HIV Positive HIV Positive Less likely to use SEP Less likely to use SEP Receptive Syringe sharing Receptive Syringe sharing	Current Current Current Current Current Current Current Current last 12 months last 12 months last 12 months last 12 months	2.2 (1.1, 4.4) 20.6 (10.0, 42.7) 3.5 (1.9, 6.4) 2.9 (1.5, 5.4) 3.0 (1.3, 6.8) 1.4 (0.8, 2.5) 1.4 (0.8, 2.5) 3.1 (1.5, 6.5) 2.13 (1.47, 3.13) 1.64 (0.83, 3.23) 0.68 (0.46, 1.00) 1.67 (0.92, 3.04)	- 12.6 (5.4, 29.3) <sup>a</sup> - - - - - - 1.69 (1.12, 2.5) <sup>a</sup>
Hayashi (2013) [AIDS]	Thailand, Bangkok	435	Beaten by police Tested for drugs by police Beaten AND tested for drugs by police	ever ever ever	Syringe Sharing Syringe Sharing Syringe Sharing	ever ever ever	1.81 (1.06, 3.11) 2.17 (1.18, 3.99) 2.61 (1.46, 4.65)	1.82 (1.04, 3.20) <sup>a</sup> 2.00 (1.16, 3.45) 2.40 (1.35, 4.26)
Hayashi (2013) [BMC]	Thailand, Bangkok	639	Beaten by police Beaten by police Beaten by police Arrest for syringe possession/planted evidence Tested for drugs by police	ever ever ever ever ever	Syringe Sharing MMT Use HIV Positive Receptive needle sharing Avoid health care	ever ever current last 3 months ever	1.93 (1.52, 2.45) 1.74 (1.30, 2.33) 1.35 (1.08, 1.67) 1.68 (1.12, 2.53) 1.80 (1.10, 2.93)	- - - - -
Lunze (2014)	Russia, St. Petersburg	582	Beaten by police Rushed injection due to fear of police	ever ever	Avoid health care Avoid health care	ever ever	1.38 (0.90, 2.13)	-
Heath (2015)	Bangkok, Thailand	437	Arrested Avoided carrying syringes due to fear Clean syringe confiscated	ever ever ever	Risky Injection Behavior Risky Injection Behavior Risky Injection Behavior	last 1 month last 1 month last 1 month	2.29 (1.15, 4.59) 2.71 (0.66, 11.15) 1.49 (0.74, 3.02)	- - -
Michalopolous (2016)	Malaysia, Panang State	154		ever	Risky Injection Behavior	last 1 month	1.93 (1.01, 3.70)	-

Armenta (2015)	USA, San Diego	574	Planted drugs Police forced to buy back drugs Rushed injection due to police presence Police presence affected where to use drugs Worry about police arrest Arrest for syringe possession (sterile) possession (used) Arrest for syringe possession (sterile) Arrest for syringe possession (used)	ever ever ever ever ever ever ever ever ever ever	Risky Injection Behavior Risky Injection Behavior Pre-filled syringe use Pre-filled syringe use MMT Nonattendance Shooting gallery Shooting gallery Shooting gallery Shooting gallery Shooting gallery attendance attendance	last 1 month last 1 month ever ever recent last 6 months last 6 months last 6 months last 6 months last 6 months	1.08 (0.53, 2.19) 1.51 (0.75, 3.03) 2.63 (1.79, 3.86) 1.86 (1.31, 2.66) 12.0 (1.6, 92.3) 1.74 (.88, 3.10) 2.79 (1.51, 5.14) 2.74 (1.53, 4.92) 2.82 (1.58, 5.03)	- - - - - - - - - -
Strathdee (2008)	Mexico, Tijuana	1052	Arrested	ever	HIV Positive Syringe sharing (receptive)	Current	0.92 (0.38, 2.22)	-
Fairbairn (2006)	Thailand, Bangkok	238	Planted drugs Planted drugs Planted drugs	ever ever ever	Syringe sharing (distributive) MMT Use	ever ever ever	2.16 (1.27, 3.65) 2.06 (1.22, 3.48) 1.82 (1.10, 3.02)	- 2.08 (1.19, 3.66) <sup>g</sup> -
Strathdee (2011)	Mexico, Tijuana and Ciudad Juarez	620	Demanded bribe Syringes confiscated	ever last 6 months last 6 months	HIV Positive HIV Positive	Current Current	1.61 (0.73, 3.62) 2.38 (1.17, 4.81)	- -
Wagner (2013)	USA, Los Angeles	187	Received a citation Arrested	last 2 years* last 2 years*	Syringe sharing (receptive) Syringe sharing (receptive)	last 30 days last 30 days	1.51 (0.82, 2.79) 1.71 (0.93, 3.15)	- -
Shaw (2015)	Canada, Ottawa	270	Redzoned by police Stopped/search	ever ever	SIF use SIF use High dead-space syringe use	intended intended	2.33 (1.29, 4.20) 1.37 (0.75, 2.48)	- -
Rafful (2015)	Mexico, Tijuana	557	Arrested	ever last 6 months	SIF use High dead-space syringe use	ever	1.74 (1.11, 2.71)	1.84 (1.11, 3.07) <sup>g</sup>
Werb (2015)	Mexico, Tijuana	637	Paid police a bribe Sexual assault by police	ever last 6 months	OST attendance	last 6 months	1.07 (0.77, 1.50)	1.69 (1.02, 2.81) <sup>g</sup>
Kutsa (2016)	Ukraine (5 Cities)	1613	Sexual assault by police Physical assault by police	ever ever ever	HIV Positive OST attendance OST attendance	Current ever ever	1.48 (0.77, 2.82) 1.10 (0.68, 1.77) 1.48 (1.20, 1.82)	- - -
Lunze (2016)	Russia, St. Petersburg	228	Sexual assault by police	ever	Receptive Syringe	last 3 months	1.67 (0.88, 3.26)	-



## APPENDIX E. GLOBAL DISTRIBUTION OF COUNTRIES WITH REPORTED INJECTION DRUG USE AND MEASURED ASSOCIATIONS BETWEEN POLICE PRACTICES AND HIV SEROPREVALENCE BEHAVIOR

