

THE IMPACTS OF HIV-SPECIFIC CRIMINAL LAWS ON HIV SEROSTATUS
DISCLOSURE,
RISK BEHAVIORS, AND HIV TESTING

by

Shao-Chiu Juan

A Dissertation

Submitted to the University at Albany, State University of New York

In Partial Fulfillment of

The Requirements for the Degree of

Doctor of Philosophy

School of Criminal Justice

2018

ProQuest Number: 10982718

All rights reserved

INFORMATION TO ALL USERS

The quality of this reproduction is dependent upon the quality of the copy submitted.

In the unlikely event that the author did not send a complete manuscript and there are missing pages, these will be noted. Also, if material had to be removed, a note will indicate the deletion.



ProQuest 10982718

Published by ProQuest LLC (2019). Copyright of the Dissertation is held by the Author.

All rights reserved.

This work is protected against unauthorized copying under Title 17, United States Code
Microform Edition © ProQuest LLC.

ProQuest LLC.
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106 – 1346

Abstract

Before the advent of anti-retroviral therapy (ART), many states enacted and strictly enforced laws that criminalized HIV transmission. These laws were enacted to prevent HIV-infected individuals from knowingly transmitting the virus to the uninfected. Over the past two decades, however, questions have been raised regarding the effectiveness of HIV criminalization and its unintended consequences. For example, there is little evidence that the criminalization of HIV transmission has been effective in reducing the spread of the disease, particularly when compared to education and other prevention efforts. Moreover, stigmatization associated with criminalization may actually undermine public health efforts. The dissertation aims to assess these issues by asking whether HIV-specific criminal laws (HSCLs), at a state level, has served their purposes to promote HIV prevention by encouraging serostatus disclosure, reducing risk behaviors, and encouraging the testing for HIV.

Recent studies argued that HIV-specific criminal laws do not prevent HIV, have no effect on HIV self-disclosure, do not reduce HIV-related risk behaviors, and may undermine public health efforts by “detering” people from testing for HIV. However, methodological limits in previous research may limit the usefulness of study findings. Most studies were conducted in a single state or two locations, drew conclusions from individual-level data, and have not HSCLs examined how the impacts of HSCLs on risk behaviors may vary when considering the different components of the laws. Built on an ecological framework of Deterrence Theory, the current study will advance knowledge in this aspect by examining the extent to which HSCLs influence the likelihood of HIV serostatus disclosure, the likelihood of needle sharing, and the likelihood of HIV testing among people who inject drugs (PWID) and men who have sex with men (MSM).

The current study involves two stages. First, data were combined from multiple sources, including: (1) individual-level data collected from the Sexual Acquisition and Transmission of HIV Cooperative Agreement Program (SATHCAP) in three states (California, Illinois, and North Carolina); and (2) state-level data collected from official statistics, including Bureau of Justice Statistics' Federal Correctional Facilities (CSFCF), Federal Bureau of Investigation's Uniform Crime Reporting (UCR), and information on HSCLs extracted from Westlaw and LexisNexis.

In the second stage, mixed-effects logistic regression was performed to examine the contextual effects of HSCLs on three main outcomes: (1) HIV serostatus disclosure, (2) uptake of HIV testing, and (3) HIV-related risk behaviors (needle sharing, condomless sex), controlling for individual-level factors and other state-level factors which may confound HSCLs' effects.

The results show that generally, HSCLs have no significant effect on HIV serostatus disclosure among HIV-positive individuals, have no significant effect on risk behaviors among at-risk individuals, and have no significant effect on HIV testing among individuals who exhibit risk behaviors. For individuals who shared needles or had condomless sex, the presence of HIV law against sex worker is associated an increased likelihood (OR = 1.559, $p < .05$) of HIV testing; the presence of HIV law against needle sharing is associated with a lower likelihood (OR = 0.641, $p < .05$) of HIV testing when controlling for individual-level variables.

Creating an enabling environment for HIV prevention is important. To some extent, however, HIV criminalization against needle sharing may hamper the prevention efforts. The study provides critical insights on this issue by showing that HSCLs do not have a significant deterrent effect. Therefore, a rigorous reassessment of the laws is recommended.

TABLE OF CONTENTS

	Page
Chapter 1: INTRODUCTION	
HIV IN THE UNITED STATES	1
A. Prevalence of HIV/AIDS	4
B. Importance of HIV control and prevention	5
C. Transmission risks including condomless sex and needle sharing	6
D. Vulnerable populations	8
E. Prevention strategies	10
F. Advance in current HIV treatment	13
CRIMINAL LAWS AND HIV	14
A. An overview of HIV non-disclosure as a crime	14
A.1. The President Commission Report of 1988	16
A.2. The Ryan White CARE Act of 1990	17
B. HIV-specific criminal laws	18
B.1. Law against HIV non-disclosure in general	18
B.2. Law against HIV non-disclosure before sharing needles	20
B.3. Law against HIV non-disclosure for HIV infected sex workers	21
PROBLEMS POSED BY THE CRIMINALIZATION OF HIV NON-DISCLOSURE	21
A. Undermine recent public health efforts for HIV prevention	22
B. Punishment out of proportion: a non-evidenced based justice	23
C. Current debates: criminal intent, and the significant risk of HIV transmission	23

	Page
D. Looking for further evidence	25
D.1. Previous empirical studies	24
D.2. Knowledge gaps	26
Chapter 2: THEORETICAL FRAMEWORK	
DETERRENCE THEORY IN CRIMINOLOGY	28
A. Deterrence theory	29
A.1. General deterrence	29
A.2. Specific deterrence	30
B. Applications of deterrent theory on crimes	31
B.1. Deterrent effects of state laws on criminal behaviors	31
B.2. Ecological model of deterrence	32
B.2.1. State-level factors	33
B.2.2. Individual-level factors	35
C. Application of Deterrence Theory: To what extent HIV-specific criminal laws have been effective	35
Chapter 3. AIMS OF THE STUDY	
RESEARCH QUESTIONS	36
HYPOTHESES	36
METHODS	39
DATA AND SAMPLE	39

	Page
MEASUREMENT	41
A. OUTCOME VARIABLES	41
A.1. HIV serostatus disclosure to one’s main sexual partner	41
A.2. Needle-sharing behaviors	41
A.3. Condomless Sex	41
A.4. HIV testing	42
B. STATE-LEVEL FACTORS	42
B.1. HIV-specific criminal laws: Serostatus disclosure, needle sharing, prostitution	42
B.2. Capacity of the criminal justice system: number of inmates held, number of correctional facilities, total law enforcement employees	43
B.3. Violent crime rates	43
C. INDIVIDUAL-LEVEL FACTORS	43
C.1. Demographics: Age, gender, race/ethnicity, education, income, marital status, employment status, HIV status	44
C.2. Injecting drug use (IDU)	44
C.3. Men having sex with men (MSM)	44
STATISTICAL ANALYSIS	45
Chapter 4. RESULTS	
DESCRIPTIVE STATISTICS	47
HYPOTHESES	48

	Page
Chapter 5. DISCUSSION	
GENERAL CONCLUSIONS	53
LIMITATIONS OF THE STUDY	56
POLICY IMPLICATIONS	57
REFERENCES	62
TABLES	
Table 1. Empirical Studies Examining the Effect of HIV-Specific Criminal Laws on HIV Disclosure, Condomless Sex, and HIV Testing	80
Table 2. State Variations of HIV-Specific Criminal Laws	82
Table 3. HIV-Specific Criminal Laws in California, Illinois, and North Carolina	83
Table 4. Descriptive Statistics (Standard Deviation in Parentheses)	84
Table 5. Mixed-Effects Logistic Regression Models (Hypothesis 1), Odds Ratios	87
Table 6. Mixed-Effects Logistic Regression Models (Hypothesis 2), Odds Ratios	89
Table 7. Mixed-Effects Logistic Regression Models (Hypothesis 3), Odds Ratios	91
Table 8. Mixed-Effects Logistic Regression Models Controlling for State-Level Criminal Justice Variables, Odds ratios	93
Table 9. Mixed-Effects Logistic Regression Models Controlling for State-Level Criminal Justice Variables, Odds ratios	94
Table 10. Mixed-Effects Logistic Regression Models Controlling for State-Level Criminal Justice Variables, Odds ratios	95

	Page
Table 11. Mixed-Effects Logistic Regression Models Controlling for State-Level Criminal Justice Variables, Odds ratios	96

FIGURES

Figure 1. Theoretical Framework that Examines the Deterrent Effect of HIV-Specific Criminal Laws on Serostatus Disclosure, Risk Behaviors, and HIV Testing	97
Figure 2. Analytic Samples	98

APPENDIX

Table A. Total Number of HIV-Infected Persons Prosecuted or Sentenced in California, Illinois, and North Carolina	99
Figure A. Enactment of State HIV-Specific Criminal Laws in 33 States—1986-2011	100

Chapter 1

INTRODUCTION

HIV IN THE UNITED STATES

More than 1.2 million people in the United States are living with human immunodeficiency virus (HIV; Centers for Disease Control and Prevention [CDC], 2016a). Back to 1980s and early 1990s, HIV was still a deadly disease. According to CDC's report (2001), from 1981 to 1992 the accumulated number of AIDS (the acquired immune deficiency syndrome) diagnoses quickly rose to over 20,000 individuals, and approximately half of these individuals had died by 1992 (CDC, 2001). With the advance in medicine, HIV infection seems no longer a deadly threat. However, there were still 12,333 deaths in the year 2014 among people ever diagnosed as AIDS, and over half (6,721) of these deaths were directly attributed to the infection of HIV (CDC, 2016a). To date, people are still searching for a cure for HIV infection. Without early detection and treatment, however, AIDS—the end stage of HIV infection—is still a major cause of death.

Before the advent of anti-retroviral therapy (ART) in the mid-1990s, state criminal laws were created to punish HIV-infected individuals from knowingly transmitting the virus to the uninfected (Fritchie, 2015). When the disease seemed unstoppable in early days of the epidemic, criminalization of HIV transmission might have made sense, given that effective treatment was yet to be available. When those days are long gone, relics of the “HIV panic” persist, in outdated criminal laws that have not aligned with contemporary science.

For example, by 2014 at least thirty-two states had enacted HIV-specific criminal laws (HSCLs; Richardson, Golden, & Hanssens, 2015).¹ Most states have prosecuted people living with HIV (PLWH) for their failure to disclose HIV serostatus prior to having sex even when no HIV transmission has occurred, or the actual risk is negligible (e.g., spitting and biting; Richardson et al., 2015). Notably, the United States has risen to be a leading country prosecuting the largest number of PLWH (Bernard & Bennett-Carlson, 2012).

Nonetheless, criminalization of HIV-infected individuals for knowing transmission has presented special challenges in recent years. An increasing number of studies jointly argue that HIV criminalization fails to prevent the spread of HIV and may unintentionally undermine public health efforts by “detering” at-risk individuals from receiving HIV testing services (UNAIDS, 2012; Lazzarini, Galletly, Mykhalovskiy, Harsono, O’Keefe, Singer et al., 2013; Civil Rights Division, U.S. Department of Justice, 2014; The White House, 2015; Kesler, Kaul, Loutfy, Myers, Brunetta, Remis et al., 2018). For example, one large-scale study examining 2,013 men who have sex with men (MSM) across 16 U.S. states found that HIV criminal laws have little or even counterproductive effects on risk behaviors (Horvath et al., 2016). Another study conducted in New Jersey further showed that awareness of the law was not associated with prevention measures such as seropositive status disclosure or condom use; paradoxically, the fear of punishment by the laws may prohibit individuals from disclosing one’s seropositive status to their partner (Galletly, Glasman, Pinkerton, & DiFranceisco, 2012a). Moreover, the fear of future prosecution is associated with decreased willingness of HIV testing among at-risk individuals, which further increases one’s likelihood of HIV transmission (Kesler et al., 2018). In response to

¹ Based on the presence of HIV-specific laws and the severity of punishment, states laws can be divided into three general categories: (1) no HIV-specific criminal law, (2) HIV-specific criminal laws that do not criminalize low or negligible risk behaviors, and (3) HIV-specific criminal laws that criminalize low or negligible risk behaviors (Lehman, Carr, Nichol, Ruisanchez, Knight, Langford et al., 2014).

the controversy surrounding HIV criminal laws, lawmakers in several states call for repeal (e.g., California) or amendment (e.g., Illinois) of these laws (Bollag, 2017; Galletly, Lazzarini, Sanders, and Pinkerton, 2014), among which HIV criminal laws against sex workers have been successfully repealed in Colorado in the year 2016 (Law, 2016).

As such, there is a pressing need to reassess whether these laws have served their intended purposes. The usefulness of previous research is limited by methodological issues. These issues will be explained with more details in the literature review section. Here I provide a general overview: First, prior research on HSCLs has not been guided by criminological theories. Second, previous studies were often conducted in a single or two locations, drew conclusions merely from the individual-level data, and did not examine the nuances of the different HIV criminal laws enacted in different jurisdictions. Lastly, the state laws' effects may be confounded by other state-level factors, which have not been examined in previous research.

To fill these gaps, this dissertation will take a multilevel approach to assess the contextual effects of HSCLs on individual-level responses. Guided by Deterrence Theory, this study will combine individual-level data with state-level data of three states (California, Illinois, North Carolina). This multi-level approach will include state-level controls, which is not characteristic of previous research. The study findings generated from the study may substantially alter our view of HIV criminalization as a “deterrent” and lead to the reassessment of HIV-specific criminal laws.

The dissertation is organized into three chapters. Chapter 1 presents important information on HIV prevalence, transmission risk, prevention strategies, and current scientific advances in HIV treatment. This is followed by an overview of literature on HSCLs, a more detailed discussion of problems posed by HIV criminalization, along with the important findings

garnered from previous research. Knowledge gaps are also addressed, followed by research questions and corresponding hypotheses. Chapter 2 presents the ecological model used in deterrence research and describe the state-level and individual-level factors that will be controlled for in this study. This material helps to reinforce the argument that state-level factors, more or less, may shape human behaviors. Chapter 3 first describes the data and sample and then introduces the measures and analytic methods well-suited for modeling HSCLs' effects on three major outcomes, including serostatus disclosure to one's main sexual partner, risk behaviors (needle-sharing, condomless sex), and the testing for HIV. Chapter 4 presents the study findings. Finally, Chapter 5 summarizes the dissertation, discusses its findings and contributions, points out limitations of the current study, outlines directions for future research, and concludes with recommendations for HIV prevention and policy making. I will begin my introduction with the facts about HIV.

A. Prevalence of HIV/AIDS

The epidemic of HIV/AIDS has not been fully controlled. By the end of 2015, over 36 million people are living with HIV, among which 2.1 million people (5.7%) were newly infected with HIV in 2015 (World Health Organization, 2016; UNAIDS, 2017). In the United States, an estimated 44,073 people were newly diagnosed with HIV infection in 2014, and over 1.2 million people (1,242,000) were living with HIV (CDC, 2016a). It is estimated that 1 in 8 PLWH (12.5%) were still not aware of their infection (CDC, 2016ba). While HIV can affect anyone regardless of the gender, race, ethnicity, or sexual orientation, disproportionately males (81% of new HIV diagnoses), African Americans (44%), MSM (83%), and people who inject drugs (PWID; 6%) are most affected (CDC, 2016a).

In the meantime, the burden of HIV is not evenly distributed geographically. For example, the population rate of persons diagnosed with HIV infection in 2014 were highest in the South (18.5 persons per 100,000 people), up to 2,100 to 3,080 persons per 100,000 people in certain locations (CDC, 2016b). Given that the average rate of HIV infection was 13.9 persons per 100, 000 people in the nation, the rate was highest in District of Columbia (57.8), followed by Louisiana (30.4) and Florida (26.9; CDC, 2015a).² The geographic disparities in these rates imply that contextual factors such as state-level laws, policies, and demographics may play a role in determining the effectiveness of HIV prevention (Oldenburg, Perez-Brumer, Hatzenbuehler, Krakower, Novak, Mimiaga et al., 2015).³ Sure enough, we need to identify key populations most vulnerable to HIV infections so that appropriate strategies can be implemented to control and prevent the epidemic of HIV.

B. Importance of HIV control and prevention

The HIV epidemic is a serious concern all over the world. From cradle (mother-to-child transmission) to grave, HIV can impact every stage of one's life. While youth aged 13 to 24 accounted for more than 20% of new HIV diagnoses in 2014 (CDC, 2016c), HIV mostly affects people in their prime of life—adults aged 20 to 49 accounted for 60% of all PWLH in the United

² Three states will be examined in this study. The infection rates in California (14.3) and in North Carolina (14.3) were both above the national average, whereas the infection rate in Illinois (13.5) was relatively lower in 2014 (CDC, 2015a).

³ Oldenburg and colleagues (2015) conducted an anonymous online survey and found that a lower level of structural stigma (a composite variable that measures the density of same-sex couples per 1,000 households, the proportion of public high schools with Gay-Straight Alliances per state, state laws and policies related to sexual orientation discrimination, and public opinions toward homosexuality and citizenship rights for same-sex couples) was associated with a lower level of condomless anal sex (CAI; adjusted odds ratio = 0.97, 95% CI = 0.94-0.99) and a higher level of preventive actions (e.g., taking preventive medication before or after sex) among 5,455 HIV-positive men who have sex with men in the United States.

States (CDC, 2016a). HIV epidemic is so concentrated on the younger population that without effective prevention and control, the societal and personal costs incurred by HIV can be enormous.

Averting additional cases of infection is therefore a critical priority. To prevent new infections, the White House released the National HIV/AIDS strategy (NHAS) for the United States in July 2010 (Holtgrave, 2013). Guided by scientific evidence, the NHAS set forth potentially achievable goals for the year 2015. Realizing that “treatment is prevention,” a new goal has been added the updated version of NHAS that by 2020, prevention services for PLWH engaged in unprotected risk behavior should be provided via public health and social services, including increased access to healthcare, maintenance of viral suppression, and stable housing services (Holtgrave, 2013; U.S. Department of Health & Human Services, 2016a).

Interestingly, the NHAS does not include HIV criminal laws as a major mode of prevention strategy. Rather, one of its priorities is to create measures and annual reports to assess how “HIV-related stigma experienced by persons living with HIV (especially, to gauge how such experiences serve as barrier to entry into, or retention in, HIV care)” (Holtgrave, 2013). While criminal laws serve to create social stigma to deter individuals from committing a crime (Cook & Dickens, 2014), we know very little about the extent to which such deterrence and subsequent stigmatization may influence HIV control and prevention. Before a detailed description of the deterrence framework in Chapter 2, first we need to understand how HIV is transmitted, what measures can prevent HIV transmission, and scientific advances in the treatment for HIV.

C. Transmission risks including condomless sex and needle sharing

The risk of HIV transmission may vary by different routes and prevention measures. Recognizing this fact, in March 2014 the United States Department of Justice (DOJ) and CDC jointly announced that most HSCLs do not account for actual scientifically-supported risk reduction measures, such as the use of ART, pre-exposure prophylaxis⁴ (PrEP), or condom; and therefore, state criminal laws should be reexamined to ensure that existing policies reflect “contemporary understanding of HIV transmission routes and associated benefits of treatment” and “do not place unique or additional burdens on individuals living with HIV/AIDS” (Lehman, Carr, Nichol, Ruisanchez, Knight, Langford et al., 2014). However, many states laws also criminalize behaviors that pose either no or negligible risk for HIV transmission (United States Department of Justice Civil Rights Division, 2014). As a result, DOJ encourages states to reassess whether criminal laws align with current evidence regarding the transmission risk of HIV.

Is HIV merely a sexually transmitted infection (STI)? The answer is no. Individuals can transmit and get HIV through body fluids, including blood, breast milk, semen, pre-seminal fluids, rectal fluids, vaginal fluids; or through specific activities such as needle/syringe sharing, or having anal or vaginal sex without using a condom especially when not taking medicines to prevent or treat HIV (CDC, 2016e). The estimated probability of HIV transmission per 10,000 acts, by the ordering of transmission risk, is 9,250 for blood transfusion (95% CI 8,900-9,610), 2,260 for mother-to-child transmission (vertical transmission; 95% CI 1,700-2,900), 138 for receptive anal intercourse (95% CI 102-186) , 63 for needle-sharing injection drug use (95% CI 41-92), 23 for percutaneous needle stick (95% CI 0-46), 11 for insertive anal intercourse (95%

⁴ Pre-exposure prophylaxis (PrEP) is a medicine taken daily to lower one’s chance of getting infected by HIV (CDC, 2016d).

CI 4-28), 8 for receptive penile-vaginal intercourse (95% CI 6-11), and 4 for insertive penile-vaginal intercourse (95% CI 1-14), and extremely low for receptive/insertive oral sex (Patel, Borkowf, Brooks, Larsry, Lansky, and Mermin, 2014; White, Fox, Weber, Fidler, and Ward, 2014).

For sexual exposures, multiple prevention measures have been proven effective in reducing the transmission risk. For example, male circumcision, condom use, PrEP use, ART use, or a combined use of condom and ART can reduce the risk of sexually transmitted HIV by 50%, 80%, 92%, 96%, and 99.2%, respectively (Patel et al., 2014; CDC, 2015b). For people who inject drugs, the risk of HIV acquisition is reduced by 54% when enrolled in methadone maintenance treatment (MacArthur, Minozzi, Martin, Vickerman, Deren, Bruneau et al., 2012), and by 83.5% when taking PrEP nearly daily (CDC, 2015b). Of all these measures, a combined use of ART and condom is most effective against HIV transmission. Bearing this in mind, the next step we need to take is to identify the populations that are most vulnerable to the transmission of HIV.

D. Vulnerable populations

As mentioned earlier, HIV disproportionately affects certain populations. Back to the 1980s, HIV infection was once thought as a “gay disease.” After the first five cases of AIDS were reported in Los Angeles in June 1981, the greatest impact of this epidemic was among people who engaged in male-to-male sex (CDC, 2001). Shortly, the second at-risk group joined in: people who received blood transfusions could also acquire HIV. But it was not until 1985 that screening of the blood supply for HIV antibody was initiated, whereas the number of

intravenously acquired cases continued to increase and reached its peak of 1,098 in 1993 (CDC, 2001). Although condomless sex is the most common mode of HIV transmission, the act of needle/ syringe sharing among PWID can also spread the virus rapidly, which therefore became the second most common mode of transmission during the 1990s. By December 2000, 774,497 persons were diagnosed with AIDS and over half (448,060 persons) of these individuals had died (CDC, 2001).

Over time, people have realized that HIV is not a “gay disease.” Heterosexual contact can also transmit HIV. In 2014, for example, women have made up 19% (8,328) of new HIV diagnoses (44,073) in the United States, of which 87% (7,242) was acquired by heterosexual sex, and only 13% (1,045) by injection drug use (CDC, 2016f). When pregnant women are infected by HIV, the virus can be transmitted to the offspring at any stage of pregnancy. This mode of transmission is known as vertical transmission, perinatal HIV, or mother-to-child transmission (CDC, 2016g). The number of perinatally acquired HIV cases reached its peak of 901 in 1992 (CDC, 2001) and declined to 174 children in 2014 (CDC, 2016g). Among 4,998 American children who died of AIDS, almost all of them (91%) acquired HIV by perinatal transmission (CDC, 2016g).

African Americans are another vulnerable group mostly affected by HIV. Back to the early 1980s, most HIV cases occurred among whites (CDC, 2001). But by 1996, African Americans had taken the largest share of HIV infections (CDC, 2001). In 2014, African Americans still shared the heaviest burden of HIV of all racial/ethnic groups in the United States and made up 44% (19,540) of all people with new HIV diagnoses, 42% (5,128) of all women with new HIV diagnoses, 65% of all adolescents and adults who acquired HIV through perinatal transmission, and 42% of all people ever diagnosed with AIDS (CDC, 2016g; CDC, 2016h). The

number of HIV diagnoses is especially high among African American women when compared to women of other race/ethnicities (CDC, 2016h). Clearly, prevention strategies need to be comprehensive enough to address the specific needs of vulnerable populations.

E. Prevention strategies

Despite the grim picture of AIDS, HIV infection is now preventable. Preventive measures include the abstinence from sex, condom use, male circumcision, ART use, and two relatively new measures—post-exposure prophylaxis (PEP) and pre-exposure prophylaxis (Patel et al., 2014; CDC, 2015b). Antiretroviral drugs can also be used in the prevention of mother-to-child transmission of HIV (PMTCT; Wiegert, Dinh, Mushavi, Mugurungi, & Kilmarx, 2014).

Although abstinence from sex is the most reliable method to prevent disease transmission (Isler, Eng, Maman, Adimora, & Weiner, 2014), this approach is not always realistic in practice (Underhill, Montgomery, & Operario, 2007), especially in the face of basic human needs for intimacy and sex. Therefore, the major emphasis is usually placed on alternative measures.

First, a consistent use of condom can reduce the risk of per-act HIV transmission by 80% (95% CI 53%-92%; Patel et al., 2014). In other words, the probability of HIV infection is 1 out of every 5 condomless sex acts. While scientists have identified multiple factors related to condom use such as being unmarried, having a high-risk partner, access to condoms, possession of condoms, and one's intention to use condoms (Song, Calsyn, Doyle, Dierst-Davies, Chen, & Sorensen, 2009), however, the average rate of condom use among high-risk individuals seems to decline over time. One study examining 5,371 HIV-positive MSM in 21 cities of the United States found that condomless sex has increased from 19% in 2005 to 25% in 2014 among

seroconcordant couples (i.e., both partners are HIV positive), and from 15% to 19% among serodiscordant couples; and more alarmingly, this trend could not be explained by the use of ART (Paz-Bailey, Mendoza, Finlayson, Wejnert, Le, Rose et al., 2016). Ironically, the importance of condom use might be undermined by promoting alternative measures, such as the use of PrEP (Alaei, Paynter, Juan, & Alaei, 2016).⁵

Second, male circumcision reduces the risk of HIV transmission from females to males by 50% to 60% (Patel et al., 2014; Sgaier, Reed, Thomas, & Njeuhmeli, 2014; CDC, 2015b). This measure has garnered wide support in Africa for its cost-effectiveness because only one-time action is required to provide continuous benefits (Sgaier et al., 2014). It does not only prevent the transmission of HIV but also other sexually transmitted diseases (Tobian, Kacker, & Quinn, 2014) because foreskin is more susceptible to HIV infection for its vulnerable mucosa than other penile tissues (CDC, 2016i). Using a national probability samples of adults surveyed from 1999 through 2004, the National Health and Nutrition Examination Surveys (NHANES) found that 79% of males in the United States were circumcised, including 88% of White males, 73% of Black males, and 42% to 50% of males of other races/ethnicities (Introcaso, Xu, Kilmarx, Zaidi, & Markowitz, 2013; CDC, 2016i). Nonetheless, male circumcision alone cannot prevent HIV acquisition for receptive partners having condomless sex with a circumcised male living with HIV. As a result, it is not a one-size-fits-all solution, and must be coupled with other HIV prevention strategies.

Third, the arrival of ART saves lives and brings hope. The use of multiple antiretroviral drugs has rendered HIV preventable and treatable. This treatment is also called combination

⁵ One study found that condom does not provide significant protection against HIV infection when comparing MSM with consistent condom use to those who never used a condom (Smith, HerbstZhang, & Rose, 2015).

antiretroviral therapy (cART) or highly active antiretroviral therapy (HAART). It not only controls HIV infection, but also reduces the incidence of other HIV-related diseases, such as Karposi's sarcoma and a number of cancers (Cobucci, Lima, de Souza, Costa, de Mesquita Cornetta, Fernandes et al., 2015). Since 1996, cART has been widely available in the United States (Cobucci et al., 2015). With adequate treatment, the viral load becomes undetectable in the blood (called viral suppression), greatly reducing the probability of HIV transmission by 96% (Patel et al., 2015) and to almost zero risk (Rodger, Cambiano, Bruun, Vernazza, Collins, van Lunzen et al., 2016). An international study examining 1,763 serodiscordant couples at 13 sites in the United States and another 8 countries found that early treatment is associated with a 96% lower risk of sexual transmission (Cohen, Chen, McCauley, Gamble, Hosseinipour, Kumarasamy et al., 2016). In another study that followed 1,166 HIV serodiscordant couples at 75 clinics in 14 European countries, Rodger et al. (2016) found that condomless sex with HIV-positive partners who received cART gave a rate of 0% for within-couple HIV transmission during a follow-up of 1.3 years. In other words, ART is likely to provide a full benefit for HIV prevention.

Lastly, post-exposure and pre-exposure prophylaxis are actually a special case of cART. PEP means taking antiretroviral medicines as soon as possible (within 72 hours) after one's exposure to HIV; and PrEP means taking these medicines daily before the exposure (CDC, 2016j; CDC, 2016k). PEP can reduce the HIV transmission risk by 81% (CDC, 2016j), whereas a consistent use of PrEP can reduce the risk by 92% (CDC, 2016k). For PrEP, Truvada (a combination of emtricitabine and tenofovir) is the only ART approved by the Food and Drug Administration (FDA) since 2012, and it has to be taken daily in combination with other preventive measures to prevent sexually transmitted HIV (FDA, 2012).

F. Advance in current HIV treatment

ART has made HIV a treatable disease. Historically, antiretroviral medicines were first made available in 1990s and remain the cornerstone of HIV treatment and prevention. According to 2016 recommendations of the International Antiviral Society, ART should be started in all infected individuals with detectable viral load, regardless of CD4 cell count⁶ (Günthard, Saag, Benson, Del Rio, Eron, Gallant et al., 2016). Among 39 FDA-approved HIV medicines (FDA, 2016b),⁷ optimal initial regimen is a combined use of medicines that have two different mechanisms of action, such as nucleoside reverse transcriptase inhibitors (NTRIs) plus protease inhibitors (Günthard et al., 2016).

The benefit of ART is multifold. ART does not only control HIV but also enables infected individuals to live a long and healthy life. However, ART cannot cure HIV, which may explain why AIDS and HIV-related deaths still occur each year in the United States. For example, among 12,963 deaths of people ever classified as having AIDS in 2013, over half (6,955) of these deaths were directly caused by HIV infection (CDC, 2016a). To date, there is only one rare case in whom HIV infection has been cured after receiving bone marrow

⁶ CD4 cell count is a lab test to measure the number of CD4 T lymphocyte, a specific type of white blood cell that reflects the immune function; the CD4 count in healthy adults or adolescents ranges from 500 to 1,600 cells per cubic millimeter; the CD4 count of fewer than 200 cells per cubic millimeter is one of the indicators for a diagnosis of AIDS (Myers, Xia, Torian, Irvine, Harriman, Sepkowitz, et al., 2016; U.S. Department of Health & Human Services, 2016b).

⁷ Antiretroviral medicines can be divided into 9 categories: Nucleoside reverse transcriptase inhibitors (NRTIs), non-nucleoside reverse transcriptase inhibitors (NNRTIs), protease inhibitors (PIs), fusion inhibitors, entry inhibitors, integrase inhibitors, pharmacokinetic enhancers, and combination HIV medicines (FDA, 2016). Of 39 medicines, didanosine is the first available regimen, which was approved by FDA in 1991. More information is available at: <https://aidsinfo.nih.gov/education-materials/fact-sheets/21/58/fda-approved-hiv-medicines>

transplantation (Allers, Hütter, Hofmann, Loddenkemper, Rieger, Thiel et al., 2011).⁸ Before finding the cure, HIV-infected individuals still need ART to prevent disease progression and to sustain their life (Günthard et al., 2016).

In summary, science has made tremendous progress in treating HIV and understanding its route of transmission. In lieu of criminal punishment, however, Americans still face criminal prosecutions under state laws that fail to keep pace with the progress in science. It is now known that spitting and biting can barely transmit the virus. It is also known that sexual transmission of HIV is nearly impossible if the infected individual has an undetectable viral load or uses condom constantly. Clearly, science tells us that disclosure alone does not prevent the transmission of HIV. But most state criminal laws have not taken scientific evidence into consideration. To provide a better understanding of this critical issue, I will first give an overview of HSCLs, and then explain why these laws may undermine public health efforts.

CRIMINAL LAWS AND HIV

A. An overview of HIV non-disclosure as a crime

HIV is not the only STI whose carriers are criminalized for knowing exposure and transmission. Herpes Simplex Virus (HSV-2), for example, is a contagious virus that passes from person to person through direct sexual contact. While genital herpes seems to be so common that

⁸ An HIV-infected individual was cured of HIV after bone marrow transplantation (Allers et al., 2016). There was no HIV infection sign or viral replication even after discontinuation of ART, strongly suggesting reconstitution of immune function and a cure of HIV.

over two million Americans had been infected by it over the past 10 years (CDC, 2016k), back in the early 1980s it was still thought incurable, and hence, infected individuals might choose to file suit for “grievous bodily harm” inflicted by their sexual partners (Alexander, 1984). Although criminal sanctions against herpes are nowadays rarely invoked in the United States, individuals living in other countries may still face a sentence of over one-year imprisonment for reckless transmission (Roebuck, 2014).

People may ask why the transmission of HIV has been singled out as a “heinous” crime? In fact, HIV criminalization has its historical roots to the rise of AIDS cases in the early 1980s. After the first five cases of AIDS were reported in Los Angeles in June 1981 (CDC, 2001), the disease began to spread rapidly with the number of AIDS cases peaking at a rate of 150,000 per new cases per year in the mid-1980s. Because at this time the disease was still primarily a death sentence, its spread triggered public fear and panic. Before the advent of ART in the mid-1990s, imprisonment of the high-risk individuals—as a last resort for quarantine and isolation—was believed to be an effective way to prevent the wide spread of HIV. More or less, this approach seemed to target on particular populations already stigmatized in the society—namely MSM and PWID—for homosexual behaviors and illegal drug use that were seen as a violation of the norms held by many majority members of the society. Coupled with early-epidemic hysteria and banal racism, classism, and homophobia, to an unknown extent HSCLs may reinforce the social stigmatization of marginalized populations, creating obstacles for vulnerable individuals in obtaining treatment and prevention services that are essential to their health (Galletly & Pinkerton, 2006).

The punishment invoked by criminal laws can be harsh. Prior to 1986, states used to punish the knowing exposure of HIV as a crime equivalent to an assault or attempted murder

under the general criminal laws (Fritchie, 2015); however, these laws seemed to be ill suited and insufficient because the punishment was “too lenient” in assault cases. In response to this, legal reform took place. In 1988, the President Commission on the Human Immunodeficiency Virus Epidemic created a national HIV strategy, specifically addressing “the possible need to adopt a criminal statute specific to HIV” (ERIC Institute of Education Sciences, 1988; Fritchie, 2015).

A.1. The President Commission Report of 1988

To manage the HIV epidemic, twenty recommendations were made in the President Commission Report of 1988 (ERIC Institute of Education Sciences, 1988).⁹ Criminalization of HIV transmission was specifically addressed in the Section IV of Chapter Nine. And, as mentioned in its opening, “Extending criminal liability to those who knowingly engage in behavior which is likely to transmit HIV is consistent with the criminal law’s concern with punishing those whose behavior results in harmful acts. HIV infected individuals who knowingly conduct themselves in ways that pose a significant risk of transmission to others must be held accountable for their actions. Establishing criminal penalties for failure to comply with clearly set standards of conduct can also deter HIV-infected individuals from engaging in high-risk behaviors, thus protecting society against the spread of the disease” (Legal and Ethical Issues,

⁹ These recommendations include (1) replacement of the term “AIDS” with “HIV infection,” (2) early diagnosis, (3) increased HIV testing, (4) treatment of HIV infection as a disability under federal and state law, (5) legal protection of the privacy of HIV-infected persons, (6) immediate implementation of preventive measures such as confidential partner notification, (7) prevention and treatment of PWID (was called “intravenous drug abuse” in this report), (8) implementation of drug and alcohol abuse education programs, (9) establishment of federal and state scholarship and loan programs for nurses to engage in HIV healthcare, (10) expansion of the National Health Services Corps, (11) aggressive biomedical research, (12) equitable and cost-effective financing of HIV healthcare, (13) addressing the concerns for healthcare workers, (14) federal assurance of the safety of the blood supply, (15) undertaking all reasonable efforts to avoid blood transfusion, (16) development and implementation of education programs, (17) addressing the problem of HIV-infected babies, (18) addressing the problem of high-risk adolescents, (19) addressing ethical issues raised by the HIV epidemic, and (20) supporting and encouraging international efforts to combat the spread of HIV infection (ERIC Institute of Education Sciences, 1988).

1988). In other words, penalties for assault were thought to be too lenient and not tailored to the specific crime of knowing transmission of HIV.¹⁰

This report therefore encouraged states to adopt HSCLs. If the act of transmission was “the actual cause of victim’s death,” laws against non-disclosure might prohibit an infected person, without informing sexual partners of the infection, from having sexual intercourse. To prompt state legislatures to enact HIV disclosure laws, two years later the Congress issued Ryan White CARE Act of 1990 as one of the largest federally funded program for HIV/AIDS (Hoppe, 2015; Fritchie, 2015), providing incentives for states to adopt HSCLs.

A.2. The Ryan White CARE Act of 1990

The Ryan White Comprehensive AIDS Resources Emergency Act of 1990 (The Ryan White CARE Act¹¹ of 1990; United States Government Publishing Office, 1990) was made to provide financial assistance with low-income, uninsured, or under-insured patients. The Ryan White CARE Act mandated that the adequacy of HSCLs should be certified in all states to prosecute the knowing exposure of HIV (Fritchie, 2015; see Figure A in the Appendix for the timeline of HSCL enactment by state). To secure this largest federal funding, about half of the states had created an HIV-specific law by the year of 1993; advocates also argued that HIV-specific legislation serves the purpose of criminal punishment, defines specific illegal conducts, and avoids inappropriate application of general criminal laws (Fritchie, 2015).

¹⁰ The difference between intentional transmission and reckless transmission is hard to determine and often relies on the context and judgment made by legal professionals (Weait, 2007).

¹¹ This act was named in honor of Ryan White, a teenager infected with HIV due to a contaminated treatment for hemophilia; after diagnosis, he was later expelled from school, became an advocate for AIDS awareness, and died six years later after diagnosis (Dirk Johnson, 1990).

B. HIV-specific criminal laws

Attaching criminal sanctions to the knowing exposure to or the transmission HIV, especially in an era without ART, seemed to be a reasonable way to prevent the spread of HIV. Yet little evidence supports that these laws have been effective in reducing the incidence of HIV (Lazzarini et al., 2013; Galletly et al., 2014). Under criminal laws, an individual may be found guilty of knowingly exposing an unknowing partner to HIV. The infected person is thus punished if s/he knows s/he is infected and fails to protect others out of malicious intent or negligence.

Generally, current HSCLs fall into two broad categories: (1) crimes in which HIV status is the only factor that determines the culpability of knowing exposure or transmission; and (2) an existing crime in which greater punishment is imposed when the suspect is infected with HIV (e.g., enhanced penalties for prostitution offenses; Lazzarini et al., 2013). The first category can be further divided into two subcategories: (1) criminalization of an act of HIV exposure or transmission (e.g., sexual intercourse, donation of blood or body tissues); and (2) criminalization of needle-sharing behaviors among PWID (Richardson et al., 2015).¹² Regardless of the category, HSCLs demand HIV positive status to be disclosed before engagement in high-risk behaviors.

B.1. Law against HIV non-disclosure in general

¹² For a detailed list of HIV-specific criminal laws in each state, please see the report archived by the Center for HIV Law and Policy (Richardson et al., 2015).

Laws that criminalize HIV non-disclosure seek to deter infected individuals from engaging in the types of risky actions that would lead to the exposure of others to HIV (Gable, Gamharter, Gostin, Hodge, and Van Puymbroeck, 2007). These acts may range from sexual intercourse, and the donation of blood/tissue/organ, to acts posing little risk of HIV transmission such as biting or spitting.¹³

Under HSCLs, infected individuals may be prosecuted for engaging in condomless sex when knowing his/her positive status, but does not disclose HIV status to sexual partners (Richardson et al., 2015). This seems understandable because a sexual partner may avoid the transmission itself or the risk of transmission when knowing that HIV transmission might take place. If the sexual partner understands the risk, and still consents to have unprotected sex, then HIV disclosure itself is a defense which negates the *actus reus* element of the offense (Weait, 2007).¹⁴ Proof of serostatus disclosure is therefore an affirmative defense to prosecution; whereas proof of nondisclosure is an element of the crime which prosecution must establish.

Across different states, the punishment for HIV non-disclosure varies widely and can range from several months of imprisonment to a life sentence. For example, under California's felony exposure statute, three to eight years of imprisonment may be invoked if the infected person "knows at the time of the unprotected sex¹⁵ that he or she is infected with HIV, has not disclosed his or her HIV positive status, and acts with the specific intent to infect the other person with HIV" (CAL. Health & Safety Code § 120291; Richardson et al., 2015). If criminal

¹³ In this dissertation I will only focus on serostatus disclosure before sexual intercourse and needle sharing because HIV screening is a standardized procedure required before any blood and tissue donations. Biting and spitting, on the other hand, remain a rare occasion.

¹⁴ In criminal laws, *actus reus* refers to a voluntary act that causes social harms (e.g., bodily harm or death; Dressler, 2012).

¹⁵ Unprotected sex refers to any vaginal or anal intercourse without the use of a condom (CAL. Health & Safety Code § 120291).

intent cannot be proven, the infected individual may still be prosecuted as a misdemeanor and sentenced up to six months (Richardson et al., 2015). Alternatively, the defendant may be prosecuted under the general criminal law when living in a state where no HSCL exists (Richardson et al., 2015).

B.2. Law against HIV non-disclosure before sharing needles

The risk of HIV transmission increases when uninfected PWID reuse a needle or syringes shared by the infected. The transmission may occur when contaminated blood is injected directly into the bloodstream. By 2000, 14 states require disclosure to needle-sharing partners (Lehman et al., 2014). Under such HSCLs, the infected persons will be prosecuted for sharing needle with others if they fail to disclose their serostatus before engaging in these acts. For example, in Illinois it is a felony for an HIV-positive person aware of his own HIV status to “dispense, deliver, exchange, sell, or in any other way transfer to another any nonsterile intravenous or intramuscular drug paraphernalia”; regardless of the actual transmission, PWID with the specific intent to transmit HIV can be sentenced to a felony count of three to seven years in prison (Illinois COMP. STAT. § 5/12-5.01; Richardson et al., 2015).

The disclosure may not be limited to current drug partner. In North Carolina, for example, PWID shall notify needle partners since the date of infection if the time of initial infection is known, otherwise they shall notify needle partners for the previous year (N.C. Administrative Code § 41A.0202; Richardson et al., 2015). Taken together, sharing needles while being HIV positive may result in criminal penalties. It is the infected individual’s responsibility to disclose serostatus before engaging in such behavior.

B.3. Law against HIV non-disclosure for HIV infected sex workers

Sex workers¹⁶—individuals who exchange sex for money or goods—bear a disproportionately burden of HIV infection due to multiple sexual partners, condom non-use, gender-based violence, or a restricted access to HIV prevention and treatment resources (Shannon, Strathdee, Goldenberg, Duff, Mwangi, Rusakova et al., 2015). Sex workers may face heightened penalties when they solicit sex while HIV positive. For example, in California additional penalties may be incurred if the sex worker was tested positive for HIV following a previous sex offense conviction of soliciting or engaging in prostitution; the defendant is guilty of felony and may be sentenced to three additional years in prison (California Penal Code § 647f; Richardson, 2015). It is therefore sex workers' responsibility to disclose their serostatus before soliciting or engaging in commercial sex when HIV positive. However, the criminalization of commercial sex is believed to drive sex workers underground, making them a hidden population difficult to be served by sexual health services (Baral, Friedman, Geibel, Rebe, Bozhinov, Diouf et al., 2015).

PROBLEMS POSED BY THE CRIMINALIZATION OF HIV NON-DISCLOSURE

So far we understand that most HSCLs are not based on current science of HIV prevention and transmission (Richardson, 2015). Rather the laws enacted in the late 1980s and early 1990s (Hoppe, 2015), were informed by public opinion and fear of this then deadly disease,

¹⁶ As clients can be any gender, sex workers can be males and females. Compared to female sex workers (FSW), male sex workers (MSK) are less visible and less commonly studied (Robertson, Syvertsen, Ulibarri, Rangel, Martinez, and Strathdee, 2014)

and the suspect class of individuals thought most responsible for its spread (e.g. homosexuals and drug users). These laws punish infected individuals when they fail to disclose serostatus, ignoring one fact that many PLWH today strive to avoid infecting others with HIV (Fritchie, 2015). Regardless of actual transmission and effective prevention strategies (e.g., condom use, ART use), non-disclosure is still treated as a crime.

However, criminalization of non-disclosure did not stop the HIV outbreak. The United States has prosecuted more PLWH than many other countries in the world (Bernard et al., 2012), but the HIV prevalence is still on the rise (CDC, 2016c). Apparently, neither criminal prosecution nor disclosure is sufficient to prevent the spread of HIV. A number of issues associated with HSCLs have been identified in previous literature. Here I sort them into three debates.

A. Undermine recent public health efforts for HIV prevention

Criminal laws intend to affect risk behaviors through deterrence, norm setting, and incapacitation. At times, these laws may have unintended effects. For example, criminal laws deter future crime by creating the fear of prosecution. This fear, however, may discourage at-risk individuals from getting tested (Kesler et al., 2018), damage therapeutic relationships that are built on mutual trust to foster disclosure activities, and reinforce the discrimination against HIV (Lazzarini et al., 2013), all of which undermine public health efforts in preventing the transmission of HIV.

Although knowledge of HIV transmission has advanced considerably, criminal laws have not kept pace with such progress. Behaviors that pose no significant risk of HIV transmission

(e.g., spitting and biting) remain culpable in some states (Richardson, 2015). This may promote misunderstanding by instilling the public with incorrect knowledge, nullifying the effectiveness of public health interventions. When the state has spent a lot of resources and budget to support HIV prevention, criminal laws may undermine this effort by perpetuating the myth about the route of contracting HIV. These arguments, however, have not been well studied.

B. Punishment out of proportion: a non-evidenced based justice

Regardless of scientific evidence, the violation of HSCLs is still linked to severe punishment. For example, although saliva alone has never been shown to transmit HIV, by 2014 spitting and biting has still been treated as a crime in at least 11 states (Lehman et al., 2014). Regardless of the context, actual transmission, or underlying intent, disproportionate punishment, such as life sentence is still invoked in the United States (Richardson, 2015). This raises a serious concern for not only the failure of the law to align with science, but also whether criminal punishment has been too harsh. In response to this critical issue, the U.S. Department of Justice (2014) and the White House (2015) have called for reform of HSCLs.

C. Current debates: criminal intent, and the significant risk of HIV transmission

This punitive approach has triggered a heated debate in recent years. First, *mens rea*, a malicious motive to take another's life, is often hard to prove. Non-disclosure—as a form of deliberate deception—is then treated as a criminal intent (Weait, 2007). Although disclosure alone does not always lead to condom use (Adebayo, Ilesanmi, Omotoso, Ayodeji, Kareem, and Alele, 2014) and therefore is insufficient to prevent HIV, criminal laws still put its spotlight on

disclosure. This selective attention may create a false sense of security, making uninfected individuals believe a zero risk of contracting HIV when disclosure does not take place. In fact, taking protective sexual practices is a shared responsibility, not to mention the difficulty in raising the topic of HIV in intimate and sexual contexts (Weait, 2007).

Second, in criminal laws the term “significant risk” is vague. One controversy centered on HSCLs is punishing behaviors that carry no significant risks for HIV transmission such as spitting and biting (Richardson, 2015). However, such acts are still punishable in certain states. For example, in Louisiana spitting, biting, or even throwing of other bodily substances are still treated as an “AIDS contaminated object;” engagement in these acts can be punished by a maximum of eleven years in prison (Frithie, 2015). Clearly, criminal laws have failed to keep pace with scientific evidence.

D. Looking for further evidence

Traditionally, criminological research does not pay much attention to the intersection between criminal laws and HIV. Crossing the academic discipline, researchers in this field have not adopted the framework of criminological research. Before discussing these limits, I first review the empirical evidence built on previous research.

D.1. Previous empirical studies

The major findings in previous research is summarized in Table 1. To date, there are only five quantitative studies (Gorbach, Galea, Amani, Shin, Celum, Kerndt, and Golden, 2004; Burris et al, 2007; Delavande, Goldman, and Sood, 2010; Horvath, Weinmeyer, and Rosser, 2010; Galletly et al., 2012a, Galletly et al., 2012b) and one qualitative study (Gorbach et al.,

2004) in the United States to explore the associations between HSCLs and disclosure or condomless sex. Only one quantitative study (Lee, 2015) and one qualitative study (Klitzman, Kirshenbaum, Kittel, Morin, Daya, Mastrogiacomo, and Rotheram-Borus, 2004) attempt to explore the relationship between HSCLs and HIV testing. To date, no empirical research has examined the relationship between HSCLs and needle sharing.

[Insert Table 1 about here.]

Null effects of the laws were reported in most studies. When it comes to disclosure and risk behaviors, most quantitative studies (four out of five) showed that HSCLs have no impact (Burriss et al., 2007, Horvath et al., 2010; Galletly et al., 2012a; Galletly et al., 2012b). For example, one study examining 490 high-risk individuals (MSM and PWID) in Chicago and New York City found that people living in a state with HSCLs regulating sexual behaviors of the infected showed no significant difference in actual sexual behaviors when compared to those in a state without such a law (Burriss et al., 2007). Only one study reported a negative association between HSCLs and condomless sex (Delavande et al., 2010). Among three studies that addressed HSCLs and their impact on HIV testing, only quantitative study found a negative association between media coverage of HIV criminalization and a 7% to 9% decrease in HIV testing rates among at-risk individuals (Lee, 2015); the fear of future prosecution is associated with a 7% decrease in the willingness of HIV testing among HIV-negative MSM (Kesler et al., 2018). In other words, HSCLs have unintended effects. However, these studies are exploratory in nature and have not differentiated such effects by investigating risk behaviors across different groups. It remains unknown whether HSCLs have an impact on HIV testing between individuals who do or do not exhibit risky behaviors (e.g., needle sharing or condomless sex).

It is also noteworthy that the existence of HSCLs does not always coexist with public awareness. For people living in a state where HSCLs take place, they do not always know the laws. In this regard, previous research presented mixed findings. While one recent study reported that 73% of MSM were not aware of the existing HSCLs (Horvath et al., 2012), another earlier study reported that over 70% of HIV-positive individuals knew the existence of the law (Galletly, DiFranceisco, and Pinkerton, 2009). States with HSCLs tended to report higher rates of AIDS diagnoses than did states without such laws (Forsyth and Valdiserri, 2015); however, it remains unclear whether HSCLs relate to HIV rates among MSM. On the other hand, heterosexual Black men with female partners and White women may have a higher risk of conviction than MSM (Hoppe, 2015). In short, the impacts of HSCLs on serostatus disclosure, risk behaviors, and HIV testing remain under-studied.

D.2. Knowledge gaps

So far we still have a very limited understanding of HSCLs' impacts on the prevention of HIV. The scarcity of research in this field might be one reason, but methodological limits in previous research are also worth mentioning. In most studies, the conclusions were drawn from individual-level data without controlling for state-level factors other than criminal laws. Moreover, most of these studies were not informed by the criminal justice literature. A theoretical framing of studies in this area will help the research to better address the specific reasons why these laws may or not be effective and determine what information needs to be included in the study to accurately isolate the impact of the law from other possible confounding factors. For example, many of these studies were conducted in only a single location, such that other social and demographic variables of the place could be responsible for the findings. In the

few studies that included multiple locations, the researchers did not clearly differentiate the content of the HSCL law or disaggregate its effect by distinct HSCL category.

This study will seek to improve upon prior work by address the content of HSCLs across jurisdictions while controlling for potential spurious and confounding variables. In addition, I will take a theoretical approach using the knowledge gained from studies on Deterrence Theory to guide my research questions and model specification.

Chapter 2

THEORETICAL FRAMEWORK

There are two primary purposes of this chapter. The first is to discuss the theoretical framework of deterrence in order to illuminate the functions through which criminal laws could deter crime. As deterrence has been an established theme in Criminal Justice (Nagin, 1998; Pogarsky, 2007; Anwar et al., 2011; Loughran, Piquero, and Pogarsky, 2011; Chalfin et al., 2015), the second purpose of this dissertation is to highlight potential contributions this dissertation will make by applying the ecological model of deterrence to HSCLs and their consequences.

DETERRENCE THEORY IN CRIMINOLOGY

Deterrence, by definition, is the use of criminal punishment as a threat to deter people from committing a crime. Since the publishing of Cesare Beccaria's famous essay "On Crimes and Punishments" (1764), t deterrence has been one of the most important characteristics of criminal punishment (Loughran et al., 2011). Cesare proposed that criminals were simply rational human beings who exercised their free will to make choices that brought them the most pleasure and the least pain. Thus, to deter crime the punishments must be proportional to the crimes committed, that is, they must inflict more negative consequences than the positive gain the individual would incur by committing the offense. In addition to the severity of the punishment to be handed down, theories of deterrence also address the certainty that the individual will be caught and the swiftness by which they will be punished. By raising the levels of severity, certainty, and swiftness of punishment the criminal justice system can reduce the likelihood that a crime will be committed (Loughran et al., 2011). By inducting the fear of punishment, deterrence prevents individuals' commission of future crimes.

Over the past decades, Deterrence Theory has been tested empirically in the field of Criminal Justice. Its central focus is to assess whether severe criminal sanctions, such as death penalty, and other crime legislation are effective public policies (Nagin and Pepper, 2012).

A. Deterrence theory

There are two key assumptions in the Deterrence Theory: (1) the threat of a punishment imposed on criminal offenders would prevent them from committing further crimes; and (2) the fear of punishment would also prevent others from committing similar crimes (Cook 1980; Braga and Weisburd, 2011). Built on these two assumptions, deterrence fits into two categories: general deterrence and specific deterrence.

A.1. General deterrence

General deterrence is the idea that the general population, especially those who share similar characteristics of a punished criminal, would be dissuaded from committing crime out of their fear of criminal punishment (Braga et al., 2011). A general deterrent effect, at a population level, would be observed as a reduction in crime rates among all individuals who are under the domain of a particular criminal statute (Wagenaar and Burris, 2013). That is, criminal laws seek to discourage the public from engaging in criminal acts by making examples of specific criminals, sending a public message that advertises the punishment for criminal acts (Devos, 2013).

So why does general deterrence relate to HSCLs and risk behaviors? One conceivable hypothesis is that at-risk individuals are aware of these laws and therefore refrain from behaviors that increase the risk of HIV infection. Over the past three decades, HSCLs have been enacted in over 30 states (Lehman et al., 2014; see Appendix Figure A). The publicity of these criminal laws

may increase over time, contributing to the general deterrent effect. Nonetheless, empirical studies present mixed findings. For example, one study found that over 70% of HIV-positive individuals knew the existence of HSCLs (Galletly et al., 2009), whereas another study reported that 73% of MSM were not aware of the existing laws (Horvath et al., 2012), let alone another disturbing finding that awareness of the laws does not necessarily lead to perceived responsibility among HIV-positive individuals, or sexual abstinence among community residents (Galletly et al., 2012a; Galletly et al., 2012b). It is therefore important to examine the extent to which HSCLs discourage HIV-negative individuals from engaging in risk behaviors.

A.2. Specific deterrence

Specific deterrence is targeting the specific individuals in question. By instilling an understanding of the consequences derived from crime, the threat or imposition of punishment would prevent the criminals from future crime (Braga et al., 2011). As a result, criminal punishment would extract obedience and conformity. In terms of research, the deterrent effect of a particular criminal law can be assessed by measuring the reduction in offending among criminals (Wagenaar et al, 2013).

HIV-positive individuals are not necessarily criminals. In the context of HSCLs, HIV-positive individuals might be punished as “criminals” if they know their serostatus but fail to disclose it before initiating any risk behavior (Richardson et al., 2015). Awareness of these laws, therefore, should encourage these “criminals” to disclose serostatus and refrain from having risk behaviors out of the fear of criminal punishment. Nonetheless, a few studies present mixed results. For example, a qualitative study examining 55 HIV-positive individuals reported that fear of being arrested, at times, may discourage individuals from disclosing HIV status (Gorbach et al., 2004).

Another study found that awareness of the laws is not significantly associated condom use (Delavande et al., 2010). In other words, there seems to be a discrepancy between knowing HSCLs and actual behaviors. It is also important to assess specific deterrent effects among HIV-positive individuals who have been punished for non-disclosure offense. Limited by data availability, however, this study will not examine specific deterrence for a lack of information on prior non-disclosure offense among HIV-positive individuals.

B. Applications of deterrent theory on crimes

Less focused on public health, much of the literature on deterrence is centered on traditional types of crime, such as violent crimes (Braga, 2001; McGarrell, Chermak, Wilson, and Corsaro, 2006; Engel, Corsaro, and Tillyer, 2010), economic crimes (Buccafusco and Masur, 2013; Cornish and Clarke, 2014), and homicides (Hood and Hoyle, 2015; Nagin et al., 2015). Compared to criminological research, only a few studies have assessed the deterrent effect of legislation on health (Shepherd, 2001; Wagenaar et al., 2013). Although deterrence research largely focuses on the assumption of rational choice (i.e., the decision making process of crime commission that involves rational calculations), an alternative line of research begins to explore the “irrational” element in criminal decision, such as affections and behavioral economics (Van Gelder, 2013; Pogarsky, 2014). This alternative approach, however, is beyond the scope of this dissertation and therefore will not be the central focus.

B.1. Deterrent effects of state laws on criminal behaviors

From previous discussion we understand that HIV non-disclosure has been charged as assault or attempted murder (Fritchie, 2015), both of which are classified as a type of violent

crime. This naturally leads to a question: is deterrence effective in preventing violent crimes? The findings, however, remain inconclusive, largely due to the mixed results of previous studies.

Taking homicides as an example, heated debates over the effectiveness of the death penalty have persisted for decades. Researchers have long used data on homicide rates and sanctions to examine the deterrent effect of the death penalty. The findings, however, remain mixed. One study found that each execution can save eighteen lives (Dezhbakhsk, Rubin, and Shepard, 2003), while another study presented the opposite results (Donohue and Wolfers, 2005). Study results seem to be highly volatile to the research design adopted (Yang and Lester, 2008). A systematic review concluded that available studies “provide no useful evidence on the deterrent effect of capital punishment,” partly due to methodological flaws in previous research; more specifically, deterrence studies generally examined only a single geographic location and did not control for non-capital sanction factors in their analyses (Nagin et al., 2012).

Despite these flaws, research on other types of crime remains informative. Varied by the study design, a host of state-level factors have been identified in ecological studies and can be used to assess their associations with crime rates. By controlling for these non-sanction, potential confounding factors, the deterrent effect of a criminal law can be assessed with better accuracy (Wagenaar et al., 2013).¹⁷

B.2. Ecological model of deterrence

Generally, deterrence research falls into three approaches: ecological studies, perceptual studies, and time-series studies (Nagin, 1998). Ecological studies use natural variations in the

¹⁷ In the field of health law research, Wagenaar and Burris (2013) argue that deterrence may exert its influences on health behaviors through a series of mediators. For example, the link between general deterrence and behavior is mediated by population-level factors (i.e., aggregate unit of analysis); the link between specific deterrence and behavior, on the other hand, is mediated by individual-level factors.

sanction levels and crime rates across space and population units. This approach enables researchers to examine the relationship between criminal punishment and crime rates. In a statistical sense, a negative association between these two variables would validate the existence of deterrence.

So why is it important to incorporate the ecological model into deterrence research? The ecological framework views crime as the outcome of influences from factors at different levels—the individual, and the living environment such as communities, states, and the society. It is through the environmental context that criminal laws exert deterrent effects that translate state legislature into crime prevention and health-related behaviors (Wagenaar et al., 2013). Following this logic, HSCLs may therefore create a context where state residents, especially those at risk for HIV infection or already infected, would abide by these laws and present less risk behaviors when compared to states where no HSCLs exist. Furthermore, criminal sanctions have heterogeneous impacts on different groups and should adjust for cross-state differences (Chalfin et al., 2015). To address these issues, this dissertation research will incorporate the ecological model to assess the impacts of HSCLs on individuals from different at-risk groups, adjusting for a host of individual-level and state-level factors.

B.2.1. State-level factors

A number of state-level factors have been assessed in deterrence research, with most factors drawn from census records, such as population size, poverty rate, unemployment rate, income, education level, and race/ethnicity (Dezhbakhsh et al., 2003; Kovandzic, Vieraitis, and Boots, 2009; Nagin et al., 2012). Additionally, governor's political affiliation (Republican or Democratic) was found to affect the attitude toward criminal sanctions (Payne and Coogle, 1998;

Nagin et al., 2012). More importantly, criminal justice variables have been examined in previous research, such as crime rates, prison population, number of correctional facilities, and the density of law enforcement employees (Kovandzic et al., 2009; Chalfin and McCrary, 2013; Chalfin et al., 2015; Nagin et al., 2012).

Depending on the types of crime and study design, the aforementioned factors have different effects on crime rates; as a result, previous studies often present mixed findings (Nagin et al., 2012). For example, high crime rates are more likely to be reported in populated areas, or places with a higher proportion of minority populations (Gruenewald, Freisthler, Remer, LaScala, & Treno, 2006); but the opposite direction of association is also reported in previous research (Dezhbakhsh et al., 2003). At a population level, high crime rates are associated with a lower level of average income, a higher level of poverty, and a lower level of educational attainment, but not necessarily associated with high unemployment rates (Kovandzic et al., 2009; Machin, Marie, & Vujić, 2011). On the other hand, Republican states tend to be a higher level in criminal sanctions (Whittle, & Parker, 2014), which would expect to have lower crime rates if deterrence works. High crime rates may be associated with poor performance of the criminal justice system, but the findings remain inconclusive (Nagin et al., 2012).

To my best knowledge, previous research has not systematically examined criminal justice variables at the population level in terms of their impacts on serostatus disclosure; only a few studies explored the associations between population-level factors and HIV-related risk behaviors (for example, Bluthenthal, Do, Finch, Martinez, Edlin, & Kral, 2007; Li, Goggins, & Lee, 2009). Focused on Deterrence Theory, this dissertation research will take criminal justice variables into account to better assess HSCLs' independent effects.

B.2.2. Individual-level factors

In addition to population-level factors, a number of individual-level, demographic factors (e.g., age, race/ethnicity, education, income, marital status, and employment) have been examined for their associations with deterrability of a crime (Jacobs, 2010) and the likelihood of committing a crime (Fowler, Cantos, and Miller, 2016; Teplin, Jakubowski, Abram, Olson, Stokes, and Welty, 2014). It also bears mentioning that knowing the law and its enforcement may play an intervening role in the link between criminal sanctions and actual acts (Loughran et al., 2011; Chalfin et al., 2012). These mediation processes, however, are not available in the data acquired and therefore will not be the central focus of this dissertation.

C. Application of Deterrence Theory: To what extent HIV-specific criminal laws have been effective

In a wider context, I will explore the deterrent effect of each HIV-specific law by applying the ecological framework proposed by Deterrence Theory. Although the criminological tradition is compatible with the study of criminal laws in offending, most work on HIV/AIDS stem from public health. The limited role is understandable because disease transmission is not a primary concern when compared to major crimes in criminology. Although non-disclosure and HIV exposure is pertinent to criminal offending, Deterrence Theory has not been adopted in previous research. The gaps in knowledge prompt me to conduct this dissertation research to better assess the impacts of HSCLs on a set of behavioral outcomes among MSM and IDUs across three states.

Chapter 3

AIM OF THE STUDY

This study aims to assess whether HSCLs have served their purposes to promote the prevention of HIV. To determine the consequences of HSCLs, a multilevel approach is required wherein individual-level and state-level factors can be examined simultaneously. The specific objectives are to assess the associations between HSCLs and three outcomes of interest after controlling for a number of state-level and individual-level factors that have been identified in previous deterrence research.

RESEARCH QUESTIONS

To address these knowledge gaps, my dissertation will focus on three research questions:

1. To what extent HSCLs influence HIV serostatus disclosure among infected individuals?
2. To what extent HSCLs influence HIV-related risk behaviors (sharing needles, condomless sex) among at-risk individuals?
3. To what extent HSCLs influence the uptake of HIV testing among individuals who do or do not exhibit risk behaviors?

HYPOTHESES

To assess the consequences of HSCLs, I adopt the ecological framework of Deterrence Theory. As shown in Figure 1, this multilevel approach emphasizes the role of legal contexts in

creating an environment conducive to conformity. When applied to individual offending, deterrence would predict that HIV-positive individuals residing in a state with HSCLs will be more likely to disclose their serostatus and less likely to engage in risk behaviors compared to those residing in a state without HSCLs. If general deterrence had an unintended effect on public health approaches, then at-risk individuals (HIV-negative individuals) living in the same state would be discouraged from being tested for HIV. Assuming that HSCLs have a deterrent effect that promotes serostatus disclosure, inhibits risk behaviors, but discourages HIV testing, I adopt a criminological framework and hypothesize that:

[Insert Figure 1 about here.]

H1. The presence of HSCL is associated with an increased likelihood of serostatus disclosure among infected individuals.

If the first hypothesis (H1), as described in Chapter 1 is true, then I expect to find a positive association between HSCLs and HIV disclosure among HIV-positive individuals. In other words, HSCLs have exerted their deterrent effects. If it is not true, then a counterproductive effect (i.e., a negative association) or a null effect (i.e., no effect) will be detected, indicating that HSCLs does not promote HIV disclosure.

Rationale: According to Deterrence Theory (Chalfin and McCrary, 2015; Dezhbakhsh, Rubin and Shepherd, 2003; Anwar and Loughran, 2011), the fear of prosecution would refrain the individual from committing a crime. A threat of severe punishment would prevent crimes because the cost of committing a crime outweighs the benefit derived from the crime (Nagin, 1998). Since nondisclosure may lead to imprisonment or life sentence (Richardson, 2015), to

avoid such punishment, HIV-positive individuals living in a state with a specific type of HSCL would abide by the law and therefore be more likely to disclose their serostatus to sexual partners when compared with those living in a state without such a law. However, there is no pure control group in this study because each state has one or more types of HSCL. Therefore, I am looking for subtle differences between states by examining three types of HSCL and their effects on serostatus disclosure.

H2. The presence of HIV-specific criminal law is associated with a reduced likelihood of risk behaviors among at-risk individuals.

If the second hypothesis (H2) is true, then I expect to find a negative association between HSCLs and risk behaviors among HIV-positive individuals. If it is not true, then a counterproductive effect (i.e., positive association) or a null effect will be detected, indicating that HSCLs do not inhibit HIV-related risk behaviors.

Rationale: Through general deterrence, at-risk individuals would stop engaging in illegal behaviors (Anwar et al., 2011; Pogarsky, 2007). If HIV-positive individuals are regarded as potential “criminals,” then living in a state with HSCLs prevent them from engaging in risk behaviors, such as needle sharing among PWID, and condomless sex among infected individuals who know their own serostatus.

H3. The presence of HIV-specific criminal law is associated with a reduced likelihood of HIV testing among individuals who do or do not exhibit risk behaviors.

If the third hypothesis (H3) is true, then I expect to find a negative association between HSCLs and the history of HIV testing among at-risk individuals. Also, this negative association is expected to be stronger among individuals who exhibit risk behaviors (e.g., sharing needles or

condomless sex) because they are more likely to be deterred from HIV testing than those not engaging in risk behaviors. On the other hand, a null effect or a beneficial effect (i.e., a positive association) would indicate that HSCLs do not deter at-risk individuals from HIV testing.

Rationale: HIV testing is prioritized in the National HIV/AIDS Strategy (The White House, 2015). The fear of criminal prosecution, however, may serve as a barrier to HIV testing, especially for MSM (Adam, Elliott, Corriveau, and English, 2014; Patterson, Milloy, Ogilvie, Greene, Nicholson, Vonn et al., 2015; Kesler et al., 2018). This study will explore the extent to which HSCLs discourages at-risk individuals from getting tested for HIV.

METHODS

DATA AND SAMPLE

The individual-level data were collected from the Sexual Acquisition and Transmission HIV Cooperative Agreement Program (SATHCAP). The SATHCAP study was conducted in three U.S. sites (Los Angeles, Chicago, and Raleigh-Durham) between 2005 and 2008, with its primary goal to examine the role of risk behaviors associated with HIV among high-risk individuals, including MSM and PWID (Iguchi, Ober, Berry, Fain, Heckthorn, Gorbach et al., 2009). Participants were recruited through respondent-driven sampling (RDS) that yielded a sample of 4,688 participants, including MSM, PWID, and their sexual partners across three sites.

The state-level data were collected from several sources. First, information on HIV-specific laws was retrieved from the legal research library Westlaw¹⁸ and LexisNexis¹⁹ and previous

¹⁸ [https://1-next-westlaw-com.libproxy.albany.edu/Search/Home.html?rs=IWLN1.0&vr=3.0&sp=000681081-2100&forcecdn=false&bhskip=1&transitionType=Default&contextData=\(sc.Default\)](https://1-next-westlaw-com.libproxy.albany.edu/Search/Home.html?rs=IWLN1.0&vr=3.0&sp=000681081-2100&forcecdn=false&bhskip=1&transitionType=Default&contextData=(sc.Default))

¹⁹ <http://www.lexisnexis.com.libproxy.albany.edu/hottopics/lnacademic/>

research (Richardson et al., 2015). Population statistics were retrieved from the American Community Survey (ACS) conducted by the U.S. Census Bureau.²⁰ Criminal justice statistics were retrieved from Uniform Crime Reporting (UCR) conducted by FBI,²¹ and Census of State and Federal Correctional Facilities (CSFCF) conducted by the Bureau of Justice Statistics (BJS).²² Lastly, health statistics were retrieved from the Behavioral Risk Factor Surveillance System (BRFSS) conducted by CDC.²³

Figure 1 shows the process of determining the analytic sample. To begin, this dissertation will focus on male participants (n = 3,014; 64.3% of the original sample). Female participants are excluded because the SATHCAP survey did not ask female participants about their unsafe sexual practices, such as condomless sex. Also excluded are male participants who did not provide valid responses for key questions (e.g., serostatus disclosure, HIV testing, and condomless sex). These two exclusions lead to an analytic sample of 2,930 males (97.2% of the male sample).

To test three hypotheses, I divide the analytic sample into a set of subsamples. First, to assess serostatus disclosure (Hypothesis 1), the subsample is limited to individuals who reported themselves as HIV positive and had a primary sexual partner in the past 6 months (n = 317). On the other hand, HIV testing (Hypothesis 3) is assessed among all participants (n = 2,930), whether they engaged in risky behaviors (needle sharing or condomless sex; n = 862) or not (n = 2,068). . Second, PWID (n = 1,238) were assessed for their needle sharing (Hypothesis 2). Finally, for condomless sex, both PWID and MSM were then pooled together (Hypothesis 2), including any condomless anal sex with males (n = 349), any condomless vaginal or anal sex with females (n = 717), and any condomless sex with males and/or females (n = 859).

²⁰ <https://www.census.gov/programs-surveys/acs/>

²¹ <https://ucr.fbi.gov/>

²² <https://www.bjs.gov/index.cfm?ty=pbdetail&iid=530>

²³ <https://www.cdc.gov/brfss/>

[Insert Figure 2 about here.]

MEASUREMENT

A. OUTCOME VARIABLES

A.1. HIV serostatus disclosure to one's main sexual partner

In the SATHCAP study, serostatus disclosure was only assessed among individuals who had a sexual partner in the past six months. This variable is measured by asking self-reported HIV-positive individuals “Does your primary sexual partner know your HIV status?” Any affirmative response is coded 1 (= yes), otherwise coded 0 (= no).

A.2. Needle-sharing behaviors

Needle-sharing is a general term used to describe unsafe injection that is conducive to HIV infection. In fact, HIV and other viruses can be transmitted from infected individuals to the uninfected by sharing injection equipment such as syringes, needles, and injecting paraphernalia (e.g., cookers, cottons, rinse water; Wenz, Nielsen, Gassowski, Santos-Hövener, Cai, Ross et al., 2016). In this study the variable is measured by the occurrence of these behaviors in the past 30 days: (1) sharing syringe from others; (2) sharing syringe to others; and (3) sharing cooker, cottons, or rinse water. Any affirmative response is coded 1 (= yes), otherwise coded 0 (= no).

A.3. Condomless sex

Condomless sex is measured by a dummy variable to assess whether or not the participants used condom when having anal or vaginal sex with males/females in the past 6 months. Any affirmative response is coded 1 (= yes), otherwise coded 0 (= no).

A.4. HIV testing

HIV testing is measured by a dummy variable to assess whether self-reported HIV-negative individuals ever had a test for HIV prior to the interview. Any affirmative response is coded 1 (= yes), otherwise coded 0 (= no).

B. STATE-LEVEL FACTORS

B.1. HIV-specific criminal laws: Serostatus disclosure, needle sharing, prostitution

The independent variables of interest include HSCLs of three distinctive categories: (1) laws against *serostatus non-disclosure for HIV-positive individuals*; (2) laws against *serostatus non-disclosure before needle sharing for HIV-positive PWID*; and (3) laws against *serostatus non-disclosure for HIV-positive sex workers* (Richardson et al., 2015). As shown in Table 2, each category is dichotomized to indicate the presence of a given law in each state (0 = absence of the law, 1 = presence of the law; also see Table 3 for detailed information on HSCLs enacted in California, Illinois, and North Carolina²⁴).

²⁴ The North Carolina law against needle sharing actually originated from the Administrative Code (10A N.C. ADMIN. CODE 41A.0202; see Table 2) rather than the Criminal Code. According to the General Assembly of North Carolina, "North Carolina Administrative Code shall create a list of all crimes defined by the agency, board, or commission" (<https://www.ncleg.net/EnactedLegislation/SessionLaws/HTML/2017-2018/SL2018-69.html>). Criminalized rules and regulations, therefore, may appear in the Administrative Code and other records instead of the statute book. It's a misdemeanor to violate any administrative regulation. The maximum sentence is 2-year imprisonment. in prison.

Realizing the counterproductive effect of criminal laws, in 2018 North Carolina has started to modify its HSCL. HIV-positive individuals are not required to disclose their serostatus if they are virally suppressive for at least 6 months; they do not have to use a condom if their sexual partner is taking PrEP (Pre-exposure prophylaxis) or is also HIV-positive (NC AIDS Action Network, 2018).

[Insert Table 2 and Table 3 about here.]

B.2. Capacity of the criminal justice system: number of inmates held, number of correctional facilities, total law enforcement employees

Statistics on prison inmates and correctional facilities were retrieved from BJS' 2005 CSFCF database, including the total number of inmates held, and the total number of correctional facilities²⁵ in each of the three states. Statistics on law enforcement were retrieved from FBI's 2005 UCR database, including the total number of law enforcement employees in each state.²⁶

B.3. Violent crime rates

Statistics on 2005 violent crime rates were retrieved from FBI's UCR database. This variable is measured as the average number of violent crimes²⁷ per 100,000 population per year.

C. INDIVIDUAL-LEVEL FACTORS

²⁵ The types of correctional facilities included prisons and prison farms; prison hospitals; centers for medical treatment and psychiatric confinement; boot camps; centers for reception; diagnosis; classification; alcohol and drug treatment; community correctional facilities; facilities for parole violators and other persons returned to custody; institutions for youthful offenders; and institutions for geriatric inmates. More information is available at: <https://www.bjs.gov/content/pub/pdf/csfcf05.pdf>.

²⁶ Law enforcement employees included officers and civilians. More information is available at: https://www2.fbi.gov/ucr/05cius/data/table_77.html.

²⁷ According to FBI, violent crimes include murders, rapes, robberies, and aggravated assaults. More information is available at: <https://www.fbi.gov/about-us/cjis/ucr/crime-in-the-u.s/2005>

C.1. Demographics: Age, race/ethnicity, education, income, marital status, employment status, HIV status

Age is measured in years. *Race/ethnicity* is divided into six categories, including White (reference), Black, Hispanic, American Indian, Asian/Pacific Islander, and other. *The highest level of education* completed is measured by four levels, including no formal schooling (reference), less than high school, high school graduate/GED, some college, and college graduate or more. *Monthly Income* is divided into 9 categories, including "\$0 to \$500" (reference), "\$501 to \$1,000," "\$1,001 to \$1,500," "\$1,501 to \$2,000," "\$2,001 to \$2,500," "\$2,501 to \$3,000," "\$3,001 to \$4,000," "\$4,001 to \$5,000," and "\$5,100 or more." *Marital status* at the time of interview is measured by a dummy variable (0 = unmarried, 1 = married). *Employment status* at the time of interview is measured by a dummy variable (0 = unemployed, 1 = employed). *Self-reported HIV status* is measured by a dummy variable (0 = HIV-negative, 1 = HIV-positive).

C.2. Injecting drug use (IDU)

The history of drug injection was assessed in the survey by asking the participants "Have you ever injected any drugs?" Affirmative response is coded 1 to indicate PWID; otherwise coded 0 to indicate non-PWID.

C.3. Men having sex with men (MSM)

According to CDC's definition,²⁸ gay and bisexual men are both categorized as MSM. In this study, the variable is coded 1 (= MSM) if the participants reported only having sex with men

²⁸ <https://www.cdc.gov/hiv/group/msm/>

or having sex with both men and women; otherwise coded 0 to indicate non-MSM (i.e., heterosexual males).

STATISTICAL ANALYSIS

Descriptive statistics and multilevel analyses will be employed in this study. First, frequency distributions and summary statistics will be performed to describe and organize the data. Chi-square tests and t-tests will be used to examine the group differences for categorical variables and continuous variables, respectively. Ideally, conditional logistic (fixed-effects) regression can be used to examine HSCLs' influences on human behaviors. This method is introduced by McFadden (1974) and able to incorporate the "dependency" problem in the nested data because clusters of observations cannot be considered independent. For example, people residing in the same state might share similar behavioral patterns than those from different states. To overcome this problem, the conditional logit model takes the stratification into account by having a different constant term for each strata (i.e., a given state), and therefore is able to address the dependency issue when making statistical inferences from a sample of individuals living in the same state.

However, intragroup collinearity prohibits me from using conditional logistic regression to account for the clustering effect because state-level factors are highly associated with each other. Due to collinearity, conditional regression models fail to converge; statistical estimates cannot be computed. Therefore, I will use logistic mixed-effects models (Hierarchical Linear and Nonlinear Modeling; HLM) as an alternative method to account for the clustering effect. The function form is expressed as:

$$\text{Log} [p_{ij} / (1-p_{ij})] = \beta X_{ij} + b_i Z_{ij} \text{ where}$$

P_{ij} denotes the probability of the binary outcome (0 = absence, 1 = presence) of the j^{th} individual of the i^{th} state. X_{ij} refers to the corresponding predictors (individual-level and state-level factors). Random intercept ($z_{ij}b_i$) is included to account for the clustering effect of each state. To avoid collinearity between HSCL and other state-level factors, each state-level criminal justice factor is controlled for in a separate regression model.²⁹

It also bears mentioning that HLM is often used to produce robust estimates that are suitable for nested data with a hierarchical structure (Aarts, Verhage, Veenvliet, Dolan, and Van Der Sluis, 2014). However, HLM does not have adequate power to detect statistical significance when there are fewer 10 clusters (Austin, 2010).³⁰ Lastly, all analyses will be performed using STATA version 14 (STATA Corp., Texas, USA) in this study.

²⁹ The Pearson correlation coefficients (ρ) range from -.698 to .996 between stage-level criminal justice variables.

³⁰ Another alternative approach is to use logistic regression with robust clustered standard errors which relax the assumption of independence. A series of sensitivity analysis will be performed in this study to compare the results produced by this alternative approach (by specifying the option *vce(cluster state_ID)* in STATA; see <http://www.stata.com/manuals14/rlogistic.pdf>) and the conditional logistic regression (using the command *clogit* in STATA; see <http://www.stata.com/manuals14/rclogit.pdf>).

Chapter 4

RESULTS

There are two primary sections of this chapter. The first section is to describe basic characteristics of the analytic sample. In the second section, I will test three hypotheses and present the major results.

DESCRIPTIVE STATISTICS

As shown in Table 4, a total of 2,930 males were included in this study. The average age was 43.6 years. The majority of participants were Black (71.9%), had at least had high school education (68%), with the monthly income of less than \$500 (66.1%), and did not have a job (80.8%). About 12% of the participants had sex with men (MSM), and 42.3% had ever injected drugs (IDU).

[Insert Table 4 about here.]

For outcome variables, self-disclosure of HIV status and needle sharing behaviors vary substantially across different states. More specifically, participants living in Illinois on average were more likely to disclose their HIV status (31.5%) when compared to those living in California (17.8%) or North Carolina (24.7%). Participants living in Illinois and California were more likely to share needles (16.6% and 14%, respectively) than those in North Carolina (9.2%); but this may simply reflect the underlying composition of participants (48.3% in California, 44.8% in Illinois, and 29.3% in North Carolina were IDUs).

At the state level, criminal justice variables also vary across three states. California had a higher value of three variables (the number of prison inmates per 100,000 population, the number of correctional facilities, the number of criminal justice employees) when compared to

another two states. The violent crime rates were highest in Illinois (552 per 100,000 population).

HYPOTHESES

I used mixed-effects logistic regression models to assess the extent to which each HSCL independently influences three major outcomes controlling for individual-level and state-level variables. Taking the clustering effect into account, I first present the results of hypothesis testing in Table 5 to Table 7 by controlling for individual-level variables. Furthermore, in Table 8 to Table 11, I present the results controlling for individual-level variables and each of the four state-level criminal justice variables.

H1. The presence of HSCL is associated with an increased likelihood of serostatus disclosure among infected individuals.

As shown in Table 5 (Model 1 to Model 3; M1 to M3), there is no statistically significant effect of each HSCL on HIV serostatus disclosure among HIV-positive individuals. More specifically, HSCLs do not encourage infected individuals to disclose their HIV status to primary sexual partners. In other words, HSCLs do not deter infected individuals from hiding their serostatus.

[Insert Table 5 about here.]

At the individual level, married individuals are approximately five times (ORs = 4.828, 5.043, 5.043; $p < .05$) more likely to disclose their serostatus than unmarried individuals; men who had sex with men (MSM) are also more likely to disclose their serostatus (odds ratios range from 1.975 to 2.122) than their counterparts, controlling for HSCL and other individual-level variables.

H2. The presence of HIV-specific criminal law is associated with a reduced likelihood of risk behaviors among at-risk individuals.

Table 6 (M4 to M9) shows the results testing the hypothesis H2. There is no statistically significant effect of each HSCL on risk behaviors. More specifically, HSCLs do not have a significant deterrent effect on needle sharing among people who inject drugs. Also, HSCLs do not have a significant deterrent effect on condomless sex among HIV-positive individuals.

[Insert Table 6 about here.]

At the individual level, HIV-positive MSM are at least three times (odds ratios range from 3.422 to 3.685) more likely to engage in condomless sex when taking HSCLs and other individual-level variables into account (M7 to M9). Although not statistically significant, drug injection is associated with a higher likelihood of condomless sex (odds ratios range from 1.758 to 1.786) among HIV-positive individuals when controlling for HSCLs and other individual-level variables (M7 to M9).

H3. The presence of HIV-specific criminal law is associated with a reduced likelihood of HIV testing among non-infected individuals who do or do not exhibit risk behaviors.

Table 7 presents mixed results of hypothesis testing among individuals who exhibit risk behaviors (needle sharing or condomless sex; M10 to M12) and those do not (M13 to M15). More specifically, HSCLs have no statistically significant effect on HIV testing among risk-taking individuals. On the other hand, the presence of HIV law against needle sharing is associated with a lower likelihood (OR = 0.641, $p < .05$) of HIV testing; the presence of HIV law

against sex worker is associated an increased likelihood (OR = 1.559, $p < .05$) of HIV testing when controlling for individual-level variables.

[Insert Table 7 about here.]

In other words, HSCLs do not significantly influence the likelihood of HIV testing among risk-takers, but may or may not discourage non-risk-takers from getting tested for HIV, depending on the type of HSCL. At the individual level, MSM (odds ratios range from 2.04 to 2.353) and drug injection (odds ratios range from 1.499 to 1.819) are associated with an increased likelihood of HIV testing, when controlling for HSCLs and other individual-level variables.

State-level criminal justice variables

Table 8 to Table 11 present the results controlling for individual-level variables and each of the four state-level criminal justice variables. First, there is a significant and negative association (odds ratios range from 0.978 to 0.985; $p < .001$; see M1 to M3 in Table 8) between the number of prison inmates per 100,000 population in a given state and HIV serostatus disclosure among infected individuals, controlling for each HSCL and individual-level variables. Additionally, there is no significant effect of inmate population on other outcomes, except a slightly positive effect (OR = 1.004, $p < .05$) on HIV testing among individuals who did not exhibit risk behaviors (M13). Therefore, a larger population of prison inmates is associated with a reduced likelihood of HIV disclosure, and a slightly increased likelihood of HIV testing.

[Insert Table 8 about here.]

Second, there is a significant and negative association (odds ratios range from 0.946 to

0.948, $p < .001$; see M1 to M3 in Table 9) between the number of correctional facilities per state and HIV serostatus disclosure among infected individuals. This variable has no significant impact on other outcome variables, except a weak positive effect (OR = 1.009, $p < .05$; M13) on HIV testing among individuals without risk behaviors. Overall, a larger number of correctional facilities is associated with a reduced likelihood of HIV disclosure, and a slightly increased likelihood of HIV testing.

[Insert Table 9 about here.]

Third, the number of criminal justice employees per state is slightly and positively associated with HIV serostatus disclosure among infected individuals (odds ratios are close to 1; see M1 to M3 in Table 10), and with HIV testing among individuals without risk behaviors (OR is close to 1, $p < .05$; M13). However, there is no significant of this state-level variable on other outcomes. In summary, a larger number of criminal justice employees is associated with a slightly increased likelihood of HIV disclosure and HIV testing.

[Insert Table 10 about here.]

Lastly, violent crime rate per 100,000 population is positively (odds ratios range from 1.024 to 1.072, $p < .001$; see M1 to M3 in Table 11) associated with HIV serostatus disclosure among infected individuals, and is negatively (OR = .981, $p < .05$) associated with HIV testing among people without risk behaviors. There is no significant association between violent crime rates and other outcome variables. Therefore, a state with a higher number of arrests for violent crimes tend to have a higher likelihood of HIV disclosure, and a reduced likelihood of HIV testing.

In summary, HSCLs generally do not have a significant deterrent effect on major

outcomes. When considering state-level variables, a larger capacity of criminal justice system (inmate population and correctional facilities) is associated with a reduced likelihood of HIV serostatus disclosure. On the other hand, a better performance of criminal justice personnel (number of criminal justice employees and number of arrests for violent crimes) presents the opposite effects.

Chapter 5

DISCUSSION

This study adds to discussions concerning the deterrent effects of HIV-specific criminal laws on criminal justice and public health outcomes. First, I used data from Sexual Acquisition and Transmission of HIV Cooperative Agreement Program (SATHCAP) study to explore the extent to which at-risk males' behaviors are affected by HIV-specific criminal laws (HSCLs) across three states. Second, I include both state-level criminal justice factors and individual-level variables in this study. Lastly, I adopt the ecological framework of Deterrence Theory to investigate the association between HSCLs and major outcomes that might have important implications in HIV prevention and policy making.

GENERAL CONCLUSIONS

Taken together, the findings from this study extent current scholarship in several ways. The major results show that generally, HSCLs do not have a significant and independent influence on major outcomes. These findings support recent research that HSCLs do not deter infected individuals from hiding HIV serostatus (for example, Burriss et al., 2007; Galletly et al.; 2012), do not deter at-risk individuals from engaging in risk behaviors (Horvath et al., 2010; Galletly et al., 2012). Overall, HSCLs have no prominent effect on HIV disclosure, needle sharing, condomless sex, and HIV testing among at-risk males, regardless of the types of HSCLs.

More specifically, I examined three different HSCLs and their impacts on target populations. First, the null findings imply that criminal laws against HIV non-disclosure have no significant impact on HIV-positive individuals. In other words, the mere presence of such a law does not necessarily lead to an increased likelihood of HIV disclosure among infected

individuals, and therefore does not have a deterrent effect. However, non-disclosure of HIV serostatus may place sexual partners at an increased risk of infection because they are less likely to protect themselves when engaging in sexual behaviors. Therefore, this law may fail to serve its public health purpose in terms of HIV prevention via serostatus disclosure.

There are several possible explanations of this null effect. As shown in previous research, at-risk individuals are not always aware of HSCLs. For example, up to 75% of the participants do not know the existence of non-disclosure laws in their states (Harvath et al., 2016). As a result, infected individuals may not know the penalty for non-disclosure and therefore are not deterred by these laws. It is also possible that certain infected individuals are also risk takers, for whom breaking the rules is the norm and therefore are less likely to be deterred by criminal laws.

In addition to criminal punishment, several factors also prohibit infected individuals from disclosing HIV status. For example, the fear of rejection or the loss of one's partner, adverse experiences about disclosure in the past, the length of time since diagnosis, awareness of partners' serostatus, socioeconomic status, fear of being isolated by partners, physical abuse along with many other factors are also barriers to HIV disclosure (Sullivan, 2005; Adeoye-Agboola et al., 2016). To prevent HIV infection, lawmakers need to take all of these factors into account.

While previous research has accumulated some insights into non-disclosure, however, the literature has not examined the deterrent effects of HSCLs that punish sharing needles and sex work for non-disclosure. When compared to the general non-disclosure laws, these two types of HSCLs are narrower in scope because they are targeted at more specific behaviors. As a result, it is equally important to examine the extent to which these two laws serve their purpose by deterring at-risk individuals from non-disclosure. However, this study shows null effect. That is,

the presence of laws against sharing needles or against sex work does not promote HIV disclosure or reduce the likelihood of condomless sex, both of which are important approaches to HIV prevention. In sum, three types of HSCLs, whether general or specific, do not have a significant deterrent effect as intended. Also importantly, this is the first quantitative study to demonstrate that HSCLs do not necessarily have an unintended effect on HIV testing. Contingent on the target populations (e.g., IDUs, sex workers) and personal behavioral characteristics, HSCLs exert mixed influences on HIV testing. There is no significant effect among individuals who exhibit risk behaviors (needle sharing or condomless sex). But for people who do not exhibit risk behaviors, HIV law against needle sharing may discourage them from getting tested for HIV, while HIV law against sex worker promotes HIV testing.

This sounds counterintuitive because if not exhibiting risk behaviors, why would the law impact their likelihood of HIV testing? There are several possible explanations. It is likely that non-risk-takers are more “deterable” by the threat of criminal punishment when compared to incorrigible, risk takers (Pogarsky, 2002). In other words, HSCLs may have a stronger general deterrent effect and thus discourage non-risk-takers from getting tested, out of the fear of criminal punishment. Alternatively, this statistically significant effect may be an artifact. To an unknown extent, participants might deny having risk behaviors out of the social desirability bias. Therefore, HSCLs may still have a deterrent effect on certain risk takers who tend to underreport their risk behaviors. This would require a refined research design that collects information from other informants (e.g., family or friends) to validate participants’ responses.

Lastly, this is also the first study that adopts the framework of Deterrence Theory to examine the association between HIV-related outcomes and state-level criminal justice factors. Prior criminological research suggests that criminal justice variables have mixed effects on

violent crimes (Kovandzic et al., 2009; Nagin et al., 2012; Chalfin et al., 2013; Chalfin et al., 2015); high crime rates may or may not be associated with poor performance of the criminal justice system (Nagin et al., 2012). The results from this study suggest that a larger capacity of criminal justice system may encourage infected individuals' disclosure of HIV serostatus to their primary sexual partners, whereas a better performance of criminal justice personnel may have inhibitory effects. It is possible that the awareness of criminal punishment (e.g., imprisonment rates, more correctional facilities built in a state) pushes HIV-positive individuals to disclose their own serostatus; but the fear of punishment (e.g., living in a state with higher arrest rates or surrounded by more law enforcement people) discourages them from disclosing HIV status. To address this assumption, future research may examine how fear of punishment and other psychological factors interact with each other to influence HIV disclosure decisions and process.

LIMITATIONS OF THE STUDY

This study has a number of limitations that should be considered when interpreting the results, including the cross-sectional design that precludes any causal inferences. An ideal study should simulate the experimental design that randomly assigns interventions (criminal laws) into different locations, or simulate a natural experiment that collects information before and after the intervention. In this way, the immediate and delayed effects of HSCLs can be more precisely evaluated through better data collection and sophisticated statistical analysis (for example, structural equation modeling or interrupted time series analysis).

Moreover, the findings should not be generalized to males living in other states, and at-risk individuals other than MSM and IDUs. Statistically, mixed-effects regression models may not have enough power to detect significance because of the smaller number of groups (3 state

only) and the small sample size. It is possible that HSCLs have significant influences if data could be collected from more participants living in different states.

I also note that state laws have wide variations in terms their contents, definitions, and possible punishments, which depend on the location and may change over time. Each state also has different laws, cultures, capacities, priorities, and performance of the criminal justice system that may jointly influence the results. Future study may address these issues by collecting detailed information from multiple agencies. Furthermore, state-level variables examined in this study are a general measure of the criminal justice system and therefore, not specific to the context of HIV. Future research can be refined by collecting specific information on HIV populations that are actually processed or punished by the criminal justice system to see at the state level, how these factors influence the results.

Lastly, the awareness of criminal punishment also influences behavioral outcomes at the individual level (Braga et al., 2011) and the population level (Wagenaar et al., 2013). More specifically, the awareness of state HIV criminal laws may influence outcomes such as HIV disclosure, risk behaviors, and HIV testing (Harvath et al., 2010; Horvath et al., 2016; Kesler et al., 2018). However, these variables were not collected in SATHCAP study and therefore their associations could not be addressed. Future research may collect information from both at-risk individuals and the general public to see how these factors interact with each other to influence HIV-related outcomes.

POLICY IMPLICATIONS

Overall, the research presented here extends knowledge and adds to discussions concerning the influences of HIV-specific criminal laws on at-risk individuals. This study should

challenge researchers to consider behavioral outcomes among males who inject drugs and men who had sex with men, and to explore the extent to which HIV criminalization does or does not interfere with HIV prevention effort. Based on the study results, there are a number of policy considerations that should be taken into account in determining the criminalization of HIV non-disclosure.

Repeal HIV-specific criminal laws for the lack of deterrence

As noted in a number of recent studies (Lee et al., 2015; Harvath et al., 2016; Kesler et al., 2018), the current state HIV criminal laws offer little public health benefit. My study results add evidence to such arguments. The results of this study suggest that HSCLs generally do not have a deterrent effect: HSCLs do not promote HIV disclosure, do not inhibit needle sharing, and do not inhibit condomless sex. Moreover, criminal laws against needle sharing may hamper HIV prevention by lowering the likelihood of HIV testing among at-risk individuals who have not exhibited risk behaviors yet. In other words, HIV criminalization may hamper the prevention efforts.

Thus, in considering the impact of HIV criminalization on HIV prevention, policymakers and researchers must take into account the different types of HSCLs, and their relationships with the target populations and risk behaviors. Doing so will contribute to a more thorough understanding of what HIV criminalization means for at-risk individuals in terms of the decision and process of serostatus disclosure, engaging in risk behaviors, and getting tested for HIV. As such, the outdated criminal laws that have counterproductive effects should be repealed.

Investigate the primary functions of criminal law

Criminal laws serve four primary functions: deterrence, incapacitation, rehabilitation, and retribution. But it is unclear that these functions will make significant contributions to prevent HIV transmission. First, criminal deterrence may not be an ideal, public health strategy in terms of HIV prevention. Although deterrence is an established theme in criminal justice, but its role in prevention of HIV infection has been treated with ambivalence, due to a lack of systematic studies.

Moreover, imprisonment of infected individuals does not necessarily prevent the spread of virus. The transmission of HIV may still occur through high-risk behaviors between prisoners due to the lack of access to condoms (Braithwaite & Arriola, 2008). Compared to public health approaches, imprisonment may not be the best tool to “rehabilitate” a person to prevent future conduct that carries a significant risk of HIV transmission. While imposing criminal punishment as retribution can be justified for behaviors that are morally blameworthy, the merits of such approach contribute little to HIV prevention. Appealing to retribution in policy making may also heighten HIV stigma and discrimination. Keeping these issues in consideration, future research should investigate the primary functions of criminal law and their efficacy as prevention strategies against the transmission of HIV.

Ground best available scientific evidence in the determination of criminal liability

Specific concerns have been raised about the problem of “significant risk” defined in criminal laws. When it comes to the mode of transmission and risks, most HSCLs do not keep up with best available scientific evidence. Regardless of safe sex practice, disproportionate

punishment has been imposed on conduct that carries little risk of HIV transmission. In response to this issue, legal reforms have taken place in recent years. In 2018, for instance, North Carolina has modernized its HSCL so that infected individuals are no longer required to disclose their HIV serostatus if they are virally suppressive for at least 6 months; additionally, they do not have to use a condom if their sexual partner is taking PrEP (Pre-exposure prophylaxis) or is also HIV-positive (NC AIDS Action Network, 2018).

Similar principles have also been adopted in other countries. For example, the Swiss Statement stated that HIV is not transmitted under fully suppressive therapy (Vernazza & Bernard, 2016). In line with scientific evidence, HIV-positive individuals on effective antiretroviral therapy with an undetectable viral load are not sexually infectious. Ruled by the Swiss Federal Court, HIV transmission is no longer regarded as serious bodily harm, and therefore results in lesser sentences.

Call for alternative approaches to prevent the transmission of HIV

While scientific literature has documented the mode of HIV transmission and levels of risk, the extent to which infected individuals can be persuaded—through actual punishment or knowledge of criminal risks—not to transmit HIV virus to others remains understudied. There is still a strong need for research that explores the underlying social, behavioral and cultural factors that drive HIV-related criminalization. When it comes to deterrence, this dissertation research highlights the possibility that criminalization of HIV non-disclosure provides little preventive benefit.

In reality, criminal punishment only applies to a tiny subset of cases (see Appendix Table A). This might explain why the presence of HSCL essentially makes no difference regarding

HIV disclosure and risk behaviors. Lessons can also be learned from public health approaches such as harm reduction that has had some success in working with the criminal justice system for injection drug users. To address such complex, public health problems, creating an enabling environment—where HIV-positive individuals feel comfortable disclosing their serostatus and therefore their partners can protect themselves by practicing safe sex—should be integrated into strategies for HIV prevention.

REFERENCES

- Adam, B. D., Elliott, R., Corriveau, P., & English, K. (2014). Impacts of criminalization on the everyday lives of people living with HIV. *Canada Sexuality Research and Social Policy*, 11(1), 39-49.
- Adebayo, A. M., Ilesanmi, O. S., Omotoso, B. A., Ayodeji, O. O., Kareem, A. O., & Alele, F. O. (2014). Disclosure to sexual partner and condom use among HIV positive clients attending ART clinic at a tertiary health facility in South West Nigeria. *The Pan African Medical Journal*, 18.
- Adeoye-Agboola, D. I., Evans, H., Hewson, D., & Pappas, Y. (2016). Factors influencing HIV disclosure among people living with HIV/AIDS in Nigeria: a systematic review using narrative synthesis and meta-analysis. *Public health*, 136, 13-28.
- Alaei, K., Paynter, C. A., Juan, S. C., & Alaei, A. (2016). Using PrEP, losing condoms? PrEP promotion may undermine safe sex. *AIDS*, 30(18), 2753-2756.
- Alexander, L. A. (1984). Liability in tort for the sexual transmission of disease: Genital Herpes and the law. *Cornell Law Review*, 70, 101.
- Allers, K., Hütter, G., Hofmann, J., Loddenkemper, C., Rieger, K., Thiel, E., & Schneider, T. (2011). Evidence for the cure of HIV infection by CCR5 Δ 32/ Δ 32 stem cell transplantation. *Blood*, 117(10), 2791-2799.
- Anwar, S., & Loughran, T. A. (2011). Testing a Bayesian learning theory of deterrence among serious juvenile offenders. *Criminology*, 49(3), 667-698.

- Austin, P. C. (2010). Estimating multilevel logistic regression models when the number of clusters is low: A comparison of different statistical software procedures. *The International Journal of Biostatistics*, 6(1).
- Baral, S. D., Friedman, M. R., Geibel, S., Rebe, K., Bozhinov, B., Diouf, D., ... & Cáceres, C. F. (2015). Male sex workers: practices, contexts, and vulnerabilities for HIV acquisition and transmission. *The Lancet*, 385(9964), 260-273.
- Beccaria, C. (1764). 1986. *On crimes and punishments*. Indianapolis: Hackett Pub. Co.
- Buchanan, K. S. (2015). When Is HIV a Crime? *Sexuality, Gender and Consent*. *Sexuality, Gender and Consent* (May 28, 2015), 99, 14-29.
- Bernard, E., & Bennett-Carlson, R. (2012). Criminalization of HIV non-disclosure, exposure and transmission: Background and current landscape. Geneva: UNAIDS. Retrieved from http://www.unaids.org/sites/default/files/en/media/unaids/contentassets/documents/document/2012/BackgroundCurrentLandscapeCriminalisationHIV_Final.pdf
- Bluthenthal, R. N., Do, D. P., Finch, B., Martinez, A., Edlin, B. R., & Kral, A. H. (2007). Community characteristics associated with HIV risk among injection drug users in the San Francisco Bay Area: A multilevel analysis. *Journal of Urban Health*, 84(5), 653-666.
- Bollag, S. (2017). California lawmakers want to repeal HIV-criminalization laws. Retrieved from <https://www.usnews.com/news/best-states/california/articles/2017-03-08/california-lawmakers-want-to-repeal-hiv-criminalization-laws>
- Braga, A. A. (2001). The effects of hot spots policing on crime. *The Annals of the American Academy of Political and Social Science*, 578(1), 104-125.

Braga, A. A., & Weisburd, D. L. (2011). The effects of focused deterrence strategies on crime: A systematic review and meta-analysis of the empirical evidence. *Journal of Research in Crime and Delinquency*, 49(3), 323-358.

Braithwaite, R. L., & Arriola, K. R. (2008). Male prisoners and HIV prevention: A call for action ignored. *American Journal of Public Health*, 98(Supplement_1), S145-S149.

Buccafusco, C., & Masur, J. S. (2013). Innovation and Incarceration: An Economic Analysis of Criminal Intellectual Property Law. *S. Cal. L. Rev.*, 87, 275-334.

Burris, S., Beletsky, L., Bureson, J. A., Case, P., & Lazzarini, Z. (2007). Do criminal laws influence HIV risk behavior? An empirical trial. *Arizona State Law Journal*, 39, 467-519.

Centers for Disease Control and Prevention. (2001). HIV and AIDS—United States, 1981-2000.

Retrieved from <https://www.cdc.gov/mmwr/preview/mmwrhtml/mm5021a2.htm>

Centers for Disease Control and Prevention. (2015a). HIV Surveillance Report, 2014, vol. 26.

Retrieved from <http://www.cdc.gov/hiv/pdf/library/reports/surveillance/cdc-hiv-surveillance-report-us.pdf>

Centers for Disease Control and Prevention. (2015b). Effectiveness of prevention strategies to reduce the risk of acquiring or transmitting HIV. Retrieved from

<https://www.cdc.gov/hiv/pdf/risk/estimates/cdc-hiv-risk-prevention.pdf>

Centers for Disease Control and Prevention. (2016a). HIV in the United States: At a glance.

Retrieved from <http://www.cdc.gov/hiv/statistics/overview/ataglance.html>

Centers for Disease Control and Prevention. (2016b). Trends in U.S. HIV diagnoses, 2005-2014.

Retrieved from <http://www.cdc.gov/nchhstp/newsroom/docs/factsheets/hiv-data-trends-fact-sheet-508.pdf>

Centers for Disease Control and Prevention. (2016c). HIV among youth. Retrieved from

<http://www.cdc.gov/hiv/group/age/youth/>

Centers for Disease Control and Prevention. (2016d). PrEP. Retrieved from

<http://www.cdc.gov/hiv/basics/prep.html>

Centers for Disease Control and Prevention. (2016e). HIV transmission. Retrieved from

<http://www.cdc.gov/hiv/basics/transmission.html>

Centers for Disease Control and Prevention. (2016f). HIV among women. Retrieved from

<http://www.cdc.gov/hiv/pdf/group/gender/women/cdc-hiv-women.pdf>

Centers for Disease Control and Prevention. (2016g). HIV among pregnant women, infants, and

children. Retrieved from <http://www.cdc.gov/hiv/group/gender/pregnantwomen/>

Centers for Disease Control and Prevention. (2016h). HIV among African Americans. Retrieved

from <http://www.cdc.gov/hiv/group/raciaethnic/africanamericans/>

Centers for Disease Control and Prevention. (2016i). Male circumcision. Retrieved from

https://www.cdc.gov/hiv/pdf/prevention_research_malecircumcision.pdf

Centers for Disease Control and Prevention. (2016j). Updated guidelines for antiretroviral postexposure prophylaxis after sexual, injection drug use, or other nonoccupational exposure to HIV—United States, 2016. Retrieved from

<http://www.cdc.gov/hiv/pdf/programresources/cdc-hiv-npep-guidelines.pdf>

Centers for Disease Control and Prevention. (2016k). Genital Herpes Simplex Virus (HSV) Infections—Initial Visits to Physicians’ Offices, United States, 1966–2014. Retrieved from <http://www.cdc.gov/std/stats15/figures/50.htm>

Center for Disease Control and Prevention. (2016l). HIV Testing and Risk Behaviors Among Gay, Bisexual, and Other Men Who Have Sex with Men — United States. Retrieved from <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6247a4.htm>

Chalfin, A., & McCrary, J. (2013). The effect of police on crime: New evidence from US cities, 1960-2010 (No. w18815). National Bureau of Economic Research. Retrieved from: <https://pdfs.semanticscholar.org/e87f/473217411b4544e9b9958abff0ff964ec0da.pdf>

Chalfin, A., & McCrary, J. (2015). Criminal deterrence: a review of the literature. *J Econ Lit*, 11(22), 2014. Retrieved from: http://eml.berkeley.edu/~jmccrary/chalfin_mccrary2015b.pdf

Civil Rights Division, U.S. Department of Justice. (2014). Best practices guide to reform HIV-specific criminal laws to align with scientifically-supported factors. Retrieved from <https://www.aids.gov/federal-resources/national-hiv-aids-strategy/doj-hiv-criminal-law-best-practices-guide.pdf>

Cobucci, R. N. O., Lima, P. H., de Souza, P. C., Costa, V. V., de Mesquita Cornetta, M. D. C., Fernandes, J. V., & Gonçalves, A. K. (2015). Assessing the impact of HAART on the incidence of defining and non-defining AIDS cancers among patients with HIV/AIDS: A systematic review. *Journal of Infection and Public Health*, 8(1), 1-10.

- Cohen, M. S., Chen, Y. Q., McCauley, M., Gamble, T., Hosseinipour, M. C., Kumarasamy, N., ... & Godbole, S. V. (2016). Antiretroviral therapy for the prevention of HIV-1 transmission. *New England Journal of Medicine*, 375(9), 830-839.
- Cook, P. J. (1980). Research in criminal deterrence: Laying the groundwork for the second decade. *Crime and Justice*, 211-268.
- Cook, R. J., & Dickens, B. M. (2014). Reducing stigma in reproductive health. *International Journal of Gynecology & Obstetrics*, 125(1), 89-92.
- Cornish, D. B., & Clarke, R. V. (Eds.). (2014). *The reasoning criminal: Rational choice perspectives on offending*. Transaction Publishers.
- Delavande, A., Goldman, D., & Sood, N. (2010). Criminal Prosecution and Human Immunodeficiency Virus–Related Risky Behavior. *Journal of Law and Economics*, 53(4), 741-782.
- Devos, K. (2013). *Factors influencing individual taxpayer compliance behaviour*. New York: Springer Science & Business Media.
- Dezhbakhsh, H., Rubin, P. H., & Shepherd, J. M. (2003). Does capital punishment have a deterrent effect? New evidence from postmoratorium panel data. *American Law and Economics Review*, 5(2), 344-376.
- Dezhbakhsh, H., & Shepherd, J. M. (2006). The Deterrent Effect of Capital Punishment: Evidence from a “Judicial Experiment.” *Economic Inquiry*, 44(3), 512-535.
- Dirk Johnson. (1990). Ryan White dies of AIDS at 18; his struggle helped pierce myths. The New York Times.

- Dodds, C., Bourne, A., & Weait, M. (2009). Responses to criminal prosecutions for HIV transmission among gay men with HIV in England and Wales. *Reproductive Health Matters*, 17(34), 135-145.
- Donohue, J., & Wolfers, J. (2005). Uses and abuses of empirical evidence in the death penalty debate. *Stanford Law Review*, 58, 791-841.
- Dressler, J. (2012). *Understanding criminal law* (6th Ed.). San Francisco: Matthew Bender & Company.
- Engel, R. S., Corsaro, N., & Tillyer, M. S. (2010). Evaluation of the Cincinnati initiative to reduce violence (CIRV). Cincinnati, OH: University of Cincinnati Policing Institute. Retrieved from: https://nnscommunities.org/old-site-files/CIRV_Evaluation_Report_2010_FINAL.pdf
- ERIC Institute of Education Sciences. (1988). The Presidential Commission on the Human Immunodeficiency Virus Epidemic Report. Retrieved from <http://files.eric.ed.gov/fulltext/ED299531.pdf>
- Forsyth, A. D., & Valdiserri, R. O. (2015). A State-Level Analysis of Social and Structural Factors and HIV Outcomes Among Men Who Have Sex with Men in the United States. *AIDS Education and Prevention*, 27(6), 493-504.
- Fritchie, H. H. (2015). Burning the Family Silver: A Plea to Reform Louisiana's Antiquated HIV-Exposure Law. *Tul. L. Rev.*, 90, 209-240.

Food and Drug Administration. (2012). FDA approves first drug for reducing the risk of sexually acquired HIV infection. Retrieved from

<http://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm312210.htm>

Food and Drug Administration. (2016). FDA-approved HIV medicines. Retrieved from

<https://aidsinfo.nih.gov/education-materials/fact-sheets/21/58/fda-approved-hiv-medicines>

Fowler, D. R., Cantos, A. L., & Miller, S. A. (2016). Exposure to violence, typology, and recidivism in a probation sample of domestic violence perpetrators. *Child Abuse & Neglect*, 59, 66-77.

Gable, L., Gamharter, K., Gostin, L. O., Hodge, J. G., & Van Puymbroeck, R. V. (2007). Legal aspects of HIV/AIDS: A guide for policy and law reform. Washington, DC: The World Bank Group.

Galletly, C. L., & Pinkerton, S. D. (2006). Conflicting messages: How criminal HIV disclosure laws undermine public health efforts to control the spread of HIV. *AIDS and Behavior*, 10(5), 451-461.

Galletly, C. L., DiFranceisco, W., & Pinkerton, S. D. (2009). HIV-positive persons' awareness and understanding of their state's criminal HIV disclosure law. *AIDS and Behavior*, 13(6), 1262-1269.

Galletly, C. L., Glasman, L. R., Pinkerton, S. D., & DiFranceisco, W. (2012a). New Jersey's HIV exposure law and the HIV-related attitudes, beliefs, and sexual and seropositive status disclosure behaviors of persons living with HIV. *American Journal of Public Health*, 102(11), 2135-2140.

- Galletly, C. L., Pinkerton, S. D., & DiFranceisco, W. (2012b). A quantitative study of Michigan's criminal HIV exposure law. *AIDS Care*, 24(2), 174-179.
- Galletly, C., Lazzarini, Z., Sanders, C., & Pinkerton, S. D. (2014). Criminal HIV exposure laws: Moving forward. *AIDS and Behavior*, 18(6), 1011-1014.
- Gorbach, P. M., Galea, J. T., Amani, B., Shin, A., Celum, C., Kerndt, P., & Golden, M. R. (2004). Don't ask, don't tell: Patterns of HIV disclosure among HIV positive men who have sex with men with recent STI practicing high risk behaviour in Los Angeles and Seattle. *Sexually Transmitted Infections*, 80(6), 512-517.
- Gruenewald, P. J., Freisthler, B., Remer, L., LaScala, E. A., & Treno, A. (2006). Ecological models of alcohol outlets and violent assaults: Crime potentials and geospatial analysis. *Addiction*, 101(5), 666-677.
- Günthard, H. F., Saag, M. S., Benson, C. A., Del Rio, C., Eron, J. J., Gallant, J. E., ... & Volberding, P. A. (2016). Antiretroviral drugs for treatment and prevention of HIV infection in adults: 2016 recommendations of the International Antiviral Society–USA panel. *JAMA*, 316(2), 191-210.
- Holtgrave, D. R. (2014). Development of year 2020 goals for the National HIV/AIDS Strategy for the United States. *AIDS and Behavior*, 18(4), 638-643.
- Hood, R., & Hoyle, C. (2015). *The death penalty: A worldwide perspective*. OUP Oxford.
- Hoppe, T. A. (2015). Disparate risks of conviction under Michigan's felony HIV disclosure law: An observational analysis of convictions and HIV diagnoses, 1992–2010. *Punishment & Society*, 17(1), 73-93.

- Horvath, K. J., Weinmeyer, R., & Rosser, S. (2010). Should it be illegal for HIV-positive persons to have unprotected sex without disclosure? An examination of attitudes among US men who have sex with men and the impact of state law. *AIDS Care*, 22(10), 1221-1228.
- Horvath, K. J., Meyer, C., & Rosser, B. S. (2016). Men who have sex with men who believe that their state has a HIV criminal law report higher condomless anal sex than those who are unsure of the law in their state. *AIDS and Behavior*, 1-8.
- Iguchi, M. Y., Ober, A. J., Berry, S. H., Fain, T., Heckathorn, D. D., Gorbach, P. M., ... & Zule, W. A. (2009). Simultaneous recruitment of drug users and men who have sex with men in the United States and Russia using respondent-driven sampling: sampling methods and implications. *Journal of Urban Health*, 86(1), 5-31.
- Isler, M. R., Eng, E., Maman, S., Adimora, A., & Weiner, B. (2014). Public health and church-based constructions of HIV prevention: Black Baptist perspective. *Health Education Research*, 29(3), 470-484.
- Jacobs, B. A. (2010). Deterrence and deterrability. *Criminology*, 48(2), 417-441.
- Kesler, M. A., Kaul, R., Loutfy, M., Myers, T., Brunetta, J., Remis, R. S., & Gesink, D. (2018). Prosecution of non-disclosure of HIV status: Potential impact on HIV testing and transmission among HIV-negative men who have sex with men. *PLOS One*, 13(2), e0193269.
- Klitzman, R., Kirshenbaum, S., Kittel, L., Morin, S., Daya, S., Mastrogiacomo, M., & Rotheram-Borus, M. J. (2004). Naming names: perceptions of name-based HIV reporting, partner

- notification, and criminalization of non-disclosure among persons living with HIV. *Sexuality Research & Social Policy*, 1(3), 38-57.
- Kovandzic, T. V., Vieraitis, L. M., & Boots, D. P. (2009). Does the death penalty save lives? *Criminology & Public Policy*, 8(4), 803-843.
- Law, V. (2016). Activists win legislative overhaul of Colorado's HIV criminalization laws, await governor's signature. Retrieved from <http://www.thebody.com/content/77636/activists-win-legislative-overhaul-of-colorados-hi.html>
- Lazarini, Z., Galletly, C. L., Mykhalovskiy, E., Harsono, D., O'Keefe, E., Singer, M., & Levine, R. J. (2013). Criminalization of HIV transmission and exposure: Research and policy agenda. *American Journal of Public Health*, 103(8), 1350-1353.
- Lee, S. G. (2015). Criminal Law and HIV Testing: Empirical analysis of how at-risk individuals respond to the law. *Yale Journal of Health Policy, Law, and Ethics*, 14(1), 4.
- Lehman, J. S., Carr, M. H., Nichol, A. J., Ruisanchez, A., Knight, D. W., Langford, A. E., ... & Mermin, J. H. (2014). Prevalence and public health implications of state laws that criminalize potential HIV exposure in the United States. *AIDS and Behavior*, 18(6), 997-1006.
- Li, H., Goggins, W., & Lee, S. S. (2009). Multilevel analysis of HIV related risk behaviors among heroin users in a low prevalence community. *BMC Public Health*, 9(1), 137-146.
- Loughran, T.A., Paternoster, R., Piquero, A.R. and Pogarsky, G. (2011). On ambiguity in perceptions of risk: Implications for criminal decision making and deterrence. *Criminology*, 49(4), pp.1029-1061.

- MacArthur, G. J., Minozzi, S., Martin, N., Vickerman, P., Deren, S., Bruneau, J., ... & Hickman, M. (2012). Opiate substitution treatment and HIV transmission in people who inject drugs: systematic review and meta-analysis. *BMJ*, 345, e5945.
- Machin, S., Marie, O., & Vujić, S. (2011). The crime reducing effect of education. *The Economic Journal*, 121(552), 463-484.
- McFadden, D. L. 1974. Conditional logit analysis of qualitative choice behavior. In P. Zarembka (Ed.), *Frontiers in Econometrics* (pp. 105–142). New York: Academic Press. Retrieved from <https://elsa.berkeley.edu/reprints/mcfadden/zarembka.pdf>
- McGarrell, E. F., Chermak, S., Wilson, J. M., & Corsaro, N. (2006). Reducing homicide through a “lever-pulling” strategy. *Justice Quarterly*, 23(02), 214-231.
- Myers, J. E., Xia, Q., Torian, L. V., Irvine, M., Harriman, G., Sepkowitz, K. A., & Shepard, C. W. (2016). Implementation and operational research: CD4 count monitoring frequency and risk of CD4 count dropping below 200 cells per cubic millimeter among stable HIV-infected patients in New York City, 2007–2013. *Journal of Acquired Immune Deficiency Syndromes*, 71(3), e73.
- Nagin, D. S. (1998). Criminal deterrence research at the outset of the twenty-first century. *Crime and Justice*, 1-42.
- Nagin, D. S., & Pepper, J. V. (Eds.). (2012). *Deterrence and the death penalty*. National Academies Press.

- NC AIDS Action Network. (2018). Modernized HIV control measures. Retrieved from <http://www.ncaan.org/wp-content/uploads/2018/01/modernized-HIV-control-measures-can-be-found-here..pdf>
- Oldenburg, C. E., Perez-Brumer, A. G., Hatzenbuehler, M. L., Krakower, D., Novak, D. S., Mimiaga, M. J., & Mayer, K. H. (2015). State-level structural sexual stigma and HIV prevention in a national online sample of HIV-uninfected MSM in the United States. *AIDS*, 29(7), 837-845.
- Patel, P., Borkowf, C. B., Brooks, J. T., Lasry, A., Lansky, A., & Mermin, J. (2014). Estimating per-act HIV transmission risk: a systematic review. *AIDS*, 28(10), 1509-1519.
- Patterson, S. E., Milloy, M. J., Ogilvie, G., Greene, S., Nicholson, V., Vonn, M., ... & Kaida, A. (2015). The impact of criminalization of HIV non-disclosure on the healthcare engagement of women living with HIV in Canada: A comprehensive review of the evidence. *Journal of the International AIDS Society*, 18(1).
- Paz-Bailey, G., Mendoza, M., Finlayson, T., Wejnert, C., Le, B., Rose, C., ... & NHBS Study Group. (2016). Trends in condom use among men who have sex with men in the United States: The role of antiretroviral therapy and sero-adaptive strategies. *AIDS*, 30(12), 1985-1990.
- Payne, B. K., & Coogle, V. (1998). Examining attitudes about the death penalty. *Corrections Compendium*, 23(1-5), 24-26.
- Pogarsky, G. (2002). Identifying “deterable” Offenders: Implications for research on deterrence. *Justice Quarterly*, 19(3), 431-452.

- Pogarsky, G. (2007). Deterrence and individual differences among convicted offenders. *Journal of Quantitative Criminology*, 23(1), 59-74.
- Pogarsky, G. (2014). Offender Decision Making and Behavioral Economics. In *Encyclopedia of Criminology and Criminal Justice* (pp. 3311-3315). Springer New York.
- Richardson, R., Golden, S., & Hanssens, C. (2015). Ending & defending against HIV criminalization: A manual for advocates. The Center for HIV Law & Policy. Retrieved from <http://www.hivlawandpolicy.org/sites/www.hivlawandpolicy.org/files/HIV%20Crim%20Manual%20%28updated%205.4.15%29.pdf>
- Rodger, A. J., Cambiano, V., Bruun, T., Vernazza, P., Collins, S., van Lunzen, J., ... & Asboe, D. (2016). Sexual activity without condoms and risk of HIV transmission in serodifferent couples when the HIV-positive partner is using suppressive antiretroviral therapy. *JAMA*, 316(2), 171-181.
- Roebuck, J. (2014). Criminal Liability for Transmission of Herpes Simplex Virus. *The Journal of Criminal Law*, 78, 294-299.
- Sgaier, S. K., Reed, J. B., Thomas, A., & Njeuhmeli, E. (2014). Achieving the HIV prevention impact of voluntary medical male circumcision: Lessons and challenges for managing programs. *PLOS Med*, 11(5), e1001641.
- Shepherd, J. P. (2001). Criminal deterrence as a public health strategy. *The Lancet*, 358(9294), 1717-1722.

- Smith, D. K., Herbst, J. H., Zhang, X., & Rose, C. E. (2015). Condom effectiveness for HIV prevention by consistency of use among men who have sex with men in the United States. *JAIDS*, 68(3), 337-344.
- Song, Y. S., Calsyn, D. A., Doyle, S. R., Dierst-Davies, R., Chen, T., & Sorensen, J. L. (2009). Predictors of condom use among men enrolled in drug treatment programs. *AIDS education and prevention: official publication of the International Society for AIDS Education*, 21(5), 460-473.
- Sullivan, K. M. (2005). Male self-disclosure of HIV-positive serostatus to sex partners: a review of the literature. *Journal of the Association of Nurses in AIDS Care*, 16(6), 33-47.
- Teplin, L. A., Jakubowski, J. A., Abram, K. M., Olson, N. D., Stokes, M. L., & Welty, L. J. (2014). Firearm homicide and other causes of death in delinquents: A 16-year prospective study. *Pediatrics*, 134(1), 63-73.
- The White House. (2015). National HIV/AIDS Strategy for the United States: Updated to 2020. Retrieved from <https://www.aids.gov/federal-resources/national-hiv-aids-strategy/nhas-update.pdf>
- Tobian, A. A., Kacker, S., & Quinn, T. C. (2014). Male circumcision: A globally relevant but under-utilized method for the prevention of HIV and other sexually transmitted infections. *Annual Review of Medicine*, 65, 293-306.
- UNAIDS. (2012). Criminalization of HIV non-disclosure, exposure and transmission: Background and current landscape. Retrieved from http://www.unaids.org/sites/default/files/en/media/unaids/contentassets/documents/document/2012/BackgroundCurrentLandscapeCriminalisationHIV_Final.pdf

UNAIDS. (2017). Fact sheet November 2016. Retrieved from

<http://www.unaids.org/en/resources/fact-sheet>

Underhill, K., Montgomery, P., & Operario, D. (2007). Sexual abstinence only programmes to prevent HIV infection in high income countries: Systematic review. *BMJ*, 335(7613), 248-260.

United States Government Publishing Office. (1990). Ryan White Comprehensive AIDS Resources Emergency Act of 1990. Retrieved from

<https://www.gpo.gov/fdsys/pkg/STATUTE-104/pdf/STATUTE-104-Pg576.pdf>

U.S. Department of Health & Human Services. (2016a). National HIV/AIDS Strategy: Updated to 2020. Retrieved from <https://www.aids.gov/federal-resources/national-hiv-aids-strategy/nhas-update/>

U.S. Department of Health & Human Services. (2016b). CD4 count. Retrieved from

<https://www.aids.gov/hiv-aids-basics/just-diagnosed-with-hiv-aids/understand-your-test-results/cd4-count/>

U.S. Department of Justice Civil Rights Division. (2014). Best Practices Guide to Reform HIV-Specific Criminal Laws to Align with Scientifically-Supported Factors. Retrieved from

<http://aids.gov/federal-resources/national-hiv-aids-strategy/doj-hiv-criminal-law-best-practices-guide.pdf>

Van Gelder, J. L. (2013). Beyond rational choice: The hot/cool perspective of criminal decision making. *Psychology, Crime & Law*, 19(9), 745-763.

- Vernazza, P., & Bernard, E. (2016). HIV is not transmitted under fully suppressive therapy: The Swiss Statement—eight years later. *Swiss Med Wkly*, 146(w14246).
- Wagenaar, A. C., & Burris, S. C. (Eds.). (2013). *Public health law research: Theory and methods*. New Jersey: John Wiley & Sons.
- Weait, M. (2007). *Intimacy and responsibility: The criminalisation of HIV transmission*. New York: Routledge.
- Wenz, B., Nielsen, S., Gassowski, M., Santos-Hövenner, C., Cai, W., Ross, R. S., ... & Bremer, V. (2016). High variability of HIV and HCV seroprevalence and risk behaviours among people who inject drugs: Results from a cross-sectional study using respondent-driven sampling in eight German cities (2011–14). *BMC Public Health*, 16(1), 927-940.
- White, P. J., Fox, J., Weber, J., Fidler, S., & Ward, H. (2014). How Many HIV infections may be averted by targeting primary infection in men who have sex with men? Quantification of changes in transmission-risk behavior, using an individual-based model. *Journal of Infectious Diseases*, 210(suppl 2), S594-S599.
- Whittle, T. N., & Parker, K. F. (2014). Public Ideology, Minority Threat, and Felony Collateral Sanctions: A State-Level Analysis. *Criminal Justice Review*, 39(4), 432-454.
- Wiegert, K., Dinh, T. H., Mushavi, A., Mugurungi, O., & Kilmarx, P. H. (2014). Integration of prevention of mother-to-child transmission of HIV (PMTCT) postpartum services with other HIV care and treatment services within the maternal and child health setting in Zimbabwe, 2012. *PLOS One*, 9(6), e98236.

World Health Organization. (2016). Global summary of the AIDS epidemic, 2015. Retrieved from <http://www.who.int/hiv/data/en/>

Yang, B., & Lester, D. (2008). The deterrent effect of executions: A meta-analysis thirty years after Ehrlich. *Journal of Criminal Justice*, 36(5), 453-460.

Table 1. Empirical Studies Examining the Effect of HIV-Specific Criminal Laws on Serostatus Disclosure, Condomless Sex, and HIV Testing

Year	Authors	Research design	Sample	Association between HIV-specific criminal laws and three outcomes of interest	Other noteworthy results
Serostatus disclosure or condomless sex					
2004	Gorbach, P. M., Galea, J. T., Amani, B., Shin, A., Celum, C., Kermdt, P., & Golden, M. R.	Qualitative	55 HIV-positive men who have sex with men living in Seattle or Los Angeles	Participants who were less likely to disclose their positive status due reported their fear of arrest.	Other reasons for non-disclosure include "nobody's business," being in denial, having a low viral load, fear of rejection, "it's just sex" using drugs, and sex in public places.
2007	Burris, S., Beletsky, L., Burleson, J. A., Case, P., & Lazzarini, Z.	Quantitative	490 men who have sex with men living in two states (New York, Illinois).	No effect; criminal laws requiring disclosure was not significantly influencing condom use in anal or vaginal sex.	Most participants believed it was wrong to expose others to the virus; but such belief was not influenced by their beliefs about the law or whether they lived in a state with such a law or not.
2010	Delavande, A., Goldman, D., & Sood, N.	Quantitative	1,421 HIV-positive individuals living in 15 states or Washington DC.	Negative association; strict criminal laws are associated with an increase in safe sex (i.e., a reduction in condomless sex).	Strict criminal laws are associated with a reduction in the number of sexual partners, and an increase in sex with prostitutes.
2010	Horvath, K. J., Weinmeyer, R., & Rosser, S.	Quantitative	1,725 HIV-positive men who have sex with men who completed an online survey.	No effect; criminal laws did not deter unprotected sex.	Most (65%) participants believed it should be illegal for people living with HIV to have unprotected sex without disclosure.
2012	Galletly, C. L., Glasman, L. R., Pinkerton, S. D., & DiFrancisco, W.	Quantitative	479 community residents recruited from community-based organizations in New Jersey.	No effect; awareness of the law was not associated with disclosure or condom use with most recent partner.	Awareness of the law is not associated with increased sexual abstinence.
2012	Galletly, C. L., Pinkerton, S. D., & DiFrancisco, W.	Quantitative	384 HIV-positive men and women living in one state (Michigan).	No effect; awareness of the law was not associated with disclosure to all sex partners or decreased risk behaviors.	Awareness of the law is not associated with increased perceived responsibility for HIV transmission prevention.

Table 1. Empirical Studies Examining the Effect of HIV-Specific Criminal Laws on Serostatus Disclosure, Condomless Sex, and HIV Testing (Continued)

2016	Horvath, K. J., Meyer, C., & Rosser, B. S.	Quantitative	2,013 men who have sex with men living in 16 states.	Positive association: believing the existence of HIV criminal laws or living in a state having such laws were both associated with more condomless anal sex in the past 3 months.	75% (734 out of 984) participants living in a state having any HIV criminal law did not know the existence of HIV law in their state. There is no significant association between state history of arrests/prosecution/sentence enhancement and condomless anal sex.
HIV Testing					
2004	Klitzman, R., Kirshenbaum, S., Kittel, L., Morin, S., Daya, S., Mastrogiacomo, M., & Rotherham-Borus, M. J.	Qualitative	76 HIV-positive men and women living in 4 cities.	Criminalization of non-disclosure may deter HIV testing.	Name-based HIV reporting may undermine civil rights and privacy.
2015	Lee, S. G.	Quantitative	11,078 observations selected from CDC's data across 41 states.	Negative association: media's reporting of HIV criminalization was associated with a 7% to 9% decrease in HIV testing rate in states with HIV-specific statutes.	At-risk individuals living in states with HIV-specific laws are not less likely to report having been tested for HIV than those living in other states.
2018	Kesler, M. A., Kaul, R., Loufy, M., Myers, T., Brunetta, J., Remis, R. S., & Gesink, D.	Quantitative	150 HIV-negative men who have sex with men attending an HIV and primary care clinic in Toronto, Canada	Negative association: concern over future prosecution is associated with a 7% decrease in HIV testing.	This 7% decrease in HIV testing could lead to an 18.5% increase in community HIV transmission.
Other outcomes					
2009	Galletly, C. L., DiFrancisco, W., & Pinkerton, S. D.	Quantitative	384 HIV-positive men and women living in a state where a law required disclosure.	Not examined.	Over 70% of participants knew the existence of HIV-specific criminal laws.
2015	Forsyth, A. D., & Valdiserri, R. O.	Quantitative	50 States (ecological study)	Not examined.	HIV-specific criminal laws was associated with a higher AIDS diagnoses rates among men who have sex with men.
2015	Hoppe, T. A.	Quantitative	51 convicted cases living in Michigan.	Not examined.	Black men with female partners, and White women had a comparatively greater risk of conviction by HIV-specific criminal laws.

Table 2. State Variations of HIV-specific Criminal Laws

Targeted group	California	Illinois	North Carolina
(1) HIV-positive individuals (serostatus disclosure before having sex)	(+) ^a	(+) ^c	(-)
(2) HIV-positive PWID (serostatus disclosure before needle sharing)	(-)	(+) ^d	(+) ^e
(3) HIV-positive sex workers (serostatus disclosure before commercial sex)	(+) ^b	(-)	(-)

Notes: See Richardson et al. (2015) for an overview of HIV-specific criminal laws in different states. ^aCAL. HEALTH & SAFETY CODE § 120291. ^bCAL. PENAL CODE § 647f. ^{c,d}720 ILL. COMP. STAT. § 5/12-5.01. ^e10A N.C. ADMIN. CODE 41A.0202.

Table 3. HIV-specific Criminal Laws in California, Illinois, and North Carolina

State	HIV-specific criminal laws
California	<p><u>CAL. HEALTH & SAFETY CODE § 120291</u> Any person who exposes another to the human immunodeficiency virus (HIV) by engaging in unprotected sexual activity when the infected person knows at the time of the unprotected sex that he or she is infected with HIV, has not disclosed his or her HIV positive status, and acts with the specific intent to infect the other person with HIV, is guilty of a felony punishable by imprisonment in the state prison for three, five, or eight years.</p> <p><u>CAL. PENAL CODE § 647f</u> Prostitution; if the defendant has been previously convicted one or more times of a violation of that...subdivision or of any other offense listed in subdivision (d) of Section 1202.1, and in connection with one or more of those convictions a blood test was administered pursuant to Section 1202.1 or 1202.6 with positive test results, of which the defendant was informed, the previous conviction and positive blood test results, of which the defendant was informed, shall be charged in the accusatory pleading. If the previous conviction and informed test results are found to be true by the trier of fact or are admitted by the defendant, the defendant is guilty of a felony.</p>
Illinois	<p><u>720 ILL. COMP. STAT. § 5/12-5.01</u> (a) A person commits criminal transmission of HIV when he or she, with the specific intent to commit the offense: (1) engages in sexual activity with another without the use of a condom knowing that he or she is infected with HIV...or (3) dispenses, delivers, exchanges, sells, or in any other way transfers to another any nonsterile intravenous or intramuscular drug paraphernalia knowing that he or she is infected with HIV. (b) “Sexual activity” means the insertive vaginal or anal intercourse on the part of an infected male, receptive consensual vaginal intercourse on the part of an infected woman with a male partner, or receptive consensual anal intercourse on the part of an infected man or woman with a male partner. “Intravenous or intramuscular drug paraphernalia” means any equipment, product, or material of any kind which is peculiar to and marketed for use in injecting a substance into the human body...(d) It shall be an affirmative defense that the person exposed knew that the infected person was infected with HIV, knew that the action could result in infection with HIV, and consented to the action with that knowledge.</p>
North Carolina	<p><u>10A N.C. ADMIN. CODE 41A.0202</u> Infected persons shall not share needles or syringes, or any other drug-related equipment, paraphernalia, or works that may be contaminated with blood through previous use. If the date of initial infection is unknown, notify needle partners for the previous year.</p>

Notes: See Richardson et al. (2015) for an overview of HIV-specific criminal laws in different states. Information on HIV-specific criminal laws is also available in the legal research library Westlaw and LexisNexis.

Table 4. Descriptive Statistics (Standard Deviation in Parentheses)

	Total Sample (N = 2,930)	California (N = 623)	Illinois (N = 1,680)	North Carolina (N = 627)
1. Outcome variables				
Self-disclosure of HIV serostatus to main partner in the past 6 months	0.272 (0.445)	0.178 (0.383)	0.315 (0.465)	0.247 (0.432)
Needle sharing in the past 30 days	0.149 (0.356)	0.140 (0.347)	0.166 (0.372)	0.0924 (0.290)
Condomless sex in the past 6 months	0.836 (0.371)	0.819 (0.386)	0.853 (0.354)	0.804 (0.398)
Ever tested for HIV	0.831 (0.375)	0.896 (0.306)	0.808 (0.394)	0.828 (0.378)
2. Independent variables				
(1) Law against non-disclosure		1 (0)	1 (0)	0 (0)
(2) Law against needle sharing		0 (0)	1 (0)	1 (0)
(3) Law against sex worker		1 (0)	0 (0)	0 (0)
3. Individual-level variables				
Age (years)	43.56 (10.02)	43.01 (9.367)	45.20 (9.315)	39.76 (11.29)
Race/ethnicity				
White	0.141 (0.348)	0.236 (0.425)	0.0786 (0.269)	0.215 (0.411)
Black	0.719 (0.450)	0.493 (0.500)	0.792 (0.406)	0.750 (0.434)
Hispanic	0.122 (0.327)	0.226 (0.419)	0.120 (0.325)	0.0239 (0.153)
Other race/ethnicity	0.0365 (0.188)	0.0722 (0.259)	0.0262 (0.160)	0.0287 (0.167)
Education				
No formal education	0.0143 (0.119)	0.0209 (0.143)	0.0131 (0.114)	0.0112 (0.105)
Less than high school	0.306 (0.461)	0.209 (0.407)	0.330 (0.470)	0.337 (0.473)

High school graduate/GED	0.390 (0.488)	0.360 (0.480)	0.381 (0.486)	0.442 (0.497)
Some college	0.242 (0.429)	0.297 (0.457)	0.249 (0.433)	0.169 (0.375)
College graduate or more	0.0478 (0.213)	0.113 (0.316)	0.0262 (0.160)	0.0415 (0.200)
Monthly income				
\$0 to \$500	0.661 (0.474)	0.612 (0.488)	0.703 (0.457)	0.597 (0.491)
\$501 to \$1000	0.208 (0.406)	0.248 (0.432)	0.198 (0.398)	0.198 (0.399)
\$1001 to \$1500	0.0462 (0.210)	0.0408 (0.198)	0.0409 (0.198)	0.0656 (0.248)
\$1501 to \$2000	0.0496 (0.217)	0.0473 (0.212)	0.0306 (0.172)	0.102 (0.303)
\$2001 to \$2500	0.0141 (0.118)	0.0245 (0.155)	0.00901 (0.0945)	0.0176 (0.132)
\$2501 to \$3000	0.00586 (0.0763)	0.00816 (0.0900)	0.00661 (0.0811)	0.00160 (0.0400)
\$3001 to \$4000	0.00448 (0.0668)	0.00326 (0.0571)	0.00421 (0.0647)	0.00640 (0.0798)
\$4001 to \$5000	0.00345 (0.0586)	0.00489 (0.0698)	0.00300 (0.0548)	0.00320 (0.0565)
\$5001 or more	0.00724 (0.0848)	0.0114 (0.106)	0.00541 (0.0734)	0.00800 (0.0892)
Married	0.0621 (0.241)	0.0385 (0.193)	0.0756 (0.265)	0.0494 (0.217)
Having a job	0.192 (0.394)	0.146 (0.353)	0.161 (0.367)	0.322 (0.468)
Men who have sex with men (MSM)	0.118 (0.323)	0.345 (0.476)	0.0530 (0.224)	0.0686 (0.253)
Ever injected any drugs (IDU)	0.423 (0.494)	0.483 (0.500)	0.448 (0.497)	0.293 (0.456)
4. State-level criminal justice variables				
Number of prison inmates per 100,000 population		468 (0)	349 (0)	437 (0)

Number of correctional facilities per state	100 (0)	44 (0)	80 (0)
Number of criminal justice employees per state	111,062 (0)	51,390 (0)	30,132 (0)
Violent crime rates per 100,000 population	526 (0)	552 (0)	469 (0)

Table 5. Mixed-Effects Logistic Regression Models (Hypothesis 1), Odds Ratios

Variables	M1 H1: Disclosure law on HIV disclosure among HIV(+) individuals	M2 H1: IDU law on HIV disclosure among HIV(+) individuals	M3 H1: Sex worker law on HIV disclosure among HIV(+) individuals
Independent variables			
(1) Law against non-disclosure	3.201 (3.258)		
(2) Law against needle sharing		2.537 (2.416)	
(3) Law against sex worker			0.394 (0.375)
Individual-level variables			
Age (years)	0.987 (0.0190)	0.986 (0.0190)	0.986 (0.0190)
Race/ethnicity (ref=White)			
Black	1.321 (0.665)	1.232 (0.618)	1.232 (0.618)
Hispanic	0.805 (0.452)	0.840 (0.473)	0.840 (0.473)
Other race/ethnicity	0.371 (0.322)	0.382 (0.333)	0.382 (0.333)
Marital status (ref=unmarried)	4.828* (3.598)	5.043* (3.746)	5.043* (3.746)
Employment status (ref=jobless)	1.781 (0.846)	1.779 (0.847)	1.779 (0.847)
Education (ref=no formal education)			
Less than high school	1.203 (1.231)	1.154 (1.191)	1.154 (1.191)
High school graduate/GED	1.352 (1.375)	1.286 (1.321)	1.286 (1.321)
Some college	0.510 (0.528)	0.493 (0.516)	0.493 (0.516)
College graduate or more	0.469 (0.545)	0.447 (0.524)	0.447 (0.524)
Monthly income (ref=\$0 to \$500)			
\$501 to \$1000	1.409 (0.488)	1.397 (0.484)	1.397 (0.484)
\$1001 to \$1500	2.646 (1.690)	2.481 (1.562)	2.481 (1.562)
\$1501 to \$2000	0.791 (0.702)	0.812 (0.722)	0.812 (0.722)
\$2001 to \$2500	8.686*	9.513*	9.513*

	(8.689)	(9.585)	(9.585)
\$2501 to \$3000	-	-	-
\$3001 to \$4000	0.495 (0.647)	0.499 (0.654)	0.499 (0.654)
\$4001 to \$5000	5.459 (9.577)	5.535 (9.667)	5.535 (9.667)
\$5100 or more	0.338 (0.643)	0.331 (0.636)	0.331 (0.636)
Men who only have sex with men	1.975 (0.727)	2.122* (0.780)	2.122* (0.780)
Have you ever injected any drugs?	0.620 (0.217)	0.632 (0.222)	0.632 (0.222)
Constant	0.126 (0.207)	0.176 (0.274)	0.447 (0.677)
Observations	307	307	307
Number of groups	3	3	3

Note: * p<0.05, ** p<0.01, ***p<0.001

Table 6. Mixed-Effects Logistic Regression Models (Hypothesis 2), Odds Ratios

	M4 H2A: Disclosure law on sharing syringes/pa raphernalia among IDU	M5 H2A: IDU law on sharing syringes/p arapherna lia among IDU	M6 H2A: Sex worker law on sharing syringes/p arapherna lia among IDU	M7 H2B: Disclosure law on condomless vaginal/anal sex among HIV(+) individuals	M8 H2B: IDU law on condomless vaginal/anal sex among HIV(+) individuals	M9 H2B: Sex worker law on condomles s vaginal/an al sex among HIV(+) individual s
Variables						
Independent variables						
(1) Law against non-disclosure	1.632 (0.454)			0.927 (0.810)		
(2) Law against needle sharing		0.929 (0.197)			0.679 (0.443)	
(3) Law against sex worker			1.076 (0.228)			1.473 (0.961)
Individual-level variables						
Age (years)	0.986 (0.00900)	0.986 (0.00904)	0.986 (0.00904)	0.978 (0.0413)	0.979 (0.0408)	0.979 (0.0408)
Race/ethnicity (ref=White)						
Black	0.945 (0.226)	0.987 (0.237)	0.987 (0.237)	0.627 (0.583)	0.702 (0.661)	0.702 (0.661)
Hispanic	1.788* (0.459)	1.974** (0.498)	1.974** (0.498)	0.289 (0.274)	0.268 (0.253)	0.268 (0.253)
Other race/ethnicity	1.086 (0.458)	1.135 (0.477)	1.135 (0.477)	0.353 (0.369)	0.319 (0.332)	0.319 (0.332)
Marital status (ref=unmarried)	0.998 (0.346)	1.024 (0.355)	1.024 (0.355)	0.752 (1.230)	0.750 (1.245)	0.750 (1.245)
Employment status (ref=jobless)	0.727 (0.201)	0.717 (0.199)	0.717 (0.199)	0.377 (0.283)	0.359 (0.273)	0.359 (0.273)
Education (ref=no formal education)						
Less than high school	0.562 (0.350)	0.594 (0.367)	0.594 (0.367)	1.155 (1.120)	1.339 (1.318)	1.339 (1.318)
High school graduate/GED	0.521 (0.325)	0.544 (0.336)	0.544 (0.336)	2.533 (2.512)	2.644 (2.612)	2.644 (2.612)
Some college	0.554 (0.351)	0.600 (0.377)	0.600 (0.377)	1.433 (1.295)	1.565 (1.433)	1.565 (1.433)

College graduate or more	0.234 (0.201)	0.251 (0.215)	0.251 (0.215)			
Monthly income (ref=\$0 to \$500)						
\$501 to \$1000	0.763 (0.166)	0.764 (0.166)	0.764 (0.166)	1.477 (0.925)	1.486 (0.928)	1.486 (0.928)
\$1001 to \$1500	0.755 (0.376)	0.733 (0.364)	0.733 (0.364)	0.680 (0.614)	0.765 (0.684)	0.765 (0.684)
\$1501 to \$2000	0.655 (0.357)	0.631 (0.343)	0.631 (0.343)	0.342 (0.479)	0.361 (0.508)	0.361 (0.508)
\$2001 to \$2500	1.269 (1.022)	1.308 (1.053)	1.308 (1.053)	-	-	-
\$2501 to \$3000	0.571 (0.619)	0.596 (0.647)	0.596 (0.647)	-	-	-
\$3001 to \$4000	-	-	-	-	-	-
\$4001 to \$5000	-	-	-	-	-	-
\$5100 or more	-	-	-	-	-	-
Men who only have sex with men	0.515 (0.182)	0.513 (0.189)	0.513 (0.189)	3.685* (2.363)	3.422 (2.234)	3.422 (2.234)
Have you ever injected any drugs?	-	-	-	1.786 (1.081)	1.758 (1.072)	1.758 (1.072)
Constant	0.418 (0.316)	0.625 (0.475)	0.581 (0.423)	4.184 (8.609)	4.182 (8.419)	2.839 (5.946)
Observations	1,204	1,204	1,204	96	96	96
Number of groups	3	3	3	3	3	3

Note: * p<0.05, ** p<0.01, ***p<0.001

Table 7. Mixed-Effects Logistic Regression Models (Hypothesis 3) , Odds Ratios

Variables	M10 H3A: Disclosur e law on HIV testing among people with risk behaviors	M11 H3A: IDU law on HIV testing among people with risk behavior s	M12 H3A: Sex worker law on HIV testing among people with risk behavior s	M13 H3B: Disclosur e law on HIV testing among people without risk behaviors	M14 H3B: IDU law on HIV testing among people without risk behavior s	M15 H3B: Sex worker law on HIV testing among people without risk behavior s
Independent variables						
(1) Law against non-disclosure	1.060 (0.283)			0.941 (0.225)		
(2) Law against needle sharing		0.665 (0.179)			0.641* (0.124)	
(3) Law against sex worker			1.503 (0.405)			1.559* (0.302)
Individual-level variables						
Age (years)	0.993 (0.0104)	0.993 (0.0102)	0.993 (0.0102)	0.986* (0.00646)	0.984* (0.00628)	0.984* (0.00628)
Race/ethnicity (ref=White)						
Black	0.754 (0.286)	0.784 (0.298)	0.784 (0.298)	1.406 (0.275)	1.402 (0.269)	1.402 (0.269)
Hispanic	0.627 (0.273)	0.616 (0.267)	0.616 (0.267)	0.726 (0.174)	0.672 (0.157)	0.672 (0.157)
Other race/ethnicity	0.604 (0.339)	0.573 (0.322)	0.573 (0.322)	4.735* (2.859)	4.584* (2.768)	4.585* (2.768)
Marital status (ref=unmarried)	1.794 (0.979)	1.775 (0.967)	1.775 (0.967)	1.010 (0.235)	1.007 (0.234)	1.007 (0.234)
Employment status (ref=jobless)	0.855 (0.230)	0.899 (0.244)	0.899 (0.244)	0.668* (0.106)	0.690* (0.109)	0.690* (0.109)
Education (ref=no formal education)						
Less than high school	0.303 (0.323)	0.311 (0.330)	0.311 (0.330)	0.417 (0.265)	0.436 (0.276)	0.436 (0.276)
High school graduate/GED	0.412 (0.438)	0.409 (0.435)	0.409 (0.435)	0.583 (0.370)	0.600 (0.380)	0.600 (0.380)
Some college	0.561 (0.600)	0.559 (0.598)	0.559 (0.598)	0.924 (0.597)	0.931 (0.601)	0.931 (0.601)
College graduate or more	0.410 (0.478)	0.364 (0.425)	0.364 (0.425)	0.963 (0.691)	0.953 (0.684)	0.953 (0.684)
Monthly income (ref=\$0 to \$500)						
\$501 to \$1000	1.390 (0.366)	1.356 (0.357)	1.356 (0.357)	1.351 (0.219)	1.355 (0.220)	1.355 (0.220)
\$1001 to \$1500	0.993 (0.443)	0.982 (0.439)	0.982 (0.439)	0.972 (0.278)	0.993 (0.283)	0.993 (0.283)

\$1501 to \$2000	1.433 (0.817)	1.415 (0.804)	1.415 (0.804)	0.992 (0.277)	1.031 (0.286)	1.031 (0.286)
\$2001 to \$2500	0.805 (0.667)	0.786 (0.652)	0.786 (0.652)	1.188 (0.669)	1.178 (0.663)	1.178 (0.663)
\$2501 to \$3000	-	-	-	1.942 (2.068)	1.974 (2.103)	1.974 (2.103)
\$3001 to \$4000	-	-	-	1.263 (1.388)	1.267 (1.388)	1.267 (1.388)
\$4001 to \$5000	-	-	-	1.301 (1.411)	1.290 (1.400)	1.290 (1.400)
\$5100 or more	-	-	-	1.627 (1.267)	1.662 (1.299)	1.662 (1.299)
Men who only have sex with men	2.353* (1.002)	2.058 (0.893)	2.058 (0.893)	2.259** (0.613)	2.040** (0.538)	2.040** (0.538)
Have you ever injected any drugs?	1.499 (0.315)	1.505 (0.317)	1.505 (0.317)	1.819*** (0.256)	1.794*** (0.252)	1.794*** (0.252)
Constant	15.28* (18.42)	21.69* (26.51)	14.43* (17.34)	10.32** (7.366)	14.52*** (10.32)	9.313** (6.506)
Observations	836	836	836	2,037	2,037	2,037
Number of groups	3	3	3	3	3	3

Note: * p<0.05, ** p<0.01, ***p<0.001

Table 8. Mixed-Effects Logistic Regression Models Controlling for State-Level Criminal Justice Variables, Odds Ratios

	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15
	HI: Disclosure among HIV(+) individuals	HI: IDU law on disclosure among HIV(+) individuals	HI: Sex worker law on disclosure among HIV(+) individuals	H2A: Disclosure among syringes/paraphernalia among IDU	H2A: IDU law on sharing syringes/paraphernalia among IDU	H2A: Sex worker law on sharing syringes/paraphernalia among IDU	H2B: Disclosure among condoms	H2B: IDU law on condoms	H2B: Sex worker law on condoms	H3A: Disclosure among HIV(+) individuals	H3A: IDU law on testing among people with risk behaviors	H3A: Sex worker law on testing among people with risk behaviors	H3B: Disclosure among HIV(+) individuals	H3B: IDU law on testing among people without risk behaviors	H3B: Sex worker law on testing among people without risk behaviors
Variables															
Independent variables															
(1) Law against non-disclosure	1.926 (1.073)		1.627 (0.485)				1.038 (0.925)			1.325 (0.408)			1.156 (0.222)		
(2) Law against needle sharing		0.412 (0.310)			0.518 (0.209)			0.951 (1.145)			0.683 (0.284)		0.822 (0.213)		
(3) Law against sex worker			2.426 (1.827)			1.932 (0.779)			1.052 (1.267)			1.463 (0.609)			1.217 (0.316)
State-level criminal justice variable															
Number of prison inmates per 100,000 population	0.985*** (0.00337)	0.978*** (0.00624)	0.978*** (0.00624)	1.000 (0.00181)	0.994 (0.00319)	0.994 (0.00319)	1.004 (0.00592)	1.004 (0.0107)	1.004 (0.0107)	1.003 (0.00231)	1.000 (0.00309)	1.000 (0.00309)	1.004* (0.00167)	1.003 (0.00179)	1.003 (0.00179)
Observations	307	307	307	1,204	1,204	1,204	96	96	96	836	836	836	836	2,037	2,037
Number of groups	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

Note: * p<0.05, ** p<0.01, *** p<0.001; for brevity and simplicity, individual-level variables are not shown in this table.

Table 9. Mixed-Effects Logistic Regression Models Controlling for State-Level Criminal Justice Variables, Odds Ratios

	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15
Variables															
Independent variables															
(1) Law against non-disclosure	2.292 (1.257)			1.628 (0.474)			0.991 (0.872)			1.273 (0.376)			1.101 (0.200)		
(2) Law against needle sharing		0.275 (0.235)		0.468 (0.212)				1.013 (1.387)			0.687 (0.316)			0.860 (0.242)	
(3) Law against sex worker			3.634 (3.100)		2.135 (0.967)				0.987 (1.350)			1.456 (0.670)			1.162 (0.327)
State-level criminal justice variable															
Number of correctional facilities per state	0.968*** (0.00705)	0.946*** (0.0148)	0.946*** (0.0148)	1.000 (0.00385)	0.986 (0.00775)	0.986 (0.00775)	1.009 (0.0126)	1.009 (0.0262)	1.009 (0.0262)	1.007 (0.00493)	1.001 (0.00755)	1.001 (0.00755)	1.009* (0.00356)	1.006 (0.00440)	1.006 (0.00440)
Observations	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Number of groups	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

Note: * p < 0.05, ** p < 0.01, *** p < 0.001; for brevity and simplicity, individual-level variables are not shown in this table.

Table 10. Mixed-Effects Logistic Regression Models Controlling for State-Level Criminal Justice Variables, Odds Ratios

	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15
	HI: disclosure law on HIV among individuals	HI: IDU law on HIV disclosure among individuals	HI: Sex worker disclosure among individuals	HA: disclosure law on sharing syringes/p arapherna lia among IDU	HA: IDU law on sharing syringes/p arapherna lia among IDU	HA: Sex worker law on sharing syringes/p arapherna lia among IDU	HB: disclosure law on condoms vaginal/anal sex among HIV(+/-) individuals	HB: IDU law on condoms vaginal/anal sex among HIV(+/-) individuals	HB: Sex worker law on condoms vaginal/anal sex among HIV(+/-) individuals	HA: disclosure law on HIV testing among people with risk behaviors	HA: IDU law on HIV testing among people with risk behaviors	HA: Sex worker law on HIV testing among people with risk behaviors	HB: disclosure law on HIV testing among people without risk behaviors	HB: IDU law on HIV testing among people without risk behaviors	HB: Sex worker law on HIV testing among people without risk behaviors
Variables															
Independent variables															
(1) Law against non-disclosure	13.88*** (8.589)			1.637 (0.501)			0.616 (0.649)			0.844 (0.257)			0.665* (0.123)		
(2) Law against needle sharing	1.669*** (2.795)			3.986 (3.424)				0.257 (0.759)			0.621 (0.531)			0.319* (0.165)	
(3) Law against sex worker						0.251 (0.216)			3.893 (11.51)			1.611 (1.379)			3.138* (1.629)
State-level criminal justice variable															
Number of criminal justice employees per state	1.000*** (6.83e-06)	1.000*** (2.64e-05)	1.000*** (2.64e-05)	1.000 (3.61e-06)	1.000 (1.33e-05)	1.000 (1.33e-05)	1.000 (1.17e-05)	1.000 (4.40e-05)	1.000 (4.40e-05)	1.000 (4.59e-06)	1.000 (1.28e-05)	1.000 (1.28e-05)	1.000* (3.32e-06)	1.000 (7.40e-06)	1.000 (7.40e-06)
Observations	307	307	307	1,204	1,204	1,204	96	96	96	836	836	836	2,037	2,037	2,037
Number of groups	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

Note: * p<0.05, ** p<0.01, *** p<0.001; for brevity and simplicity, individual-level variables are not shown in this table.

Table 11. Mixed-Effects Logistic Regression Models Controlling for State-Level Criminal Justice Variables, Odds Ratios

	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15
	HI: Disclosure among HIV(+) individuals	HI: Disclosure among HIV(+) individuals	HI: Disclosure among HIV(+) individuals	HA: Disclosure among HIV(+) individuals	HA: Disclosure among HIV(+) individuals	HA: Disclosure among HIV(+) individuals	HA: Disclosure among HIV(+) individuals	HA: Disclosure among HIV(+) individuals	HA: Disclosure among HIV(+) individuals	HA: Disclosure among HIV(+) individuals	HA: Disclosure among HIV(+) individuals	HA: Disclosure among HIV(+) individuals	HA: Disclosure among HIV(+) individuals	HA: Disclosure among HIV(+) individuals	HA: Disclosure among HIV(+) individuals
Variables															
Independent variables															
(1) Law against non-disclosure	0.0232** (0.0292)			1.607 (1.116)			3.337 (6.972)			3.640 (3.159)			3.985* (2.467)		
(2) Law against needle sharing		3.253** (1.286)			0.862 (0.188)			0.686 (0.449)			0.667 (0.181)			0.649* (0.126)	
(3) Law against sex worker						1.160 (0.252)			1.459 (0.955)			1.499 (0.407)			1.542* (0.289)
State-level criminal justice variable															
Violent crime rate per 100,000 population	1.072*** (0.0168)	1.024*** (0.00693)	1.024*** (0.00693)	1.000 (0.00829)	1.006 (0.00643)	1.006 (0.00443)	0.982 (0.0265)	0.996 (0.0112)	0.996 (0.0112)	0.984 (0.0104)	1.000 (0.00327)	1.000 (0.00327)	0.981* (0.00746)	0.997 (0.00189)	0.997 (0.00189)
Number of groups	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Observations	307	307	307	1,204	1,204	1,204	96	96	96	836	836	836	2,037	2,037	2,037
Note: * p<0.05; ** p<0.01; *** p<0.001; individual-level variables are not shown in this table.															

Figures

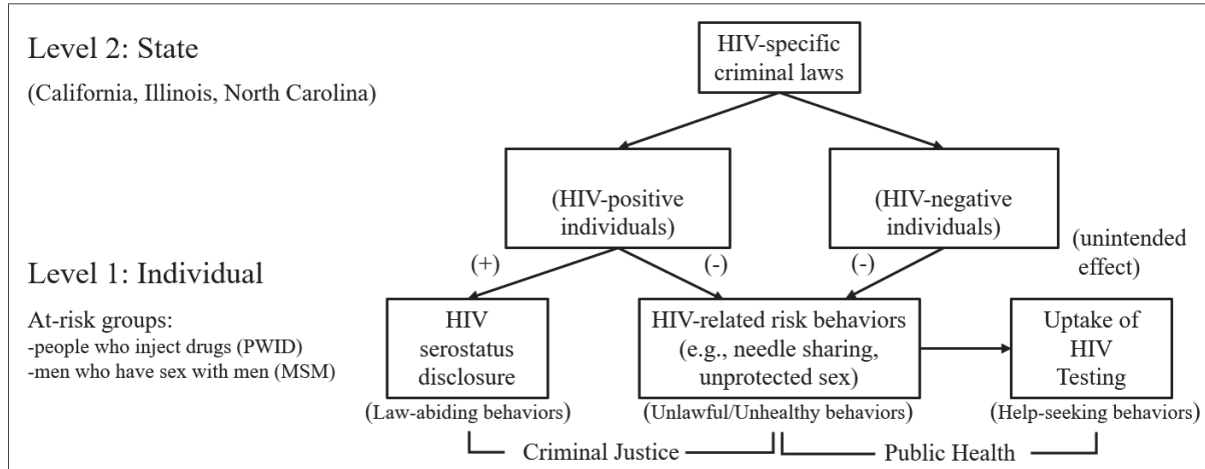


Figure 1. Theoretical Framework that Examines the Deterrent Effect of HIV-Specific Criminal Laws on Serostatus Disclosure, Risk Behaviors, and HIV Testing

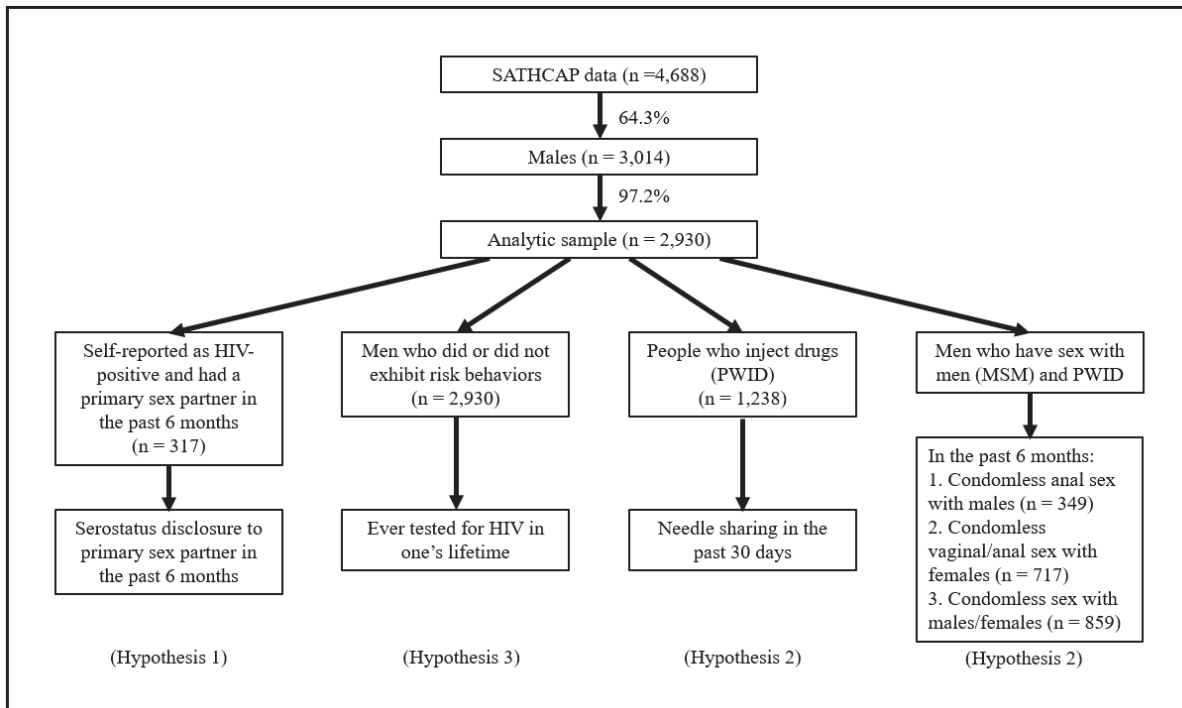


Figure 2. Analytic Samples

Appendix

	Year	California	Illinois	North Carolina
Prosecution	2005-2008	0	0	0
	2009-2018	0	3	0
Sentencing	2005-2008	0	1 ^a	0
	2009-2018	2 ^b	1 ^c	0

Notes: ^a10-year imprisonment; ^b6-month and 1-month imprisonment; ^c2-year imprisonment; case information extracted from HIV Justice Network (<http://www.hivjustice.net/site/cases/>).

Table A. Total Number of HIV-Infected Persons Prosecuted or Sentenced in California, Illinois, and North Carolina

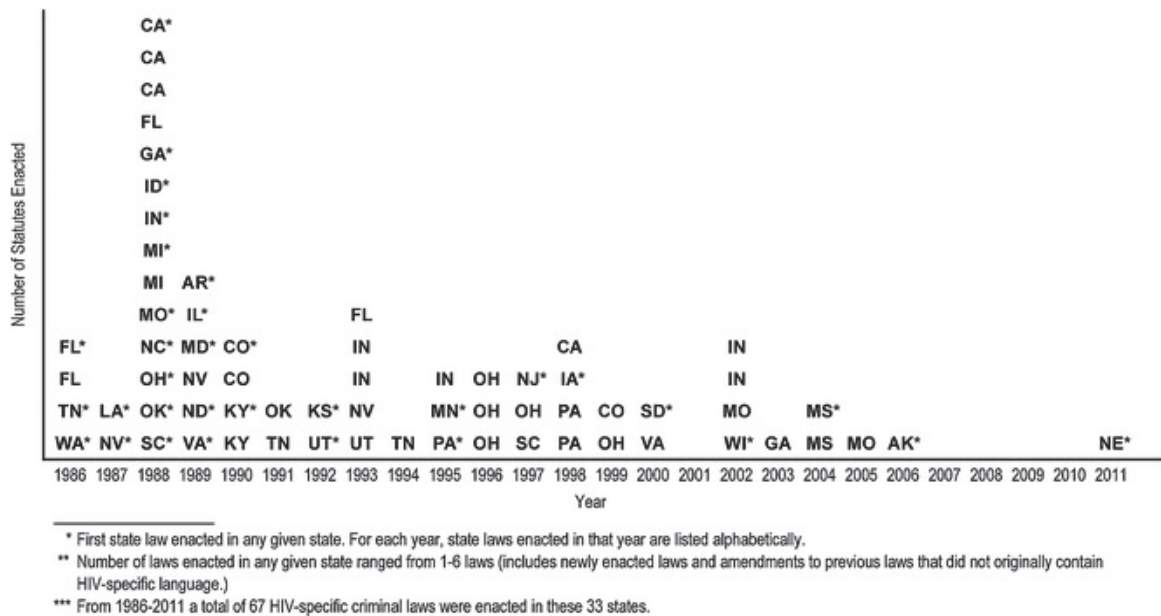


Figure A. Enactment of State HIV-Specific Criminal Laws in 33 states—1986–2011.

Note: From "Prevalence and public health implications of state laws that criminalize potential

HIV exposure in the United States" by Lehman, Carr, Nichol, Ruisanchez, Knight,

Langford et al., 2014. Copyright 2014 by AIDS & Behavior.