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Criminalization of HIV Exposure: A Review of Empirical Studies in the United States

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Abstract

This review of literature identifies and describes U.S. empirical studies on the criminalization of HIV exposure, examines findings on key questions about these laws, highlights knowledge gaps, and sets a course for future research. Studies published between 1990 and 2014 were identified through key word searches of relevant electronic databases and discussions with experts. Twenty-five empirical studies were identified. Sixteen of these studies used quantitative methods with more than half of these being cross-sectional survey studies. Study samples included male and female HIV-positive persons, HIV-positive and -negative men who have sex with men, public health personnel, and medical providers. Research questions addressed awareness of and attitudes toward HIV exposure laws, potential influences of these laws on seropositive status disclosure for persons living with HIV, HIV testing for HIV-negative persons, safer sex practices for both groups, and associations between HIV exposure laws and HIV-related stigma. Surveys of the laws and

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Authors' contributions

DH conducted the search of literature, extracted data, performed initial synthesis of the findings and wrote the first draft of the manuscript. DH and CLG were involved in further analyses of the findings, planned the structure of the review, and wrote subsequent changes to the manuscript. EO'K and ZL contributed to drafting, editing, and revising the manuscript critically for intellectual content. All authors reviewed the articles to ensure that they met the inclusion criteria and were involved in the interpretation of the findings. All authors read and approved the final manuscript.

Compliance with Ethical Standards

Conflict of interest

The authors declare that they have no conflict of interest.

Ethical approval

The manuscript is a literature review and while it does meet the Code of Federal Regulations' (CFR) definition of "research", it does not involve human subjects and 45 CFR part 46 does not apply.

Reference: Office of Human Research Protections (OHRP). Human subject regulations decision charts. http://www.hhs.gov/ohrp/regulations-and-policy/decision-trees/index.html#c1.

Informed consent

Because the manuscript is a literature review and does not involve human subjects, the requirements related to consent also do not apply (45 CFR part 46.116).

Reference: Office of Human Research Protections (OHRP). Human subject regulations decision charts. http://www.hhs.gov/ohrp/regulations-and-policy/regulations/45-cfr-46/index.html#46.116.

studies of enforcement practices were also conducted. Attention should be shifted from examining attitudes about these laws to exploring their potential influence on public health practices and behaviors related to the HIV continuum of care. Studies examining enforcement and prosecution practices are also needed. Adapting a theoretical framework in future research may be useful in better understanding the influence of HIV exposure laws on HIV risk behaviors.

Abstract

Esta revisión de la literatura identifica y describe los estudios empíricos sobre la penalización de la exposición al VIH en los Estados Unidos, analiza los resultados de los estudios sobre cuestiones claves en cuanto a estas leyes, pone de relieve las lagunas del conocimiento sobre el tema y establece un curso para futuras investigaciones. A través de palabras clave en bases de datos electrónicas y de la consulta con expertos, se localizaron los estudios publicados entre 1990 y el 2014. Se identificaron 25 estudios empíricos. Dieciséis de estos estudios utilizaron métodos cuantitativos y más de la mitad encuestas transversales. Las muestras incluyeron hombres y mujeres VIH-positivos y negativos, hombres que tienen sexo con hombres, personal de salud pública y proveedores de servicios médicos. Las investigaciones se centraron en el conocimiento y las actitudes hacia las leyes de exposición al VIH, la posible influencia de las leyes sobre la comunicación del estatus seropositivo por parte de las personas que viven con VIH, el acceso a la prueba de VIH entre las personas VIH-negativas, las prácticas sexuales seguras para ambos grupos y la relación entre las leyes de exposición al VIH y el estigma asociado con el VIH. También se realizaron encuestas sobre las leyes y estudios sobre las prácticas de su aplicación. El énfasis debe cambiar de las actitudes acerca de las leyes, a explorar su posible influencia sobre las prácticas de salud pública y los comportamientos relacionados con el continuo de atención del VIH. También se necesitan estudios que examinen las prácticas en cuanto al cumplimiento de las leyes y enjuiciamiento. En la investigación futura, adaptar un marco teórico puede ser útil para entender mejor la influencia de las leyes de exposición al VIH sobre las conductas de riesgo de VIH.

Keywords

HIV/AIDS; HIV-specific criminal laws; criminalization; HIV serostatus disclosure; public health

Background

The presumptive purpose of HIV exposure laws is to encourage persons living with HIV (PLH) to disclose their positive serostatus to sexual partners, increase HIV-protective behaviors, and ultimately reduce new infections. However, little is known about their effectiveness as an HIV prevention method (1-3), and even less is known about the potential negative impacts of the laws. The purpose of this review is to identify and describe U.S. empirical studies on the criminalization of HIV exposure, examine findings on key questions about these laws, highlight knowledge gaps, and set a course for future research.

HIV exposure laws – what is prohibited?

Although some states enacted HIV exposure laws in the 1980s (4), the passage of the Ryan White Care Act in 1990 marked an important milestone in the development of U.S. HIV exposure laws. As one of its conditions for receiving federal funds, the Ryan White Care Act

required all U.S. states to certify that they had a legal mechanism to prosecute HIV-infected individuals who knowingly exposed others to HIV (Ryan White Comprehensive AIDS Resources Emergency Act of 1990 (Public Law 101-381; 104 Stat. 576)). HIV exposure statutes were one such mechanism. To date, thirty-three states and two U.S. territories have enacted HIV-specific statutes that criminalize undisclosed exposure to HIV (4).

Most HIV-specific criminal statutes require PLH to disclose their seropositive status prior to engaging in one or more of a variety of activities including “sexual penetration” (e.g., N.J. Stat. Ann. § 2C: 34-5 (2016)), sharing injection drug paraphernalia with another person (e.g., 720 Ill. Comp. Stat. § 5/12-5.01(a)(3) (2016)), and/or donating blood or other living tissue (e.g., Fla. Stat. Ann. § 381.0041(11)(b) (2016)). The majority of these HIV-specific laws criminalize non-disclosure whether or not the virus is transmitted.

Many of the laws use the broad term “HIV exposure” to indicate when prior disclosure is required (e.g., Miss. Code Ann. § 97-27-14(1) (2016)). In this context, the term “exposure” refers to many behaviors, with the possibility of actual transmission resulting from the exposure being more or less remote—and in some cases virtually impossible such as spitting or biting (e.g., La. Rev. Stat. § 14:43.5 D.(1) (2016)). The most common HIV exposure statutes address sexual activity, which can include insertive or receptive anal, vaginal, and oral sex and, in some instances, mutual masturbation (e.g., Ark. Code § 5-14-123(c)(1) (2016)). At least one statute requires PLH to disclose and use a condom when engaging in sex (e.g., N.D. Cent. Code § 12.1-20-17 (3) (2016)).

Traditional criminal offenses such as reckless endangerment or battery can also be used to prosecute HIV exposure (e.g., Colo. Rev. Stat. § 18-3-208 (2015)). One difficulty with many of these traditional offenses, however, is that the prosecutor must prove that the defendant acted with the specific intention of harming the partner (i.e., transmitting HIV). Since the majority of cases of HIV non-disclosure do not involve intent to harm the partner (5, 6), this essential element of traditional crimes is difficult to prove. HIV-specific criminal laws were developed, in part, in response to this difficulty. These laws do not require that PLH intend to harm the partner, only that they are aware of their HIV seropositive status and engage in one of a variety of activities, typically without disclosure (5, 7).

A number of states have also adopted HIV-specific sentence enhancements that increase penalties for PLH who are convicted of other offenses (4, 7, 8). Eleven states have sentence enhancements that apply to persons convicted of prostitution or solicitation while HIV-positive (e.g., Utah Code Ann. §§ 76-10-1309 (2016)) (7). At least six states impose longer sentences for those who commit sex crimes while HIV positive (e.g., Tenn. Code Ann. § 39-13-516 (2016)) (8). Eight states impose specific penalties or enhance sentences if a PLH exposes a corrections or other public safety officer to bodily fluids (e.g., Neb. Rev. Stat. § 28-934 (3) (2016)) (8). In some cases, these laws include exposure to urine or saliva (e.g., Utah Code Ann. § 76-5-102.6 (2016)). Many of these statutes impose potentially severe penalties including long prison sentences or life imprisonment (e.g., Mo. Rev. Stat. § 191.677 (2016) and Mo. Rev. Stat. § 558.011.1) (2016)).

For the purposes of this article, we use the term “HIV exposure law” to refer to the entire class of HIV-specific statutes unless more specificity is required. We use the term “criminalization of HIV exposure” to refer to any use of the criminal law to prosecute PLH for actual or perceived exposure to HIV.

Enforcement of HIV exposure laws

Enforcement of HIV exposure laws in the U.S. has been documented by several major studies since 2002. The most ambitious of these studies attempted to report and analyze all known cases of arrests, prosecutions, and convictions for HIV-related activity across all U.S. jurisdictions (8, 9). These studies identified more than 310 cases between 1986 and 2001 (9) and at least 350 additional prosecutions between 2008 and 2011 (8). However, because these studies had to rely on cases reported in the media or recorded in court reports of (mostly) appellate cases, totals for prosecutions are likely to be significantly underestimated. Other studies have conducted comprehensive examinations of arrests and prosecutions within smaller geographic areas such as a state, for example Michigan (10) or a city, for example Nashville, TN (6). Since reporting systems vary across jurisdictions and cases are not nationally reported, there are no reliable data on how many prosecutions have occurred in the U.S.

HIV, criminal law and public health

A variety of commentators publishing in public health and law-related journals have argued against the use of criminal HIV-exposure laws on the grounds that they undermine U.S. public health efforts to prevent further HIV infections. These authors argue that the laws may increase HIV-related stigma and discrimination, thus making persons at risk for HIV less willing to be tested or fostering, in those who are at-risk, a false sense of security that infected persons are aware of their HIV-positive serostatus and can and will disclose (1, 11, 12). They also argue that the laws endorse a disclosure-based approach to HIV prevention which contradicts traditional public health messages about the universal use of condoms or other direct prevention measures (1, 12, 13). For PLH, commentators express concern about the potential of the laws to undermine public health efforts to create a supportive environment that encourages disclosure and voluntary participation in HIV testing, treatment and prevention services (1, 2, 14).

Some of these concerns are reminiscent of the concerns expressed by leaders in public health and HIV prevention as HIV surveillance efforts shifted to name-based HIV reporting of HIV-positive test results. The enactment of HIV name-based reporting in the late 1990s led to debates over its potential deterrent effect on HIV testing. No deleterious effects were, however, substantiated in research (15, 16).

In 2010, the Positive Justice Project (PJP) was launched which formed the first organized network of organizations and individuals working to modernize HIV criminal laws in the United States (17). Both in the United States and abroad, consensus statements issued by medical experts on HIV infection call for both the criminal law and the criminal justice system to take into account scientific evidence of decreased risk of sexual transmission of HIV by individuals who are on effective antiretroviral therapy when defining prohibited acts

and determining culpability (18-20). Advances in HIV treatment research have transformed the course of HIV infection from a fatal illness into a chronic, manageable condition (20). These organizations ask that HIV exposure laws be amended accordingly.

Although the majority of commentaries about the criminalization of HIV exposure focus on the potential harmful effects of these laws, potential benefits of the laws have also been noted. Proponents of the laws argue that enforcement of these laws will deter PLH from risking forward infection and thus prevent the spread of HIV (21). They reason that if PLH disclose their positive serostatus prior to engaging in sex with a new partner, the individuals will agree to practice safer sex or the HIV-negative partner will decline to engage in sexual activity (1). Proponents of the criminalization of non-disclosed exposure to HIV argue that knowledge of a partner's HIV-positive status is necessary for the other to provide consent to engage in sexual activity (22). In the late 1980s when HIV-specific statutes were first enacted, the statutes were thought to establish seropositive status disclosure as a social norm by renouncing the actions of PLH who did not disclose their positive serostatus to prospective sex partners (23).

Since the early 1990s, the topic of the criminalization of HIV exposure has been addressed in public health, HIV care and prevention, and legal literatures. Much of the early literature consists of commentaries, editorials, and position statements on the use of the criminal law to address HIV transmission. Beginning in 2002, empirical research methods were applied to questions about these laws. The purpose of this review of literature is to identify and describe U.S. empirical studies on the criminalization of HIV exposure published between 1990 and 2014, to examine findings on key questions about these laws, to highlight knowledge gaps, and to set a course for future research.

Methods

Information sources and search strategy

Articles were identified through searches on several electronic databases including PubMed, PsycINFO, Web of Science, Cochrane Library and the International AIDS Society conference abstract database (2001-2014). Unpublished studies were identified through a search of dissertation and thesis abstracts, Google Scholar, and Google. Reference lists of included articles were also examined to identify additional papers. Searches were conducted in September 2014. The search was limited retroactively to the date of the passage of the Ryan White CARE Act in 1990, which reflects an important milestone in the development of U.S. HIV exposure laws. The following headings were used for literature searches: “Criminal Law”, “HIV Infection”, “HIV Seropositivity”, “Disclosure” and “Self-disclosure.”

Study selection

Research reports meeting the following criteria were included in the review: (i) the research explicitly addressed the criminalization of HIV exposure; (ii) the research was conducted in the U.S. between January 1990 and September 2014; (iii) the research was based on empirical data; and (iv) study methods and results were reported in English.

The study selection process followed PRISMA standards (24). The initial database search yielded 1250 records. Additional studies (n=12) were identified through searches of dissertation and thesis databases, Google and Google Scholar, and contact with experts. Abstracts were screened and non-empirical papers such as critical analyses, commentaries, and legal case reports were excluded. This resulted in 127 potentially relevant articles. The second stage of the selection process involved excluding studies that addressed other HIV-related laws or policies (e.g., laws related to HIV testing), studies conducted outside the U.S., behavioral studies on HIV-positive serostatus disclosure, and papers on the use of phylogenetic analysis in HIV non-disclosure criminal cases. No studies were excluded on grounds of quality. In cases where study data were incomplete in the published reports, we contacted the lead authors to obtain further details.

Data extraction

For each eligible study, the following data were extracted: author(s); publication year; study objectives; sample; where data were collected (U.S. cities/states); study design; findings and study limitations. Relevant descriptive statistics in quantitative studies were recorded. For qualitative studies, key findings were summarized.

Results

Study characteristics

Twenty-five empirical studies met the selection criteria. The studies were published in peer-reviewed journal articles (n=18); dissertations/theses (n=3); research reports (n=3); and a working paper (n=1). The earliest study was published in 2002. Most of the studies (n=19) were published in or after 2008 and more than half were published after 2010 (n=13).

The majority of studies were quantitative (n=16). Over half of these consisted of cross-sectional surveys (n=9). Other quantitative studies included secondary data analyses (n=4), mathematical modeling studies (n=1), a survey of HIV exposure laws and prosecutions (n=1), and a review of criminal cases (n=1). Qualitative methods used included in-depth interviews (n=5), focus groups (n=1), and a narrative review of court transcripts (n=1). Two studies used a mixed methods design combining cross-sectional, quantitative surveys with qualitative analysis of free-text responses.

Sample sizes varied widely – from 38 to 11,078 participants for quantitative studies (25, 26) and from 11 to 76 participants for qualitative studies (27, 28). The two mixed methods studies involved 197 and 103 participants, respectively (29, 30). Samples included HIV-positive women, HIV-positive men who have sex with men (MSM), HIV-positive persons of mixed genders and sexual orientations, and persons of mixed genders and sexual orientations who identified as HIV-negative or of unknown serostatus. Four studies included both HIV-positive and -negative participants (26, 31-33). These mixed serostatus samples included males or females exclusively and persons of single or mixed sexual orientations. Three studies analyzed arrest records or court cases (6, 9, 10), while two were based on HIV surveillance data (26, 32). One study used a mathematical model to propose an optimal law to address sexual transmission of HIV and did not identify a specific sample (34). Specific

research designs and primary findings for quantitative and qualitative studies are summarized in Table 1 and Table 2, respectively.

Topics and research questions

There were four major topics across the 25 studies: 1) awareness of and attitudes toward HIV exposure laws and the criminalization of HIV exposure; 2) potential influences of the laws on HIV-prevention behaviors (i.e., seropositive status disclosure for PLH, HIV testing for HIV-negative persons, safer sex practices for both groups, and engagement in HIV care and treatment); 3) associations between HIV exposure laws and HIV-related stigma; and 4) enforcement of HIV exposure laws. These topics correspond to central questions in the literature related to the criminalization of HIV exposure including whether the criminalization of HIV exposure is effective as an structural-level HIV prevention strategy (1, 14, 35), whether criminalization inadvertently undermines public health HIV prevention efforts by discouraging serostatus disclosure or HIV testing (1, 11, 36), whether criminalization hinders access to care, treatment and support (14, 36), whether the laws exacerbate HIV-related stigma (4, 11, 36), and whether enforcement practices result in a disproportionate number of disadvantaged persons being arrested and prosecuted (2, 37).

Awareness and understanding of, and attitudes toward, criminal HIV exposure laws—Although some would argue that as a structural-level HIV prevention intervention, the criminalization of HIV exposure would influence even those who were not aware of the laws (9), whether individuals are aware of and understand the laws in their states were central questions in the studies identified. Participants' attitudes towards the criminalization of HIV exposure were also frequently explored.

Thirteen out of the 25 studies assessed participants' awareness of HIV exposure laws (25, 27-30, 33, 38-44). Of these thirteen studies, eight examined participants' understanding of the laws as well (27-30, 38-40, 44). Most of these studies (n=10) also examined participants' attitudes toward these laws, their perceptions of the effectiveness of the laws in prompting seropositive status disclosure or condom-protected sex, and/or their beliefs about whether PLH have a responsibility to disclose their positive serostatus to sex partners (27-30, 33, 38, 40, 41, 43, 44). Three qualitative studies used in-depth interviews to explore awareness of and attitudes toward the criminalization of HIV exposure among individuals working with PLH including persons who provided HIV care in North Carolina and Alabama (43), persons who provided HIV care in Michigan (45), and persons who counselled PLH about their state disease control measure (i.e., provisions enforced by the state health department to track and prevent further spread of contagious diseases of public health significance) (27). Table 3 summarizes key findings of these studies.

The results of studies on participants' awareness and/or understanding of HIV exposure laws were mixed. For example, although three-quarters (76%) of HIV-positive participants living in Michigan were aware of their state's law (38, 40), only 51% of HIV-positive participants living in New Jersey, a state with an HIV exposure law, were aware of the law (41). Although two-thirds of U.S. states and territories have HIV-specific laws and all have had HIV-related legal proceedings (8), only half of the 38 U.S. state and territorial HIV/AIDS

program administrators who responded to a survey administered by their professional organization (n=21) indicated that their state has such laws or cases (25).

Participants' understanding of the content of HIV exposure laws was generally low. A majority (63%) of respondents in a multi-state online survey responded that they were unsure if there was an HIV-specific law that required positive serostatus disclosure in their state (44). Nearly half (48%) of the participants in the same study did not know what behaviors were prohibited without prior serostatus disclosure to partners (44). Other studies found that participants living in states with HIV exposure laws were uncertain about requirements of the law (e.g., whether condom use was required) (38), and did not understand the meaning of terms specific to the criminalization of HIV exposure (e.g., "non-disclosure" or "intended infection") (28). One study found that participants living in a state with an HIV exposure law generally understood the law (i.e., 81% were aware that the law in their state required serostatus disclosure even if the sex partner also has HIV) (39). However, health departments in the state where the study took place informed all newly diagnosed PLH of the state law.

In a survey of 197 probationers and parolees in Alabama, while around two-thirds of the sample (69%) stated that they knew "a lot" or "some details" of their state law, some participants (5%) had misconceptions about the law such as believing that PLH can be charged with murder for non-disclosure though it falls under a misdemeanor offense in Alabama (29). Physicians (n=3) working with PLH in a state with an HIV disease control measure did not know the specific details about the measure and believed that their clients were not aware of this public health provision (27).

Participants' attitudes toward HIV exposure laws, although mixed, tended toward the positive. Participants in the majority of studies that explored attitudes did support the use of criminal laws to prompt HIV disclosure or prohibit HIV exposure (27-29, 33, 38, 40, 41, 43). For example, among 384 PLH in Michigan, 88% thought that having unprotected vaginal or anal sex without serostatus disclosure should be a crime (40). Similar results were reported in a survey of 479 PLH in New Jersey (41) and a nationwide online survey among 1725 MSM (33). Participants especially endorsed the use of the criminal law in cases involving fraud and sexual assault (e.g., (27, 43)). On the other hand, Horvath and colleagues (33) found that among MSM, attitudes toward the law varied by HIV status: while just under two-thirds (65%) of a sample of HIV-positive and HIV-negative MSM supported the use of the criminal law for instances when a PLH engages in sex without a condom with an uninformed partner, only 38% of HIV-positive participants shared this belief. The attitudes of probationers and parolees was largely positive: the majority (86%) thought that criminal HIV exposure law was "fair". Yet, some participants voiced concerns in free-text responses that the law violated the privacy of PLH and intrudes on a matter of personal choice (29).

HIV care providers in two of the three qualitative interview studies with persons working with PLH doubted that their state HIV exposure law/disease control measure would increase seropositive status disclosure (27, 43). HIV care providers in one study (27) were concerned that the laws could discourage PLH from utilizing partner notification services (i.e., services

that link partners who have been exposed to a sexually transmitted infection (STI) including HIV to testing and counseling) and therefore hinder identification of persons unknowingly infected with HIV. In the second study (43), participants who provided direct care to PLH expressed concerns about being perceived by clients as “law enforcers” and about potential detrimental effects of the laws on patients’ engagement in care. Despite these concerns, providers interviewed in this second study supported using laws to deter PLH from engaging in HIV risk behaviors: 90% of interviewees in North Carolina and 45% of interviewees in Alabama supported intervention through law (43). In the third qualitative study, local health department personnel interviewed in Michigan supported the use of the state's disease control measure and felony HIV exposure laws in extreme cases such as when a PLH was diagnosed with a subsequent STI and was believed to have engaged in unprotected sex without serostatus disclosure (45).

Influence of the criminalization of HIV exposure on sexual risk behaviors, testing, seropositive status disclosure and antiretroviral therapy adherence— Thirteen studies explored potential influences of HIV exposure laws on the behavior of PLH and those who are HIV-negative or serostatus unknown (26, 31-34, 40-43, 46-49). For PLH, potential influences examined included increased (or decreased) sexual risk behavior, increased (or decreased) seropositive status disclosure, and decreased antiretroviral therapy adherence (31, 33, 40-43, 46-49). For persons who reported being HIV-negative or not knowing their HIV status, potential influences examined included increased sexual risk behavior, and decreased HIV testing (26, 31, 32, 34, 47). Table 3 summarizes key findings of these studies.

HIV transmission-related sexual behaviors: The purported purpose of HIV exposure laws is to prevent further HIV infections by increasing positive serostatus disclosure which, it is assumed, will prompt partners to engage in safer sex behaviors or choose not to have sex (1). However, results of studies examining the influence of HIV exposure laws on HIV-related sexual behaviors found little evidence of protective benefits of these laws. In a study of PLH living in a state with an HIV exposure law, researchers determined that awareness of the state's HIV exposure was not associated with any of several HIV-prevention related behaviors including increased sexual abstinence, condom use with most recent partner, or seropositive status disclosure (41). A second study found no association between awareness of the law and increased condom use or reduced number of sex partners (40). Other studies found no association between residence in a state with or without an HIV-specific law and number of unprotected anal sex partners (33) and sex without prior seropositive status disclosure (48). Still, studies found associations between living in a state with an HIV exposure law or with greater numbers of prosecutions for HIV exposure and one or more safer behaviors (31, 47). In one study (31), while participants’ belief that their state law required seropositive status disclosure was not associated with increased HIV-positive status disclosure, HIV-positive and -negative individuals who lived in a state with an HIV exposure law were more likely to have engaged in protected vaginal, but not protected anal sex with their most recent sexual partners. A second study (47) found that PLH living in states with greater than median rates of prosecutions for undisclosed exposure to HIV were more likely

to practice safer sex and to have fewer sex partners than those living in states with lower prosecution rates.

Among those who were HIV-negative or serostatus unknown, Burris et al. (31) found no association between participants' belief that the law requires condom use and having engaged in protected anal or vaginal sex in their most recent sexual interaction. Also, Delavande et al. (47) found that living in states that strictly enforced their HIV exposure laws was not associated, among participants who were HIV-negative or status-unknown, with a decrease in risk behaviors, including number of partners and unprotected sex. A study based on secondary data and a logic model suggested that a hypothetical HIV exposure law that provided the option of disclosure or condom use would be more effective in reducing potential HIV transmission than a law requiring only seropositive status disclosure (46).

HIV testing: There has been considerable discussion about the potential of HIV exposure laws to deter persons at risk for HIV infection from seeking and/or accepting HIV testing (1, 11, 36). Yet seeking or accepting an HIV test is an exceptionally complex behavior which is influenced by a variety of factors not related to the criminalization of HIV exposure (50, 51). The complexity of the behavior and the number of factors that likely influence it may account for why studies that examined the influence of the criminalization of HIV exposure on the HIV testing behaviors of persons at risk for HIV infection found little evidence to suggest that concerns about the criminalization of HIV exposure deter testing.

Using data from publically funded HIV testing sites in six U.S. states, Wise (32) found that there was an increase in testing rates during the month of the enactment of New Jersey's criminal HIV exposure law in 1997 (N.J. Stat. Ann. § 2C: 34-5 (1997)) and a decrease in HIV incidence 6-months after the law's implementation. There was no evidence that the introduction of these laws increased testing among individuals at high risk for HIV infection in New Jersey (32). There was also no association between enactment of an HIV exposure law in California (Cal. Health & Safety Code, § 120291 (1998)) and testing (32). Another study investigated associations between self-reported HIV testing data collected from a national survey between 2002 and 2009 (with the exception of 2007) with media coverage related to the criminalization of HIV exposure (26). Although increased newspaper reports on criminal prosecutions for HIV exposure were associated with decreased HIV testing rates among persons at risk for HIV infection, individuals living in states with criminal HIV exposure laws were no less likely to report having been tested for HIV than those who lived in states without such laws (26).

In an online survey of HIV-positive and -negative persons (n=2076), participants were asked whether it was reasonable that "a person, who is otherwise feeling healthy, states he or she does not take an HIV test out of fear of being prosecuted if the HIV test came back positive" (44). Responses were on a 3-point Likert scale ranging from "very reasonable" to "not reasonable." Twenty-one percent of respondents answered "very reasonable." Furthermore, 25% of survey participants responded in the affirmative when asked, "Has anyone ever told you that they did not want to take an HIV test because of a fear that they might be prosecuted if the HIV test came back positive? (Please include yourself in the answer if this is true for you.)" (44).

A modeling study conducted to determine the most effective HIV exposure law suggested that the optimal law would include a penalty for unknowing transmission and thus promote HIV testing (34). However, the ethics of implementing a law such as this are questionable at best as punishing unknowing transmission assumes that an individual knows they are at risk of HIV infection or should be held responsible for knowing so, and then will choose to undergo HIV testing to know their serostatus.

Seropositive status disclosure: There have been two schools of thought about the potential influence of HIV exposure laws on PLH's willingness to disclose their seropositive status to sex partners (1, 23). While proponents of HIV exposure laws believe that the laws will prompt PLH to disclose to sex partners lest they face legal penalties for failing to do so (23), others express the concern that the laws will inadvertently deter PLH from disclosing by increasing the consequences of being known as someone who has HIV (1).

Several studies found that PLH living in states with HIV disclosure laws were no more likely to disclose their HIV-positive serostatus to potential sex partners than those who lived in states without such laws (31, 40, 41, 48). For example, Galletly et al. (40, 41) found that awareness that the state where one lived had an HIV exposure law was not associated with having disclosed to all partners prior to engaging in sex with them. Burris et al. (31) found much the same in their study: PLH who believed that state law required them to disclose their positive serostatus to sex partners were no more likely to disclose to sex partners than those who did not believe that this was the case. Furthermore, PLH who lived in a state that required seropositive status disclosure were no more likely to disclose to sex partners than those who lived in a state that did not require disclosure (31). Still, in-depth interviews with HIV-positive MSM reporting a recent STI or having had unprotected anal sex revealed that fear of arrest and knowing that disclosure was required by law increased the likelihood of disclosure (42). The results of one study seem to support concerns that HIV exposure laws may inadvertently deter PLH from disclosing their HIV-positive serostatus to sex partners. In a multi-state sample of 1,421 PLH, those living in states with greater than median HIV exposure prosecutions were less likely to disclose their positive serostatus to partners (47).

Antiretroviral therapy adherence and engagement in care: Despite evidence of the efficacy of HIV treatment, there was only one study that directly assessed associations between the criminalization of HIV exposure and antiretroviral therapy (ART) adherence. Phillips and colleagues (49) reported that among 1,873 HIV-positive participants, those that had higher perceived social capital (i.e., more resources to support one's life and to overcome life challenges) and resided in states with laws that require serostatus disclosure were more likely to have better 30-day ART adherence than those who lived in states without such laws. However, in interviews with healthcare providers who counseled PLH about their state seropositive status disclosure law, most believed that the criminalization of HIV exposure could deter individuals from seeking HIV care (43). Close (27) reports a similar finding: among the 11 healthcare providers and health department representatives interviewed, most participants believed that criminalization could deter individuals from engaging in HIV care and remaining on HIV treatment.

Criminalization of HIV exposure and HIV-related stigma—One of the primary concerns about the criminalization of HIV exposure is that these laws exacerbate HIV-related stigma and discrimination. Seven of the twenty-five studies explicitly addressed the potential impact of these laws on HIV-related stigma (30, 38, 40, 41, 43-45). Two survey studies compared responses of PLH who were and were not aware of their state HIV exposure law on an HIV-related stigma scale (40, 41). Contrary to the authors' hypothesis, HIV-positive participants who were not aware of their state's HIV exposure law experienced more HIV-related stigma than those who were aware of the law (40, 41). The authors posit that those who were unaware of the law were not involved in AIDS service organizations where many PLH learn about advocacy efforts and the law. Their lack of awareness was therefore indicative of social isolation which could increase HIV-related stigma (40).

In a large survey study, nearly half of HIV-positive respondents (49%) thought that their state's criminal justice system would not provide a fair hearing if they were prosecuted for non-disclosure (44). Over a third (38%) reported fear of being falsely accused of not disclosing their serostatus (44). These findings are echoed by focus group participants in a qualitative study who expressed concerns about being falsely accused of non-disclosure and believed that courts might not treat them fairly because they had HIV (38). Furthermore, in a survey of HIV-positive women, participants believed that the risk of being prosecuted for non-disclosure increased HIV-related stigma (30). These participants felt that the criminalization of HIV exposure linked being HIV-positive to criminal behavior and, as one individual stated in a free-text response, made her feel like "a leper of the 21st century" (30).

HIV-related stigma was also a concern among 40 health care staff that provided mandatory disclosure counseling to PLH (43). Interviews with health officials in Michigan revealed that residents who phoned the health department to report an alleged non-disclosure case commonly identified persons from specific groups including MSM and black women in the community (45); both groups represent 52% and 15% of PLH in Michigan, respectively (52). While in some cases health department representatives found that the allegations had no basis, a few cases led to investigative home visits by health officials (45).

Enforcement by criminal justice system and public health authorities—Although, as mentioned above, there is no national database recording prosecutions or arrests for HIV exposure, researchers have examined the enforcement of HIV exposure laws in the U.S. by examining available data on arrests and prosecutions in a single city ((6) – Nashville, TN), a single state ((10) – Michigan), and nationally (9).

Examination of arrest and prosecution data: Lazzarini et al. (9) identified 316 unique criminal prosecutions for HIV-related offenses between 1986 and 2001. Cases were identified through news reports and court records. Out of 142 court cases with known outcomes, 7 resulted in life imprisonment including one case where an HIV positive individual spat on another (9). The average sentence was 14.3 years with a range of 0.15 to 125 years. Many who were charged had already committed acts considered illegal regardless of their HIV status including prostitution and assault.

In a study of 52 arrests for HIV-related crimes (25 arrests for HIV exposure and 27 for engaging in prostitution while HIV-positive) in Nashville, Tennessee between January 1, 2000 and December 31, 2010, most of the individuals who were charged with HIV exposure and aggravated prostitution suffered from addiction, mental health and homelessness issues (6). Researchers also found that over one-third of the exposure arrests involved non-sexual incidents such as biting or spitting and nearly half of the prostitution cases involved solicitation of oral sex (6). These findings are consistent with Hoppe's review of 58 HIV exposure cases in Michigan (10) where a number of cases involved low to no risk behaviors such as oral sex, protected anal intercourse, and sex with someone with undetectable viral load.

Criminal laws and public health agencies: Four studies examined the interface between provisions related to undisclosed exposure to HIV and public health departments (25, 27, 43, 45). In the 2011 survey of state and territorial HIV/AIDS program administrators mentioned above, participants were asked whether their agency had policies related to the release of client medical records to justice officials in cases when a PLH is alleged to have exposed an uninformed partner. A majority of respondents (66%) reported that their state health departments had such policies (25).

In a qualitative interview study of local public health department staff members who were responsible for identifying PLH who may have exposed another to HIV (45), interview participants described a number of information sources through which potential cases might be identified (e.g., data from partner services, STI test results, reports from community members). A few interviewees reported having directed individuals whose partners reportedly did not disclose their seropositive status to contact law enforcement (45). Some interviewees appeared to misunderstand guidance related to the definition of a “health threat to others” in the state's provision, for example, by categorizing a PLH who was tested positive for a secondary STI as a health threat. Additionally, participants in two qualitative interview studies focused on public health workers and HIV care providers reported little consistency in procedures for informing PLH about mandatory disclosure provisions within the two study states (27, 43).

Discussion

This review of literature identified 25 empirical studies on the criminalization of HIV exposure conducted in the U.S. between 1990 and 2014. Of the studies identified, sixteen involved quantitative methods with the majority of these (nine studies) being cross-sectional survey studies. Most participants in quantitative survey studies were PLH, although surveys of HIV-positive and -negative men who have sex with men (MSM) and sexually active HIV-negative persons were also conducted. Seven studies identified were wholly qualitative in nature. PLH were also the most common participants in these qualitative studies, though some later studies focused on public health workers and HIV care providers. The two mixed methods studies involved adding open text items to cross-sectional quantitative surveys. Four studies involved analysis of already existent data. The data sources were diverse, ranging from court transcripts and arrest records, HIV testing rates to data from a nationwide study of sexual behavior.

Most studies addressed one or more of four central research questions: whether the criminalization of HIV exposure is effective as an structural-level HIV prevention strategy (31, 33, 40, 41, 47); whether criminalization inadvertently undermines public health HIV prevention efforts by discouraging serostatus disclosure (31, 40-43, 47, 48) or HIV testing (26, 32); whether criminalization hinders access to care, treatment and support (27, 43, 49); whether the laws exacerbate HIV-related stigma (30, 39-41, 43-45); and whether enforcement practices result in a disproportionate number of disadvantaged persons being arrested and prosecuted (6, 10). Most studies also addressed participants' awareness (25, 27-30, 33, 38-44), understanding of (27-30, 38, 40, 41, 44), and attitudes toward (27-30, 33, 38, 40, 41, 43, 44) these laws.

Study results for some of these central questions were not as anticipated. For example, although awareness of the criminalization of HIV exposure and/or specific HIV exposure statutes was generally low, attitudes towards the laws were more positive than anticipated. This was especially true in survey studies. Concerns about the laws were, however, revealed in interviews. Studies of the effectiveness of criminal HIV exposure laws in preventing HIV transmission revealed, as many legal scholars and advocates expected (31), that the laws were not associated with increased safer sex behavior or sexual abstinence. Two concerns that have been widely expressed by scholars and advocates, that HIV exposure laws deter PLH from disclosing their positive serostatus by increasing the consequences of being known as having HIV, and that the laws deter persons who are at risk for HIV infection from seeking or accepting testing were not, for the most part, supported. The concern that criminalization of HIV exposure exacerbates HIV-related stigma was also not supported by quantitative evidence, although again this concern was revealed in qualitative studies. Finally, the limited evidence available on enforcement practices related to criminal HIV exposure does suggest that persons being arrested and/or prosecuted for violating HIV-related criminal laws are among society's most marginalized groups (e.g., persons who were mentally ill, homeless, drug dependent). However, the current lack of data on enforcement practices makes this observation far from generalizable.

Taken as a whole, the studies identified seem to have become more sophisticated and more focused over time. As mentioned, many of the earlier studies set out to explore correlates between awareness of and attitudes toward HIV exposure laws and serostatus disclosure behaviors among PLH (28, 31, 42, 48). In more recent years, however, the studies conducted have been more diverse and their research questions more pointed. For example, several quantitative studies have employed innovative methods to investigate the potential impact of the criminal laws such as using an economic model to identify an optimal law that is more likely to minimize nonconsensual HIV transmission (34) and using a mathematical model to evaluate the relative effectiveness of hypothetical laws (46). One study applied a theoretical framework to consider ART adherence in the context of PLH's social environment which included HIV exposure laws and prosecutions for HIV exposure (49). Three studies focused on the intersection of the criminalization of HIV exposure and medical and public health services (27, 43, 45).

The review of literature highlighted several important knowledge gaps. Scientific advances since 1990 have produced much more sophisticated information on HIV transmission risk as

related to specific behaviors or mediated by effective antiretroviral therapy (as shown in the results of the HIV Prevention Trial Network (HPTN) 052 (53)) than what was known when many of these laws were drafted. However, little of the research on HIV exposure laws has examined whether and to what degree defense attorneys, prosecutors, and judges understand these scientific advances or whether the implications of these advances have made it into the courtroom. Those that have (10) found little evidence that courts have absorbed these changes. Another advance, the ability to identify the particular genetic makeup of the virus infecting each person, brings with it concerns about its misuse in the courtroom. Scientists can now determine the extent to which different persons' HIV strains are related, however, the source or direction of infection cannot be determined (54). Although information about genetic similarity may appear in a courtroom to be clear evidence that a defendant infected another, this may not be the case. Research is needed in this area.

As mentioned above, only three studies have examined data on arrests, prosecutions and/or sentencing in criminal HIV exposure cases. This gap in the literature is driven by the absence of comprehensive data in most jurisdictions. The absence of data is particularly problematic in that it is often impossible to determine the race and ethnicity of the defendant and complainant in many cases. This prevents researchers from exploring whether there are racial/ethnic disparities in enforcement of these laws. Methods of extracting and organizing existent data on arrests and prosecutions and/or collecting data on past prosecutions or those occurring in real time are desperately needed. Until this data can be accessed, researchers will struggle to assess even the most basic questions about the enforcement of HIV exposure laws.

As mentioned in a recent commentary (2), notably absent from the empiric literature on the criminalization of HIV exposure are studies on the costs and cost effectiveness of enforcing HIV exposure laws. Arresting, prosecuting, and imprisoning individuals who violate HIV exposure laws are likely to be exceedingly expensive. Considering evidence, albeit very limited, that persons prosecuted for HIV exposure may suffer from unmet needs for drug treatment, mental health care, and/or housing, the need for empirical evidence to guide resource allocations is clear. Information generated from such research could be used by lawmakers to consider alternatives to enforcing the laws such as using public health measures including enhanced case management for PLH who put others at risk.

Four studies investigated health department personnel and HIV care providers' understanding of HIV exposure laws and their awareness of protocols and practices for informing PLH of their state law (25, 27, 43, 45). With the increasing use of HIV surveillance data as a means to identify and link newly diagnosed individuals to care and to reengage those who are out of care (55), additional research on related policies and practices within public health departments and HIV prevention and care services and mechanisms to avoid misuses of data that would lead to prosecution of PLH under criminal law is particularly important. Such studies could inform health departments seeking to expand their use of surveillance data to improve HIV prevention and care outcomes without increasing the risk of criminalization of PLH.

Finally, with the exceptions of Phillip et al.'s ecosocial approach to examining social capital, criminalization of HIV exposure, and ART adherence (49) and Hoppe's emphasis on the criminalization of HIV exposure as a means of social control (45), the studies identified in this review of literature lacked a theoretical framework to advance the understanding of the influence of HIV exposure laws. A particularly promising theoretical inquiry would be to apply theories on the functioning of complex systems in order to better understand the contexts in which U.S. HIV exposure laws are enacted and sustained (56). In a recent commentary, Finitsis et al. suggests using multi-level theoretical frameworks such as syndemics theory (57) and cultural-historical activity theory (58) to investigate the impact of criminalization of HIV exposure on HIV risk behaviors by exploring relationships between individual behavioral factors, social and community context, and HIV exposure laws as a structural variable (56). Additionally, the traditional Information-Motivation-Behavior (IMB) model (59) could provide a useful theoretical framework for future studies of the influence of HIV exposure laws on HIV-related behaviors along the steps of the HIV care continuum. The information component could account for variations in individuals' awareness and understanding of the laws. The motivation component could account for incentives and disincentives to engage in various behaviors—a central topic for HIV exposure law studies. The conceptual framework of the "medico-legal borderland" described by Timmermans and Gabe (60) has proven very useful in studies on the influence of the criminalization of HIV exposure within public health systems outside of the U.S. (61). Any of these conceptual models seem appropriate theoretical frameworks for future research on HIV exposure laws.

Conclusion

This paper has identified and described empirical studies on the criminalization of HIV exposure in the U.S. and reported key findings. Study results suggest that, for the most part, persons support the criminalization of undisclosed exposure to HIV, although PLH may be more circumspect in their support than those who do not have HIV. Study results also suggest that the laws do not deter HIV testing among persons at risk for HIV infection, or decrease or increase serostatus disclosure to sex partners among PLH. The laws also do not appear to reduce sexual risk behaviors among HIV-positive or –negative persons. Records of arrests and prosecutions reveal that many cases involve non-sexual behaviors or sexual activities that pose little to no risk of HIV transmission. Additional research is needed to determine the extent to which HIV-related prosecutions are informed by current medical and scientific knowledge about HIV transmission. Research establishing the cost of enforcement of the laws is also warranted, as is research on structural factors associated with HIV exposure criminalization including perspectives of policymakers and members of the criminal justice system, and studies that examine race/ethnic disparities in enforcement of the laws. More research is needed on policies and practices within health departments and HIV prevention and care services to inform PLH of their state law, and the potential effect of HIV exposure laws on patient-provider relationships and on public health personnel who must sometimes play a role in enforcing the laws. Adapting a theoretical framework in future research may be useful in advancing our understanding of the influence of HIV exposure laws on HIV risk behaviors associated with the HIV continuum of care.

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Table I

Summary of quantitative studies (n=16) on the criminalization of HIV exposure in the United States

Author (year)	Study objectives	Location	Study design	Sample or data	Key findings
Lazzarini et al. (2002) (9)	To identify state HIV exposure laws and prosecutions and to evaluate the impact of laws on state HIV prevalence	National	Survey of statutes and prosecutions	U.S. HIV exposure laws, cases, and news reports between 1986 and 2001	316 prosecutions in 36 states and U.S. territories were identified and outcomes of 228 cases were reported. State prevalence of HIV infection did not differ between states that had and did not have criminal HIV exposure laws
Duru et al. (2006) (48)	To examine relationships between sex without HIV-positive serostatus disclosure and sexual and substance use behaviors, relationship characteristics, and HIV exposure laws	National	Cross-sectional researcher-administered survey	PLH[1] (n=875) receiving care in hospitals, clinics, and private practice settings in states with (n=534) and without (n=341) HIV exposure laws. Sample included MSM[2] (n=419), women (n=299), and heterosexual men (n=157)	No association was found in the proportions of persons engaging in sex without serostatus disclosure among PLH residing in states with and without HIV exposure laws
Burris et al. (2007) (31)	To test the null hypothesis that differences in HIV-related criminal laws and participants' beliefs about their state law do not influence condom use during last anal or vaginal sexual encounter	Chicago, New York City	Cross-sectional researcher-administered survey	MSM and PWID[3] (n=490) in a state with an HIV exposure law (Chicago, IL, n=248) and a state without one (New York City, NY, n=242). Sample included PLH (n=162) and persons who were HIV-negative or unknown serostatus (n=328)	Having unprotected anal or vaginal sex with one's last sex partner was not associated with beliefs about whether law requires condom use. Disclosing one's serostatus to one's last partner was not associated with state law requirements. Residing in a state with an HIV exposure law was associated with being more likely to having used a condom during last

Author (year)	Study objectives	Location	Study design	Sample or data	Key findings
					vaginal sex but not during last anal sex
Galletly and Pinkerton (2008) (46)	To evaluate the effectiveness of hypothetical "strict" and "flexible" HIV exposure laws at reducing HIV transmission risk	California	Mathematical modeling and analysis of secondary data	Men who were HIV-positive (n=206)[a] including MSM (n=85), MSMW[4] (n=72), and 24% MSW[5] (n=49)	Models of both "strict" and "flexible" HIV exposure laws would prompt behavior change. Strict laws would require seropositive disclosure to prospective partners before any sexual activity. Flexible laws were found to be more effective by criminalizing only high-risk sexual activities without disclosure, and providing PLH with two options, disclosure or low risk sex, but do less to protect partners' opportunity to determine the level of risk they were willing to take
Delavande et al. (2008) (47)	To estimate the effect of HIV-related prosecutions on PLH's sexual behaviors using an economic model of risky sexual behavior with criminal enforcement	National	Quantitative analysis of secondary data, computer modeling	HIV-related prosecution data (9) and sexual activity data of 1,421 PLH[b]	Simulations of estimated deterrent effects of prosecution rates on number of partners and unsafe sex suggested that a 100% increase in prosecution rates would reduce new infections by roughly 36% over a ten-year period
Francis and Mialon (2008) (34)	To apply a signaling model of sexual behavior and HIV testing to examine the efficiency of current HIV exposure criminal laws	N/A	Mathematical modeling and analysis	N/A	The optimal law should include a penalty for knowing and unknowing HIV transmission, therefore creating an

Author (year)	Study objectives	Location	Study design	Sample or data	Key findings
	and to develop the most effective law				incentive for HIV testing, and should not have a penalty for exposure without transmission, thus encouraging safer sex
Wise (2008) (32)	To examine the associations between HIV exposure laws, HIV testing rates and state HIV incidence	New Jersey, California, Virginia, North Carolina, Oregon, Texas	Quantitative analysis of secondary data (time-series designs)	Monthly HIV tests including tests with reported risk behavior and HIV incidence data collected between 1997 and 2004 from publicly funded HIV testing sites in states with HIV exposure laws (New Jersey, California, Virginia) and states without such laws (North Carolina, Oregon, Texas)	In New Jersey, there were significant increases in total monthly HIV tests and confidential tests during the month laws were enacted; HIV incidence decreased at 6-month delay from enactment of the law. In Virginia, total monthly tests increased when the law was implemented. No impact on total tests was found in California. No change in testing was detected among individuals at high risk for HIV infection
Galletly et al. (2009) (39)	To assess awareness and understanding of the state's HIV exposure law and to identify sources of information about the law and participant satisfaction with these sources	Michigan	Cross-sectional self-administered survey	PLH (n=384) including men (n=133), women (n=241), transgender persons (n=3), and unknown gender (n=7)	Most participants (76%) were aware of Michigan's HIV exposure law. More than 86% of participants correctly identified circumstances when the law did and did not apply; however, many participants 1(70%) were unaware of the penalty for non-disclosure. Most participants (80%) learned about the law from multiple sources and

Author (year)	Study objectives	Location	Study design	Sample or data	Key findings
					found HIV-specific sources (e.g., support groups, flyers, AIDS Service Organizations) most helpful
Horvath et al. (2010) (33)	To assess attitudes toward the criminalization of HIV exposure through unprotected sex and whether attitudes and sexual risk behavior differed by participants' residence in states with and without HIV exposure laws	National	Cross-sectional self-administered online survey	MSM (n=1725) including PLH (n=241) and persons who were HIV-negative (n=1319) and serostatus unknown (n=149)	Almost half (48%) of MSM who were HIV-positive believed it should not be illegal for PLH to have unprotected sex without disclosure, while 70% of HIV-negative MSM, and 69% of MSM with unknown HIV status, held the opposite view. No difference was found in attitudes or sexual risk behavior of persons living in states with and without HIV exposure laws
National Alliance of State and Territorial AIDS Directors (2011) (25)	To examine awareness of state HIV criminal laws and prosecutions, and policies and procedures related to HIV exposure incidences and the release of medical records	National	National Cross-sectional self-administered survey	State and territorial HIV/AIDS program administrators (n=38)	More than half (55%) of survey respondents reported that 1) their state had an HIV exposure law and that individuals had been prosecuted for intentional exposure or non-disclosure; and 2) their state did not have policies or procedures requiring PLH to acknowledge potential criminal liability if engaged in sexual intercourse without disclosure The majority (66%) stated that their state

Author (year)	Study objectives	Location	Study design	Sample or data	Key findings
					health departments had policies related to the release of medical records to law enforcement in alleged HIV exposure cases
Galletly et al. (2012) (40)	To examine associations between awareness of the state's HIV exposure law and serostatus disclosure, risk reduction efforts, and inadvertent negative effects of the law on PLH	Michigan	Cross-sectional self-administered survey	PLH (n=384) including men (n=133), women (n=241), transgender persons (n=3), and unknown gender (n=7)	The majority of participants were in compliance with the law (i.e., reported sexual abstinence in the past year (71%) or disclosed to all sex partners prior to first sexual encounter (61%)). Awareness of the law was not associated with increased HIV-positive status disclosure to all sex partners, decreased risk behaviors, increased perceived prevention responsibility, or HIV-related stigma. Awareness of the law was associated with disclosure to a greater proportion of sexual partners prior to first sexual encounter
Galletly et al. (2012) (41)	To examine associations between PLH's awareness of New Jersey's HIV exposure law and HIV-related attitudes, beliefs, and sexual and serostatus disclosure behaviors	New Jersey	Cross-sectional self-administered survey	PLH (n=479) including men (n=256), women (n=213), transgender persons (n=7), and unknown gender (n=3)	Half of participants (51%) were aware of the law. Awareness was not associated with increased HIV status disclosure or sexual abstinence. Participants who were unaware of the law were less comfortable

Author (year)	Study objectives	Location	Study design	Sample or data	Key findings
					with HIV status disclosure and perceived greater stigma and societal hostility toward PLH
Sprague and Strub (2012) (44)	To examine PLH's awareness of and beliefs about criminal HIV exposure laws	National	Cross-sectional self-administered online survey	PLH (n=2076) including men (n=1718), women (262), transgender persons (n=20), and unknown gender (n=76)	The majority of participants (63%) were not sure whether a statute in their state required serostatus disclosure and 48% did not know which behaviors put them at risk for arrest. A quarter of participants (28%) reported that they knew individuals who did not want to be tested due to fear of prosecution
Galletly and Lazzarini (2013) (6)	To examine individual case reports of persons charged with HIV exposure and aggravated prostitution	Nashville, Tennessee	Review of case reports between January 1, 2000 and December 31, 2010	27 arrests (25 persons) for HIV exposure and 25 arrests (23 persons) for aggravated prostitution	The majority of individuals charged with HIV exposure were male (74%) and white (56%). Those charged with aggravated prostitution were mostly female (68%) and white (52%). The median sentence was 30 months for HIV exposure, and 9 months for aggravated prostitution. More than half of aggravated prostitution cases (52%) involved oral sex and 41% of exposure cases involved spitting, scratching and biting
Phillips et al. (2013) (49)	To examine the associations between individuals' perceived social	California, Hawaii, Illinois, Massachusetts, New Jersey, New York, North Carolina,	Cross-sectional self-administered survey (for perceived social capital and adherence data) and review of HIV criminal exposure laws and prosecutions	PLH (n=1873) including men (n=1299), women (n=503),	Most participants (85%) were prescribed HIV ART.

Author (year)	Study objectives	Location	Study design	Sample or data	Key findings
	capital (i.e., resources to enhance life chances and overcome challenges), HIV exposure laws and prosecutions, and HIV ART[6] adherence	Ohio, Texas, Washington, Puerto Rico, Canada		transgender persons or other (n=51), and unknown gender (n=20)	ART adherence in the past month was associated with perceived social capital, living in a state with an HIV disclosure law or HIV-specific criminal law
Lee (2014) (26)	To examine associations between HIV exposure laws, HIV testing rates among individuals at increased risk of contracting HIV living in states with and without HIV-specific statutes, and media reports on HIV exposure criminalization	National	National Quantitative analysis of secondary data	Data collected between 2002 and 2009 of U.S. HIV exposure laws, HIV testing rates[c] (men (n=5242) and women (n=5836)), media reports, and AIDS Drug Assistance Programs' spending	Living in a state with an HIV exposure law was not associated with having been tested for HIV in the past 12 months. Increased media reporting of criminalization was associated with a decrease of HIV testing rates in states with HIV exposure laws

[1] PLH: people living with HIV

[2] MSM: men who have sex with men

[3] PWID: persons who inject drugs

[4] MSMW: men who have sex with men and women

[5] MSW: men who have sex with women

[6] ART: antiretroviral therapy

[a] Marks G, Crepaz N. HIV-positive men's sexual practices in the context of self-disclosure of HIV status. J Acquir Immune Defic Syndr. 2001;27(1):79-85

[b] HIV Cost and Services Utilization Study (1994-2000). Rockville, MD: Agency for Healthcare Research and Quality

[c] Behavioral Risk Factor Surveillance System (1983-2014). Atlanta, GA: Centers for Disease Control and Prevention.

Table II

Summary of qualitative (n=7) and mixed method (n=2) studies on the criminalization of HIV exposure in the United States

Author (year)	Study objectives	Location	Study design	Sample or data	Key findings
Gorbach et al. (2004) (42)	To identify barriers to serostatus disclosure among HIV-positive men reporting recent STI[1] or recent unprotected anal intercourse with an HIV-negative or serostatus unknown partner	Seattle, Los Angeles	In-depth interviews	HIV-positive MSM[2] (n=55)	Fear of criminal prosecution and perceived responsibility to prevent HIV transmission were cited as themes associated with greater likelihood of disclosure. Knowing that disclosure was mandated by law had influenced some men to disclose more often
Klitzman et al. (2004) (28)	To explore experiences and views of PLH[3] toward three HIV-related policies: name-based HIV reporting, partner notification, and criminalization of HIV non-disclosure	Los Angeles, Milwaukee, New York, San Francisco	In-depth interviews	PLH (n=76) including MSM (n=24), women (n=31), and PWID[4] (n=21)	Many participants believed that criminalization could be effective in increasing disclosure and safer sex. Those opposed to criminalization believed that criminalization could deter testing and be misused by partners, and that serostatus disclosure was individual responsibility and inappropriate for government regulation. Participants did not always identify correctly terms specific to the criminalization of HIV exposure
Galletly and Dickson-Gomez (2009) (38)	To explore the views of PLH on the state's HIV exposure law	Michigan	Focus groups	PLH (n=31) including MSM, heterosexual men, and women	Most participants agreed that serostatus disclosure to prospective partners was a personal duty, but also expressed concern about the negative

Author (year)	Study objectives	Location	Study design	Sample or data	Key findings
					impacts of the state's HIV exposure law including unwanted secondary disclosure, false accusations of failing to disclose, perceived discrimination in the justice system, and inequitable distribution of the burden of preventing HIV transmission
Kelly et al. (2011) (30)	To assess the experiences of HIV-positive women with regards to testing, serostatus disclosure, sexual and reproductive health, and criminal HIV exposure laws	National	Mixed method design, cross-sectional self-administered survey with free-text responses	Women living with HIV (n=103)	Nearly half (46%) of survey respondents believed that criminal HIV exposure laws could be harmful to women and over half (56%) indicated that the laws could hinder HIV testing. In open-ended responses, women expressed concerns about the law related to increasing stigma against PLH and the potential misuse of laws by abusive partners
Close (2012) (27)	To explore the views of HIV care providers and health department employees involved with the implementation and enforcement of the state's HIV control measures	North Carolina	In-depth interviews	Infectious disease physicians (n=3), health department employees (n=5), AIDS service organization staff (n=2), and policy expert (n=1)	Most participants believed that the state's HIV control measures were not enforced and failed to deter HIV risk behaviors. Some supported the use control measures to prosecute intentional HIV exposure. Concerns were focused on unequal burden to prevent HIV transmission between PLH and HIV-negative partners. Most opposed

Author (year)	Study objectives	Location	Study design	Sample or data	Key findings
					mandatory condom use despite being required by the control measures
Barber (2013) (29)	To assess probationers and parolees' HIV knowledge and to examine associations between awareness of state's HIV exposure law and HIV-related attitudes	Alabama	Mixed method design, cross-sectional self-administered survey with free-text responses	Probationers (n=77) and parolees (n=120) including men (n=129) and women (n=68)	There was no difference in knowledge of HIV and state HIV disclosure law between probationers and parolees and by gender and race/ethnicity. The majority of participants (69%) stated that they knew a lot or some about Alabama's HIV disclosure law but only 12% indicated that they had heard about someone being arrested under the law. While most participants (86%) thought that the law was fair, only 20% thought that the law reduces the spread of HIV infections
Hoppe (2013) (45)	To examine the views and practices of health officials responsible for responding to and managing HIV alleged HIV non-disclosure cases	Michigan	In-depth interviews	HIV/AIDS services coordinators and disease intervention specialists (n=25)	Health officials used several techniques to identify potential HIV non-disclosure cases: forms for newly diagnosed PLH to acknowledge potential criminal liability for non-disclosure (n=5), phone calls from local community members (n=5), partner notification services (n=3), and positive STI test results (n=2). One participant reported that health officials had facilitated contact with law enforcement in alleged

Author (year)	Study objectives	Location	Study design	Sample or data	Key findings
					exposure cases. Complaints were most often made against MSM and African Americans specifically black women.
Lichtenste in et al. (2014) (43)	To examine the attitudes and practices of providers who counsel PLH clients about mandatory serostatus disclosure	North Carolina, Alabama	In-depth interviews	HIV care providers (n=40) in North Carolina (n=20) and Alabama (n=20)	All but one participant (98%) believed that mandatory serostatus disclosure counseling would not encourage disclosure or safer sex with partners. Public health provisions and counseling procedures differed between the 2 states: NC had standardized consent forms with a description of the state's HIV control measure that required mandatory disclosure; AL was less formal consisted of legal disclosure advice without a requirement for signed form. Most respondents (90%) in NC supported the laws while only 45% in AL did so
Hoppe (2014) (10)	To analyze the narratives used in HIV exposure felony convictions	Michigan	Review of courtroom transcripts, other relevant court-related documents, and newspaper reports of cases between 1992 and 2010	58 cases	In the 43 out of 58 cases where court transcripts were available, there were narrative examples (n=19) of prosecutors and judges describing the defendants as “a carrier of death”. In some cases (n=2), defendants had used a condom and had undetectable viral load. In 4 cases, transmission

Author (year)	Study objectives	Location	Study design	Sample or data	Key findings
					was alleged. Sentences included probation, incarceration in jail (1.5–12 months) and prison (12–96 months)

[1] STI: sexually transmitted infection

[2] MSM: men who have sex with men

[3] PLH: people living with HIV

[4] PWID: persons who inject drugs

Table III

Summary of key findings by topic of empirical studies on criminal HIV exposure laws

Topic	Author (year)	Key findings
Awareness and understanding of the laws	Klitzman et al. (2004) (28)	HIV-positive interview respondents (n=76) were unable to distinguish terms related to criminalization such as “non-disclosure”, “unsafe sex” or “intended infection”
	Galletly and Dickson-Gomez (2009) (38)	HIV-positive focus group participants (n=31) did not understand the distinction between criminal prosecutions and civil actions with a monetary award in the case where a person was accused of violating the state's disclosure law
	Galletly et al. (2009, 2012) (39, 40)	A majority (76%) of the HIV-positive participants (n=384) were aware that their state had an HIV exposure law. Most who were aware of the state law recognized its basic requirements (e.g., 85% were aware that seropositive status disclosure was required prior to even protected anal or vaginal intercourse) (27)
	Kelly et al. (2011) (30)	A majority of female HIV-positive survey respondents (n=103) were aware that the U.S. had HIV exposure laws but were unsure if their state had such a law or what the law required
	Close (2012) (27)	Physicians (n=3) were not aware of details of North Carolina's HIV control measures. Some physicians and health department employees were unsure if their clients who were HIV-positive understood the details of the control measures and how they were enforced
	Galletly et al. (2012) (41)	Fifty-one percent (n=244) of HIV-positive survey participants in New Jersey were aware that their state had an HIV exposure law
	Sprague and Straub (2012) (44)	Nearly two-thirds of HIV-positive participants (63%, n=1297) were unsure about whether there was an HIV-specific law in their state that required serostatus disclosure. Nearly half of respondents (48%, n=593) were unsure what behaviors were prohibited
Attitudes toward the laws		
Support for the laws	Klitzman et al. (2004) (28)	Of 76 PLH[1] who were interviewed, most believed that HIV exposure laws could reduce HIV transmission by increasing disclosure. Some supported the laws only under specific circumstances such as in the case of rape or when a PLH lied about his or her status
	Galletly and Dickson-Gomez (2009) (38)	Focus group participants who were HIV-positive (n=31) endorsed the presumed goal of Michigan's HIV disclosure law, which was to prevent infection of uninfected sex partners
	Horvath et al. (2010) (33)	Sixty-five percent of a sample of 1725 HIV-positive and -negative MSM[2] believed that it should be illegal for a PLH to have unprotected sex without seropositive disclosure; however, only 38% of HIV-positive participants shared this belief. MSM who were HIV-positive (OR=0.33; 95% CI=0.24-0.44; $p \leq .000$), lived in states perceived as somewhat or very accepting toward homosexuality (OR=0.75; 95% CI=0.59-0.96; $p = .023$), held a baccalaureate (OR=0.53; 95% CI=0.35-0.78; $p = .002$) or graduate degree (OR=0.42; 95% CI=0.27-0.64; $p = .000$), and had two or more unprotected anal sex partners in the past three months (OR=0.72; 95% CI=0.56-0.93, $p = .013$) were less likely to support the criminalization of HIV exposure
	Close (2012) (27)	Most health department employees and HIV care providers who were interviewed (n=11) identified compulsory partner notification services as the most useful component of the state's HIV control measure given that the program prompted more PLH to notify their partners and link them into testing and care
	Galletly et al. (2012) (40)	Over two-thirds (71%, n=384) of HIV-positive survey participants were in compliance with Michigan's HIV exposure law (e.g., reported sexual abstinence in the past 12 months, disclosed positive serostatus to all vaginal, anal, and oral sex partners prior to first sex). Most participants supported criminalization of unprotected sex without disclosure (88%), lying about HIV status to have sex (91%) and intentional exposure to infect (97%)

Topic	Author (year)	Key findings
	Galletly et al. (2012) (41)	Among 479 HIV-positive survey participants in New Jersey, 54% believed that it should be against the law for a PLH to engage in condom-protected sex without disclosure and 87% believed that it should be a crime for a PLH to have unprotected sex with an uninformed partner. In multivariate analysis, predictors of compliance with the law were support for criminalization (OR=1.53; 95% CI=1.24-1.88) and comfort with disclosure (OR=0.50, 95% CI=0.30-0.83)
	Lichtenstein et al. (2014) (43)	In North Carolina where the state's disease control measure was more restrictive and had more severe penalties than Alabama's HIV exposure law (e.g., liable to up to 2 years' in NC and 3 months' imprisonment in AL), most HIV care providers who were interviewed in North Carolina (90%, n=18) supported the use of HIV exposure laws compared to 45% (n=9) of providers in Alabama
Concerns about and opposition to the laws	Galletly and Dickson-Gomez (2009) (38)	HIV-positive focus group participants (n=31) were concerned about unwanted secondary disclosure and/or being falsely accused of non-disclosure. Many believed that it was unfair to assign the entire burden of HIV prevention to PLH. Participants also expressed concern about discrimination against PLH in the criminal justice system
	Kelly et al. (2011) (30)	In open-ended survey questions, female HIV-positive participants (46%, n=47) believed that criminalization could be harmful for women living with HIV. Concerns included that criminalization could increase HIV-related stigma, reinforce discrimination against PLH, and be used as a tool of abuse by partners by falsely accusing PLH of not disclosing. Over half (56%, n=58) believed that the laws could deter persons at risk from being tested and undermine adherence efforts among PLH
	Klitzman et al. (2004) (28)	HIV-positive participants who were interviewed (n=76) believed that the criminalization of HIV exposure could deter testing and be used to falsely accuse PLH of intentional exposure or transmission. Safer sex was perceived as a better prevention strategy than disclosure. Participants also believed that serostatus disclosure should be an individual responsibility, not a legal requirement
	Close (2012) (27)	Care providers and health department employees who were interviewed (n=11) believed that their state's HIV control measure would not deter PLH from engaging in sexual risk behaviors because the law was rarely enforced and because individuals engaged in these behaviors in private. Participants also believed that criminalization could discourage PLH from participating in partner notification services
	Sprague and Strub (2012) (44)	Over one-third of online HIV-positive survey respondents (38%, n=765) stated that they had ever worried about being falsely accused of not disclosing their status. Nearly half of respondents (49%) thought that they would not be given a fair hearing in their state criminal justice system if they were accused of non-disclosure
	Lichtenstein et al. (2014) (43)	Twenty-five percent (n=5) of HIV care providers living in a state with less strict penalties for non-disclosure opposed the laws. Concerns cited included that the laws could increase stigma, deter persons at risk from testing, impede engagement in HIV care, and act as a communication barrier between providers and PLH
Perceived responsibility for HIV transmission prevention and HIV exposure laws	Horvath et al. (2010) (33)	MSM (n=1725) who had lower perceived responsibility to protect their sexual partners from HIV or STIs[3] were less likely to believe that it should be illegal for a PLH to have unprotected anal sex without HIV status disclosure (OR=0.75; 95% CI=0.69-0.81; $p = .000$)
	Kelly et al. (2011) (30)	Among female HIV-positive participants (n=103), those who thought that HIV exposure laws were not harmful to PLH (27%) were more likely to believe that PLH held the sole responsibility for preventing new infections (OR not reported)
	Galletly et al. (2012) (41)	There was no difference in perceived responsibility for HIV transmission prevention between PLH (n=479) who were aware (51%) and unaware (49%) of their state HIV exposure law. Most participants (90%) believed that PLH were responsible for preventing forward

Topic	Author (year)	Key findings
Criminalization of HIV exposure and seropositive status disclosure		
Increased disclosure	Gorbach et al. (2004) (42)	Among interviewed HIV-positive MSM (n=55) reporting recent unprotected sex or an STI, fear of arrest and knowing that seropositive status disclosure was required by law were cited as reasons to disclose
Decreased disclosure	Delavande et al. (2008) (47)	HIV-positive persons living in states with greater than median prosecution rates for knowing exposure to HIV were significantly less likely to disclose to partners ($p \leq .01$)
No effect on disclosure	Duru et al. (2006) (48)	No difference was found in the proportions of persons engaging in sex without serostatus disclosure among PLH residing in states with and without HIV exposure laws
	Burris et al. (2007) (31)	Seropositive status disclosure to sex partners did not differ between persons living in states with and without HIV exposure laws
	Galletly et al. (2012) (40)	HIV-positive participants who were aware of their state's HIV exposure law were no more likely to have disclosed to all of their sex partners in the previous year than those who were not aware of the law; however, sexually active participants who were aware of the law did report disclosing to sex partners prior to having sex with them for the first time more often than sexually active participants who were not aware ($p = 0.04$)
	Galletly et al. (2012) (41)	Awareness of the law was not associated with having disclosed HIV status to a greater proportion of partners
	Lichtenstein et al. (2014) (43)	Citing clients being evasive or agreeable during counseling sessions about HIV and the laws, all but one HIV care provider who were interviewed (n=39) believed that mandatory serostatus
Criminalization of HIV exposure and sexual behaviors of HIV-positive persons		
Sexual abstinence	Delavande et al. (2008) (47)	HIV-positive persons living in states with greater than median prosecution rates for knowing exposure to HIV were more likely to report having been sexually abstinent than those living in states with median or below prosecution rates ($p \leq .05$)
	Galletly et al. (2012) (41)	HIV-positive participants who were aware of their state's HIV exposure law were not more likely to have been sexually abstinent for the previous year than those who were unaware of the law
Number of sex partners		
Decreased	Delavande et al. (2008) (47)	HIV-positive persons living in states with greater than median prosecution rates for knowing exposure to HIV reported having fewer sex partners than those in states with lower prosecution rates ($p \leq .1$)
No difference	Galletly et al. (2012) (40, 41)	There was no significant difference in the number of reported sex partners in the past year among HIV-positive participants who were and were not aware of their state's HIV exposure law
Frequency of sex with and without condoms		
Decreased sex without condoms	Delavande et al. (2008) (47)	HIV-positive persons living in states with greater than median prosecution rates for knowing exposure to HIV reported engaging in unprotected sex less often than those in states with lower prosecution rates ($p \leq .05$)
No difference in sex without condoms	Horvath et al. (2010) (33)	HIV-positive persons living in states with and without HIV exposure laws reported similar numbers of casual, unprotected anal sex partners in the last three months
	Burris et al. (2007) (31)	There was no difference in condom use during last anal or vaginal sex between HIV-positive participants who believed and did not believe that state law required them to use condoms

Topic	Author (year)	Key findings
Increased condom-protected sex	Burris et al. (2007) (31)	HIV-negative and HIV-positive participants living in a state with an HIV exposure law were more likely to have engaged in protected vaginal sex with their last sexual partners (OR=5.40; $p \leq .001$)
Increased sex without condoms after seropositive status disclosure	Burris et al. (2007) (31)	HIV-positive participants living in a state with an HIV exposure law were more likely to have engaged in unprotected anal sex after disclosing their positive serostatus to sexual partners than those living in a state without an HIV-specific law (OR=0.06; $p \leq .001$)
Increased sex with prostitutes	Delavande et al. (2008) (47)	Living in states with greater than median prosecution rates for knowing exposure to HIV was associated with an increase in the probability of sex with a sex worker among PLH who had more than one sex partner ($p \leq .05$)
Criminalization of HIV exposure and HIV-related risk behaviors of persons who are HIV-negative or status unknown		
Increased testing rates	Wise (2008) (32)	An increase in testing rates was found on the month of the enactment of the laws in two study states with criminal laws (i.e., New Jersey (t = 2.360; $p = .20$) and Virginia (t = 3.588, $p = .001$), but not in California). Testing rates among persons at risk for HIV infection did not increase
Decreased testing rates	Lee (2014) (26)	Increased media reporting on criminalization of HIV exposure was associated with a 7% to 9% decrease of HIV testing rates in states with HIV-specific laws ($p = .01$). There was no difference in reporting having been tested for HIV in the past 12 months between persons at risk for HIV infection living in a state with an HIV exposure law and those living in a state without an HIV-specific law
Increased risk behaviors	Burris et al. (2007) (31)	There was no difference in reporting having engaged in sex without a condom during last sexual encounter between HIV-negative participants who believed that the law required PLH to disclose or to use condoms and those who did not share this belief. A greater proportion of HIV-negative residents of a state with an HIV-specific exposure law reported engaging in unprotected vaginal sex than the state residents who were HIV-positive (OR=.035; $p = .012$)
No difference in HIV-related risk behaviors	Delavande et al. (2008) (47)	There were no differences in reported number of partners, having engaged in sex without a condom or having paid for sex between HIV-negative individuals living in states with greater than median prosecution rates for knowing exposure to HIV and those who lived in other states. Living in states with greater than median prosecution rates was associated with a reduction in the probability of having paid for sex among HIV-negative individuals ($p \leq .1$).
Criminalization of HIV exposure and HIV antiretroviral adherence		
Greater HIV ART[4] adherence	Phillips et al. (2013) (49)	HIV-positive survey participants who lived in states with laws requiring HIV disclosure reported better average 30-day HIV ART adherence (r = .065, p = .01). However, PLWH who lived in states with HIV-specific criminal laws reported lower 30-day adherence (r = −.052, p = .04). In multivariate analysis, PLH who lived in states with HIV disclosure laws were more likely to be adherent to HIV ART (OR=1.38; 95% CI=0.99-1.91, p = .054)

[1] PLH, people living with HIV

[2] MSM, men who have sex with men

[3] STIs, sexually transmitted infections

[4] ART, antiretroviral therapy