

**The knowledge and effect of a drug-related Good Samaritan law among people who use drugs in Vancouver, Canada**

**by  
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## Ethics Statement

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## **Abstract**

In response to the drug poisoning crisis in Canada and the US, some jurisdictions have enacted drug-related Good Samaritan laws (GSLs) to encourage observers of acute poisoning events to call emergency medical services (EMS) during times of overdose. To date, the effectiveness of GSLs are indeterminate. This thesis undertook a literature review on the effectiveness of GSLs, evaluated the working knowledge of a GSL, and the impact of this law among participants of three large prospective cohort studies of community-recruited people who use illicit drugs (PWUD) in Vancouver, a full year after the enactment of a GSL in Canada. Overall, the literature review demonstrated mixed evidence with regard to the effectiveness of GSLs. Only about a third of our sample had accurate knowledge of the GSL and the GSL did not appear to have changed EMS-calling rates. Additional measures are urgently needed to support the aims of GSLs.

**Keywords:** Good Samaritan Law; Public Health Policy; Drug use; Overdose; Knowledge; Emergency Medical Services

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## List of Acronyms

ACCESS	AIDS Care Cohort to evaluate Exposure to Survival Services
AOR	Adjusted odds ratio
ARYS	At-Risk Youth Study
BC	British Columbia
CI	Confidence interval
DTES	Downtown Eastside neighbourhood of Vancouver
EMS	Emergency medical services
GSA	Good Samaritan Drug Overdose Act
GSL	Drug-related Good Samaritan Law
HIV	Human immunodeficiency virus
IQR	Interquartile range
LAC	Library and Archives Canada
OR	Odds ratio
PWUD	People who use illicit drugs
PWUD	People who use illicit drugs
SFU	Simon Fraser University
SRO	Single room occupancy hotels
VIDUS	Vancouver Injection Drug Users Study

## **Glossary**

Thesis	An extended research paper that is part of the final exam process for a graduate degree. The document may also be classified as a project or collection of extended essays.
Glossary	An alphabetical list of key terms
EMS	EMS refers to emergency medical services such as ambulances and paramedics.
GSL	GSL refers to the broad category of laws that aim to provide some legal immunity, generally immunity from drugs possessed for personal use, to individuals who call for EMS during an overdose situation
GSA	GSA refers to the Good Samaritan Drug Overdose Act which is a federal law in Canada

## Preface

Soroush Moallem (SM), the author of this thesis, was supported by a Canadian Institutes of Health Research (CIHR) Frederick Banting and Charles Best Canada Graduate Scholarship-Master's (CGS-M) award, as well as graduate fellowships from the Faculty of Health Sciences at Simon Fraser University.

Dr. Kanna Hayashi (KH), the senior supervisor, holds the St. Paul's Hospital Chair in Substance Use Research and is supported a CIHR New Investigator Award (MSH-141971), a Michael Smith Foundation for Health Research Scholar Award, and the St. Paul's Foundation.

The studies in Chapter 3 and 4 derived data from three ongoing prospective cohort studies (VIDUS, ACCESS, and ARYS) which are supported by the US National Institutes of Health (NIH) (U01DA038886, U01DA021525). Research in these chapters were also undertaken, in part, thanks to funding from the Canada Research Chairs program through a Tier 1 Canada Research Chair in Inner City Medicine which supports Dr. Evan Wood (Director of BC Centre on Substance Use), as well as CIHR through the Canadian Research Initiative on Substance Misuse (SMN-139148).

All chapters in this thesis were conceptualized and written by SM with guidance and assistance from KH. SM undertook the literature review in Chapter 2, the statistical analyses in Chapter 3, and the statistical analyses in the sub-analysis of Chapter 4. SM also worked closely with JinCheol Choi, a statistician at the BCCSU, who performed the longitudinal analysis in Chapter 4. The secondary supervisor, Dr. Julian Somers, also provided guidance and assistance, particularly for Chapters 3 and 4. All tables and figures were created using Microsoft Word and all statistical analyses were conducted using R Studio.

The Chapter 2 literature review has been accepted for publication in *International Journal of Drug Policy*: Moallem S and Hayashi K. The effectiveness of drug-related Good Samaritan laws: a review of the literature (2020). A version of the Chapter 3 study has also been submitted to a peer-reviewed journal: Moallem S, DeBeck K, Milloy M, Somers J, Kerr T, Hayashi K. Low prevalence of working knowledge of a drug-related Good Samaritan law during an overdose crisis among people who use illicit drugs in Vancouver, Canada (Under Review). A version of the Chapter 4 study will also be submitted to a peer-reviewed journal soon.

# Chapter 1. Introduction

## 1.1. Background and Problem Statement

As the drug poisoning crisis continues, drug overdoses<sup>1</sup> have become one of the leading causes of accidental deaths in Canada and the United States (US).<sup>1,2</sup> In 2018 alone, 63,000 individuals died from an opioid-related drug overdose death in the US, while almost 4,500 deaths occurred in Canada.<sup>3,4</sup> In most overdose cases, fatality occurs as a result of hypoxia (a deprivation of oxygen), requiring the attention of emergency medical services (EMS) as complications can easily arise.<sup>5,6</sup> Of concern, while being most likely to witness an overdose event, people who use illicit drugs (PWUD) are known to have fear about calling for EMS during times of overdose because in Canada and the US, calling an emergency number 911 for EMS can subsequently alert police officers to also attend the overdose event. This involvement of the police during emergency medical situations is the most commonly reported reason for PWUD to avoid calling EMS.<sup>6–13</sup> Numerous studies have documented some possible repercussions associated with calling EMS among PWUD, including arrest by the police, and a subsequent loss of publicly-funded housing or custody of children<sup>9,10,14–16</sup> In this context, many PWUD report being able to manage an overdose independently.<sup>8,17,18</sup> This includes using first aid measures (e.g., cardiopulmonary resuscitation [CPR]),<sup>8</sup> physical stimulation (e.g., applying ice, causing pain),<sup>8</sup> and using the pharmacological antidote to an opioid overdose, naloxone.<sup>11,14,19</sup> Although, naloxone administration can be an insufficient overdose response against potent opioids due to its short duration of action.<sup>20–22</sup> Worse still, the predominant drivers of the ongoing overdose crisis involves the contamination of the illicit drug supply with a highly potent synthetic

<sup>1</sup> The term “overdose” is a misnomer in describing many of these drug-related fatalities, as polysubstance use is common in many of these deaths.<sup>3,4,90</sup> In addition, an “overdose” can also occur when PWUD use drugs (that normally would not hurt the individual) in a novel environment, as drug tolerance requires environmental cues, that are developed in the setting PWUD normally use drugs in to initiate.<sup>91</sup> Despite being a misnomer, the term “overdose” has been continuously used to broadly describe drug-related fatalities or life-threatening effects of consuming drugs. The current study uses the term in the same way.

opioid called fentanyl,<sup>3,23,24</sup> thus there exists a considerable need for EMS to attend any suspected overdose case.<sup>3,20,23–26</sup>

In an attempt to improve the rates of EMS-calling at overdose events, drug-related Good Samaritan laws (GSLs) have been widely adopted to reduce some legal repercussions by granting amnesty from drug-related charges during times of overdose. In Canada, a federal law called the “Good Samaritan Drug Overdose Act” (GSA) was enacted in 2017.<sup>27</sup> In the US, while no nation-wide law exists, the first state to enact a similar kind of legislation was New Mexico in 2007 and by 2018, 46 states had enacted similar legislation.<sup>28,29</sup> These laws are similar to medical Good Samaritan laws where bystanders are afforded no liability to the impact that may arise from intervention during a medical emergency.<sup>30</sup> Similarly, GSLs are designed to increase calls to EMS by, generally, providing immunity from the arrest, charge or prosecution of simple drug possession (drugs possessed for personal use) and breach of conditions (e.g., probation orders, parole) related to simple drug possession at overdose events when EMS is called.<sup>27,31</sup> Although, this definition applies to Canada nationally, the exact protections vary state by state in the US.<sup>27,31</sup> The purpose of these laws is to reduce fear of arrest and thereby encourage individuals to call EMS in the event of an overdose.<sup>27</sup> While these laws have increasingly been implemented in recent years, little is known about their effectiveness in increasing calls to EMS at the scene of an overdose among PWUD, especially in Canada.

## **1.2. Rationale**

In Canada, Health Canada manages a \$2.1-million dollar opioid education campaign, which has an aim to increase awareness of the GSA across Canada using social media and poster advertising, including advertising at 38 music festivals.<sup>32</sup> The Liberal government of Canada has touted this legislation as a “life-saving measure”,<sup>33</sup> while the health minister at the time of enactment, Jane Philpott, urged individuals to call EMS with the promise that they would be safe from arrest with this new legislation.<sup>33</sup> Further, in Waterloo, Ontario, the police have attributed an increase in overdose-related calls to EMS to the enactment of the GSA,<sup>34</sup> where they claim that the GSA has increased the comfortability around EMS-calling for many.<sup>34</sup> However, to our knowledge, no scientific

research exists that can support these claims. Without scientific evidence, these claims can be harmful to the aims of the GSA as they may wrongfully assume the effectiveness of these laws when that claim currently remains indeterminate. Therefore, scientific research is needed to understand whether the GSA has effectively increased EMS-calling among PWUD. Such research would provide insight for public health and policy officials to understand whether the GSA requires adjustments (i.e., revising the legal immunities provided) or if additional measures are needed to increase the rate of EMS-calling in this population.

To date, since the adoption of GSLs, there have been few explorations into the effectiveness of GSLs in increasing calls to EMS. To our knowledge, no studies have investigated the impact of the GSA on EMS-calling among PWUD in Canada. This thesis will uniquely fill several scientific knowledge gaps using the ability to draw on longitudinal data from a community-recruited cohort of PWUD situated in one of the epicenters of the drug poisoning crisis in Canada. More specifically, this thesis examined the impact of the GSA a full year after its implementation among a large sample of PWUD in Vancouver, Canada.

### **1.3. Conceptual Framework**

This research drew upon the “Risk Environment” conceptual framework – used to understand and prevent risk factors of drug-related harm.<sup>35</sup> The framework proposes that drug-related harm is a consequence of the interactions of environmental and individual factors.<sup>35</sup> Environmental factors are organized into different levels (micro, macro) and types (physical, social, economic, and political). Therefore, the individual is not solely accountable for drug-related harm or to reduce harm, rather the responsibility is shared with societal institutions.<sup>35</sup> For example, the stigmatization and criminalization of PWUD (macro-environment) may be a barrier to EMS-calling in times of overdose among PWUD. More specifically, police involvement may be preventing PWUD from calling EMS in an overdose situation (micro-social/physical environment). This subsequently increases the chance that an overdose event becomes fatal. As illustrated, this framework will be used to

inform the research process, particularly to conceptualize variables for inclusion in the multivariable models.

In addition, the proposed study conceptualizes the GSA as a ‘structural intervention’ (macro-policy environment) aimed at reducing the risk of overdose.<sup>36</sup> However, as Burris noted,<sup>36</sup> in the same way that laws can reduce risk, improper implementation or unintended consequences can make laws an ecological cause of risk as well. In order to minimize the ecological risks that may arise through the implementation of a law, contextual factors must be accounted for.<sup>36</sup> Specifically, with regards to the GSA, it is important to account for PWUD’s interaction with their social and physical environment, especially, the interactions with law enforcement officers. In particular, the GSA must account for the long history of police brutality against PWUD and the criminalization of PWUD for the law to be effective in encouraging PWUD to call for EMS at the scene of an overdose.<sup>37</sup>

#### **1.4. Sample and study setting**

To examine the impact of the GSA among PWUD, in Chapter 3 and 4, data were derived from three ongoing prospective cohort studies of PWUD in Vancouver, Canada: the Vancouver Injection Drug Users Study (VIDUS), the AIDS Care Cohort to evaluate Exposure to Survival Services (ACCESS), and the At-Risk Youth Study (ARYS). VIDUS enrolls HIV-seronegative adults ( $\geq 18$  years of age) who injected illicit drugs in the month prior to enrolment. ACCESS enrolls HIV-seropositive adults who used an illicit drug other than or in addition to cannabis in the month prior to enrolment. ARYS enrolls street-involved youth aged 14 to 26 who used an illicit drug other than or in addition to cannabis in the month prior to enrolment. All eligible participants must reside in the Greater Vancouver Area at the time of enrolment and provide written informed consent to participate. Further, participants are recruited through community-based methods, including word of mouth, street outreach and referrals from community organizations. The studies use harmonized data collection and follow-up procedures to allow for merged data analyses. All three cohorts are administered harmonized questionnaires by trained interviewers, urine drug screen tests, HIV and HCV serologic tests at equal follow-up frequency (i.e., every six months). At each study visit, participants receive a \$40 CAD

honorarium. Further details of the three cohorts are available elsewhere.<sup>38-40</sup> All three cohorts have received ethics approval from the University of British Columbia/Providence Health Care Research Ethics Board.

Although all participants must be residing in the Greater Vancouver region at the time of enrolment, a considerable portion of participants reside in the Downtown Eastside neighbourhood of Vancouver (DTES). The DTES is one of the epicentres of the ongoing drug poisoning crisis in Canada<sup>4</sup> and it is also the most impoverished area in Canada, marked by a high prevalence of illicit drug use, marginalization, addiction, mental illness, infectious disease and criminalization.<sup>41,42</sup> This is a stark contrast to other accounts by economists who consistently rank Vancouver, British Columbia among the most liveable cities in the world.<sup>43</sup> A high level of capital is required to live in Vancouver as housing costs are high, which is one of many reasons for the high concentration of precarious living conditions in the DTES, specifically high rates of homelessness, those living in shelters and in low-cost single room occupancy hotels (SROs), which are known to be in a state of disrepair,<sup>41,42</sup> and where a high number of fatal overdoses have occurred.<sup>44</sup>

## **1.5. Specific Aims and Hypotheses**

The overarching aim of this thesis is to evaluate the effectiveness of the GSA in increasing EMS calling at the time of an overdose event among PWUD. To this end, I have developed three specific aims as described below. Based on the conceptual framework (see section 1.3) and previous research, specific hypotheses were generated for aims 2 and 3.

**Aim 1:** To evaluate and assess the current body of evidence regarding the effectiveness of GSLs through a literature review.

**Aim 2:** To evaluate the prevalence of accurate knowledge of the GSA and identify factors associated with accurate knowledge of the GSA among our study population of PWUD.

**Hypothesis 2-1:** The prevalence of working knowledge of the GSA will be low among our sample, especially accurate information regarding the specific legal protection provided by the GSA.

**Rationale 2-1:** As Burris notes in his adaptation of the Risk Environment framework,<sup>36</sup> “the law written on the books is only part of the picture”, substantial effort is needed to implement laws, including educational intervention to increase the level of knowledge of these laws among PWUD.<sup>36</sup> Past research has shown relatively low levels of awareness or knowledge of GSLs among PWUD,<sup>14,45–47</sup> and that reinforced education among PWUD is likely needed to achieve working knowledge.<sup>14</sup> Given the lack of evidence of efforts to implement the GSL in our setting, the macro-policy/social risk environment is likely restricting the uptake of GSL knowledge.

**Hypothesis 2-2:** Factors associated with accurate knowledge of the GSA include: older age, white, male, recent experience of non-fatal overdose and ever having a past negative police encounter (defined as stopped, searched or detained by police).

**Rationale 2-2:** In a previous study, knowledge of Rhode Island’s Good Samaritan Law was associated with older age, white ethnicity and experiencing an overdose previously.<sup>45</sup> Further, the macro-social environment associated with risk production, such as gender and ethnic inequalities, could limit the uptake of GSL knowledge through the oppression of non-males and non-white individuals. Ever having a past negative police encounter with the police could indicate a higher exposure to this knowledge through interactions with policing practices (micro-social/physical environment).

**Aim 3:** To assess the impact of the GSA on the monthly prevalence of EMS-calling between the pre- and post-enactment of the GSA periods, as well as identify factors associated with EMS-calling among our study population of PWUD who witnessed an overdose.

**Hypothesis 3-1:** No statistically significant differences will exist in the monthly prevalence of EMS-calling between the pre- and post-enactment of the GSA.

**Rationale 3-1:** As noted in Rationale 2-1, it is hypothesized that the macro-policy/social risk environment continues to restrict the uptake of knowledge of the GSA. As Burris mentions,<sup>36</sup> PWUD’s comprehension of public health law influences the effectiveness of these laws. Since low levels of knowledge are hypothesized, no

statistically significant impact of the GSA will be found on the monthly prevalence of EMS-calling.

**Hypothesis 3-2:** Having accurate knowledge of the GSA will not be associated with calling EMS at the event of an overdose.

**Rationale 3-2:** As a recent ethnographic study has pointed out,<sup>18</sup> routine police surveillance has increased in the DTES, which has led many PWUD to feel compelled to manage overdose situations independently due to the fear of arrest and police engagement (micro-physical/social risk environment).<sup>18</sup> It is important to note that the GSA was in effect for the majority of this ethnographic study.<sup>18</sup> Similar accounts have also been observed in San Francisco and New York.<sup>8,17</sup> Therefore, the effectiveness of public health laws (macro-policy risk environment) can be undermined by police practices (micro-social risk environment) that are not aligned with the aims of the GSA. Specifically, routine police surveillance of PWUD likely undermines the aims of the GSA and likely perpetuates the ongoing reported fear of police involvement.

**Hypothesis 3-3:** Factors associated with EMS-calling include: white, male, not residing in the DTES, ever owning a naloxone kit, and recent experience of non-fatal overdose.

**Rationale 3-3:** As mentioned previously, gender and ethnic inequalities (macro-social risk environment) are agents that produce risk and could increase reticence to call EMS. While the micro-physical/social risk environment, specifically harmful policing practices, likely undermines the effectiveness of the GSA in the DTES. In addition, previous research has identified several factors associated with EMS-calling, including: being trained to administer naloxone,<sup>48</sup> having a female bystander at the overdose scene made others more likely to call EMS.<sup>11</sup> In contrast, prior overdose experience was negatively associated with EMS-calling.<sup>11</sup>

## **Chapter 2. Literature Review**

### **2.1. Introduction**

While GSLs have increasingly been implemented in recent years, little is known about their effectiveness in increasing calls to EMS at the scene of an overdose among PWUD, especially in Canada. We conducted a review of the evidence on the effectiveness of GSLs on increasing the EMS-calling rate during times of overdose, as well as their ability to reduce drug-related harms among PWUD. To our knowledge, this is the first-of-its-kind literature review on this topic.

### **2.2. Methods**

The databases accessed in this review included: PubMed, CINAHL, Google Scholar, PsycINFO, Medline, Criminal Justice Abstracts, and ProQuest Sociology. We began our search for peer-reviewed literature a few years before the first enactment of GSLs in North America, which was in 2007 in New Mexico, US <sup>31</sup>. Therefore, the search included any relevant published literature between 2005 and September 1<sup>st</sup>, 2019.

Broad search terms employed in the search included: “good samaritan” (specific terms included: “good samaritan drug overdose act” and “samaritan laws”) and “overdose”, “emergency services” (specific terms included: “ambulance”, “police”, and “911”) or “drug use” (specific terms included: “illicit drug” and “illicit drug use”). Combinations of these search terms were used with the “good samaritan” search term (and the specific terms) included first and placed in the search field with the other search terms as “and”.

### **2.3. Inclusion criteria**

For this review, all articles must have assessed, in some way, the effectiveness or impact of GSLs on EMS-notification rates or drug-related harms either among PWUD, police, or EMS and be in the English language. Both quantitative and qualitative research

were included in this review. A total of 68 articles were identified through searching the databases. All articles must be peer-reviewed studies and grey literature was not included in the search. Of those 68 articles, titles and abstracts were read and after eligibility screening, 12 articles were read fully and deemed to meet the inclusion criteria.

## **2.4. Results**

A total of 690 articles were originally identified from the database search, after removing 240 duplications, 382 citations were removed following title and abstract screening, and 68 articles underwent eligibility selection, with 12 deemed to meet inclusion criteria. Among the 12 articles that were included into the review, the majority (9/12) were quantitative observational studies,<sup>14,29,45,46,49–53</sup> with a minority (3/12) being qualitative in design.<sup>10,15,54</sup> All studies were conducted in the US and after reviewing these articles, two major themes emerged. The first theme, “knowledge of GSLs and calling EMS,” included seven articles that assessed levels of knowledge of the law among PWUD and police officers.<sup>10,14,15,45,46,52,54</sup> The majority (5/7) of these articles also included an assessment of PWUD’s responses to overdose events.<sup>10,14,15,45,46</sup> The second theme, “overdose-related hospital admissions and mortality assessment,” included five articles that assessed the impact of GSLs on overdose-related hospital admissions and mortality rates.<sup>29,49–51,53</sup> Of the studies which assessed overdose-related hospital admissions, emergency department visits and inpatient hospital admissions data were used,<sup>49,53</sup> while those studies assessing overdose-related mortality utilized state-level mortality data.<sup>29,50,51</sup>

### **2.5. Theme 1: Knowledge of GSLs and calling EMS**

The first theme focused on knowledge of GSLs primarily among PWUD, with one study assessing this knowledge among police officers and paramedics.<sup>52</sup> Although GSLs are designed to increase calls to EMS at the scene of an overdose, potential beneficiaries of the laws are unable to consider GSLs in the decision to alert EMS if they are unaware of their existence. Therefore, the effectiveness of GSLs largely depends on PWUD having knowledge of these laws. In addition, it would be equally important for the police to be aware of GSLs to act in accordance with the law.

Among the three quantitative observational studies that evaluated knowledge of GSLs among PWUD, the percentages of those reporting awareness of the GSLs were 43% (n=55),<sup>14</sup> 45.5% (n=90),<sup>45</sup> and 77.4% (n=168).<sup>46</sup> Only one of these studies, Jakubowski et al. (2018), evaluated the accuracy of GSL knowledge among a sample of PWUD immediately after completing overdose prevention training (which includes education about a GSL). The correct knowledge of GSLs among this cohort increased from 43% (n=55) at baseline to 78% (n=94) at 12 months.<sup>14</sup> Individuals with accurate knowledge and no knowledge were shown to be more likely to engage in EMS-calling than those with incorrect knowledge.<sup>14</sup> Further, in the in-depth interviews conducted by McLean (2018), none of the 18 participants were aware of GSLs. In the cross-sectional survey by Banta-Green et al. (2013), knowledge among police officers and paramedics were assessed. The study found that only 16% (n=40) of police officers and 7% (n=2) of paramedics were aware of GSLs.<sup>52</sup>

Only one study explored factors associated with having knowledge of GSLs.<sup>45</sup> This study enrolled 198 young non-medical prescription opioid users in Rhode Island, and found that knowledge of GSLs was independently and positively associated with a history of injection drug use, having heard of naloxone, and knowledge of where to obtain naloxone.<sup>45</sup> In addition, PWUD with more high-risk drug use patterns in this sample were found to be more aware of GSLs. For instance, 72.9% of people who injected drugs were aware of GSLs, while 33.3% of non-injectors were aware. Similarly, 64.7% of PWUD who had used heroin were aware of GSLs, whereas 31% who have not used heroin reported awareness of GSLs.<sup>45</sup>

Among the six studies that explored calls to EMS among PWUD, only two studies assessed the relationship between knowledge of GSLs and EMS-calling in a multivariable regression analysis, with both studies showing a clear significant positive association.<sup>14,46</sup> Even despite a lack of GSL knowledge, two studies have also shown that PWUD have a high willingness to call EMS at the event of an overdose.<sup>15,45</sup> In addition, after being informed about GSLs, 88% of heroin users surveyed in Banta-Green et al. (2013) reported that they were more likely to call 911.<sup>52</sup> In the qualitative study by Latimore & Bergstein (2017), PWUD reported moral and ethical reasoning for their willingness to call EMS.<sup>15</sup> In addition, Jakubowski et al. (2018) compared variability in calling EMS between public and

private settings and found that PWUD were less likely to call EMS if the overdose occurred in a private setting. Similarly, EMS was less likely to be called if the overdose victim was a witnesses' relative compared to a stranger.<sup>14</sup> The authors suggest that these findings may be related to fear of endangering individuals known to them by involving the police or endangering an individual's private setting (e.g., fear of losing housing). This is congruent with the qualitative study by Koester et al. (2017), where none of the four participants with housing called 911 in overdose events they had intervened in due to fear of losing government-funded housing.<sup>10</sup> All three qualitative studies in this review report the PWUD's reluctance to call EMS due to the strong fear of arrest and expectations of maltreatment by paramedics and police.<sup>10,15,54</sup> In one of these qualitative studies, the authors found mixed perceptions among PWUD on the effectiveness of GSLs in increasing calls to EMS.<sup>15</sup> Among those who were skeptical of GSL's effectiveness, fear of arrest and doubt that police would follow these laws were primarily reported as reasons.<sup>15</sup> In addition, the fear of prosecution of homicide charges was also expressed as a reason to not alert EMS at an event of overdose.<sup>15,54</sup> This strong distrust of the police system was also cited as a reason for PWUD not to alert EMS in the study by Koester et al. (2017). In this study, findings from two complementary qualitative studies, a study based on semi-structured interviews and an on-going fieldwork-based project, were combined to understand people who inject drugs' (PWID) experiences with overdoses and calling EMS after receiving prior overdose education and naloxone distribution training. Many participants in this study also often reported not notifying EMS due to being able to handle the overdose situation alone.

## **2.6. Theme 2: Overdose-related Hospital Admissions and Mortality Assessment**

An important downstream outcome of GSLs to consider is the increase in the EMS attendance at the scene of an overdose, which would subsequently increase overdose-related hospital admission rates. If GSLs are effective, then there may be a positive association between GSLs and overdose-related hospital admission rates post-enactment. Nguyen et al. (2018) and Blanchard et al. (2018) explored this potential casual pathway by assessing variations in opioid-related hospital admission rates.

In the longitudinal study by Nguyen et al. (2018), variations in emergency department visits and inpatient admissions due to accidental opioid overdose were compared across two states, New York and New Jersey. New York State's GSL was enacted a few years before New Jersey State's GSL and these two states had almost identical patterns of illicit drug use and nonmedical pain medication use prior to GSL implementation, which made these settings ideal for comparison.<sup>49</sup> Using state-specific emergency department and inpatient databases, the authors found, after accounting for global time shifts, serial correlation and heteroscedasticity, an increase in the overall overdose-related emergency department visits and inpatient hospital admissions following the enactment of GSL in New York compared to New Jersey State where GSL had not been enacted. The authors also stratified overdose-related hospital admissions by accidental heroin (defined as poisoning by heroin) and non-heroin opioid overdose (defined as poisoning by other opiates and related narcotics: codeine, meperidine, morphine, opium) and found that the increased overdose-related hospital admission rates were largely driven by heroin-related overdoses.<sup>49</sup>

A similar study was undertaken at the state-level by Blanchard et al. (2018), where variations in 90-day opioid-related readmissions to hospitals after an opioid-related stay were examined in 13 states between 2013 and 2015. In addition to evaluating the impact of GSLs, the authors sought to assess the impacts of naloxone standing orders, which allows for naloxone to be available without prescription, and Medicaid coverage for medication-assisted treatment (MAT) for individuals with opioid use disorder (e.g., methadone, buprenorphine and naltrexone).<sup>53</sup> The primary outcome variable used in this study was readmission within a 90-day for an opioid-related principal diagnosis. The authors reported no statistically significant relationship between GSLs and opioid-related hospital readmissions. However, patients in states with naloxone standing orders were more likely to be readmitted for opioid use than were patients in states without these policies. Further, the authors found that Medicaid coverage for MAT were associated with a lower odds of hospital readmission. The authors noted that implementation of these policies may have emerged from higher rates of opioid use in these states, which also may explain the higher acute care utilization.<sup>53</sup>

Another important potential outcome of GSLs to consider is the reduction in overdose-related mortality due to an increase in EMS notification rates that may accompany GSL legislation. McClellan et al. (2018), Atkins et al. (2019), and Rees et al. (2019) compared changes in overdose-related mortality rates using a difference-in-difference approach, as well as utilized regression models to estimate the effect of GSLs on overdose-related mortality rates. All three studies utilized multiple-cause-of-death data from the National Vital Statistics System to estimate the effect of GSLs on overdose deaths.<sup>29,50,51</sup> McClellan et al. (2018) also utilized the National Survey on Drug Use and Health to assess the number of PWUD using opioid pain relievers non-medically and created their own database of naloxone access laws and GSLs in the US.

In McClellan et al. (2018), by the end of 2014, 28 (55%) states had naloxone access laws, which allow laypeople to access naloxone, and 21 (42%) states had GSLs. The authors found a 15% lower incidence in opioid overdose deaths after states enacted naloxone access laws compared to when states did not have these laws. Similarly, when states enacted GSLs, a 14% lower incidence was observed in opioid-overdose deaths compared to when states did not have these laws. Further, an even greater reduction in the incidence of opioid-related mortality after enactment of both naloxone and GSLs were seen among some populations. For example, among the African American, after enactment of naloxone access laws, a 23% lower incidence in opioid-related mortality was seen, while a 26% lower incidence in opioid-related deaths was seen after enactment of GSLs. Likewise, among the Hispanic, a 16% lower incidence in opioid-related deaths was observed after GSL enactment. In addition, the authors also explored whether non-medical opioid use would increase post enactment of naloxone access laws and GSLs and found no increase in non-medical opioid use.<sup>29</sup>

In contrast, by analyzing data on overdose deaths from 1999 to 2016, Atkins et al. (2019) found no statistically significant effect of GSLs in reducing overdose deaths across 40 states. Even when restricting the sample to unintentional drug overdose cases and opioid-related cases, no relationship was present between GSL enactment and reduction in drug-related overdose mortality rates. In addition, the authors explored whether enactment of naloxone access laws was associated with a decrease in overdose deaths. Among 47 states which had passed naloxone access laws between 2001 and 2016, no identifiable

effect was found between enactment of these laws and opioid overdose mortality.<sup>51</sup> Similarly, in the regression analyses by Rees et al. (2019), between 1999 and 2014, 22 states and the district of Columbia had passed GSLs and 27 states and the district of Columbia had passed naloxone access laws. With regard to GSL's effectiveness in reducing overdose-related mortality, the estimated effects were found to be consistently negative, but no statistically significant relationship was found. However, the authors did find an association between reductions in overdose-related mortality and naloxone access laws. More specifically, naloxone access laws were associated with a 9-10 percent reduction in opioid-related mortality, mainly driven by states that had passed legislation before 2011.<sup>50</sup>

## **2.7. Discussion**

This literature review sought to assess the current body of evidence regarding the effectiveness of GSLs in addressing the ongoing opioid overdose epidemic in North America. Overall, there is limited peer-reviewed literature evaluating GSLs, likely due to their recent implementation across North America. From the 12 studies identified, two themes emerged: knowledge of GSLs and calling EMS, and overdose-related hospital admissions and mortality assessment.

The first theme found differing levels of GSL knowledge among PWUD.<sup>14,45,46</sup> Among the three studies that did so, knowledge among PWUD samples were relatively low and the majority of these studies did not assess whether knowledge of GSLs was accurate or not.<sup>14,45,46</sup> This is an important area for future research as incorrect knowledge of GSLs among PWUD, especially when an individual believes that the GSL provides greater immunity than intended, could lead to the mistrust of the police who may charge the individual at the overdose event according to the law. Hence, jurisdictions that have enacted GSLs need to ensure that appropriate resources are allocated towards providing educational support alongside implementation of GSLs for PWUD as well as police officers. Of concern, only 16% of police officers surveyed in Banta-Green et al. (2013) were aware of GSLs. This is consistent with previous research that has shown that police officers often exhibit gaps in knowledge regarding public health policy.<sup>55</sup> Also, there are

some reports of PWUD experiencing mistreatment from the police, which includes physical searches and threatening interrogation (e.g., threats to be jailed if the individual did not provide information the police officer wanted) at the scene of an overdose.<sup>15</sup> If PWUD, with knowledge of GSLs, are calling for EMS at the scene of an overdose and are still being arrested or mistreated, despite the immunity provided by GSLs, then this would effectively render the GSL insignificant. Therefore, scaling up education and training opportunities for police forces as well as PWUD is vital to the effectiveness of GSLs.

Further, it is unclear whether GSLs are able to mitigate the fear of arrest associated with EMS-calling among PWUD.<sup>7,8,15,46</sup> Even despite GSLs being in effect, many PWUD in qualitative studies had mixed perceptions of their usefulness and reported a strong perceived risk of being criminally charged (such as for homicide) at an event of overdose.<sup>10,15,46,54</sup> This fear and mistrust of the police likely contravenes the effectiveness of GSLs. As Latimore et al. (2017) have suggested, additional measures are likely necessary to achieve the aims of GSLs. One possible measure includes police non-attendance policies, where police officers either do not attend or limit their presence at an event of overdose. For instance, the Vancouver Police Department (VPD) in British Columbia, Canada, has implemented a police non-attendance policy at overdose events<sup>56</sup>. More specifically, this means that the VPD will not attend overdose events unless the EMS has requested their presence or if the overdose is fatal.<sup>56</sup> This has reduced police presence at overdose events in Vancouver to the lowest rates throughout the province.<sup>9</sup> Although, further research is needed to establish the effectiveness of police non-attendance policies, they may be an important tool in supporting GSLs by reducing fear of arrest among PWUD at the scene of an overdose.

In the two studies included in this review,<sup>14,46</sup> having knowledge of GSLs was positively associated with calling for EMS among PWUD. However, some evidence shows that the decision to call EMS may also depend on factors such as the setting (e.g., private or public) in which the overdose occurred and an individual's personal relation (e.g., friend or family member) to the victim.<sup>9,14</sup> As others have previously suggested, individuals may be afraid to endanger their private setting (e.g., fear of losing housing) or endangering individuals known to them (e.g., fear of others being arrested) by involving the police.<sup>9,10,14,15</sup> Another possible reason for why EMS is more likely to be called in a public

setting is that individuals may find it more challenging to flee the scene if the overdose occurred in a private setting.<sup>9,15</sup> Only one of the two studies that found a positive association between GSLs and EMS-calling accounted for overdose setting and an individual's personal relation to the overdose victim.<sup>14</sup> Another potential factor that may be at play is an individual's willingness to call EMS.<sup>15,45</sup> Of the reviewed studies, two studies demonstrated that many PWUD display a high willingness to call EMS, even despite a lack of GSL knowledge.<sup>15,45</sup> Taken together, these findings suggest that GSLs are not the sole motivating factor for PWUD to alert EMS rather the decision to do so is multi-factorial.<sup>9,14,15</sup> Therefore, future assessments of GSLs should account for these reasons and any additional reasons for why an individual chooses to call EMS at an event of overdose. For instance, future studies should account for variations in legal immunity provided by each jurisdiction's GSLs. The degree of legal immunity likely affects the effectiveness of GSLs in increasing calls to EMS. Logically, providing greater legal immunity (such as including immunity from drug trafficking charges) would have a greater reduction in fear of arrest among PWUD, as it is common that PWUD engage in drug dealing,<sup>57,58</sup> but research is needed to confirm this.

This review also identified mixed evidence regarding the potential downstream effects of GSLs.<sup>29,49–51</sup> More specifically, one of the two studies that assessed overdose-related hospital admission rates found an increase in hospital utilization rates following enactment of the GSL,<sup>49</sup> while the other did not.<sup>53</sup> One major limitation to assessing the downstream effects of GSLs is the inability to fully address the potential confounding bias. For example, Ngyuen et al. (2018) suggested that enactment of GSLs in the New York state has resulted in increases in hospital admission rates related to opioid overdoses. While the authors claimed that their finding that the increased hospital admission rates were largely driven by overdoses involving heroin rather than prescription opioids strengthened their interpretation, they also noted that they could not exclude the possibility that the increase in hospital admissions may be explained by changes in the illicit drug supply not the GSL enactment.<sup>49</sup> In addition, the studies examining overdose-related hospital admissions were unable to account for cases where EMS was notified and attended the scene, but the individual was not transported to the hospital.

Although, all three articles that assessed overdose-related mortality rates employed similar statistical methods,<sup>29,50,51</sup> only one of the three studies found a decrease in overdose mortality rates following enactment of GSLs.<sup>29</sup> One main difference between these studies is the way in which the time lag, the lagged effect between implementation of GSLs and their observable effects, is accounted for. Many of the GSLs assessed were implemented recent to the study periods, which makes it difficult to estimate or observe the downstream effects of GSLs. To account for the time lag, in McClellan et al. (2018), states were classified as having a GSL the year after the law was enacted, whereas it is unclear the time period Atkins et al. (2019) lagged GSL policy in their study. In Rees et al. (2019), the authors controlled for a lag in the adoption of naloxone access laws, but did not do the same for GSLs.<sup>50</sup> Given that all three studies utilized the same dataset to estimate overdose-related mortality rates and had similar study periods, it is likely that the variations in results may be influenced by the way the studies accounted for (or did not account for) the lagged effects of GSL implementation. This time lag is listed as a prominent reason to explain the null findings in the study by Atkins et al. (2019). Therefore, the full impact of GSLs may not have been adequately assessed in all three studies due to this time lag, which means future studies should reanalyze the impact of GSLs on overdose-related mortality with additional years of data.

Among the methods identified in this review for assessing the effectiveness of GSLs, evaluating the first-stage outcomes of GSLs (e.g., calls to EMS) rather than the downstream outcomes (e.g., hospital admissions and mortality) seems to be the most straightforward method of observing the primary aims of these laws. Further, due to the recency of GSL implementation, it is important to note that the time lag (the lagged effect between implementation of GSLs and their observable effects) likely affects overdose-related mortality rates the most severely as it is an end-stage outcome of GSLs, while the effects of earlier-stage outcomes such as EMS-calling behaviour or hospital admission rates may be seen sooner. Despite this, our review demonstrates that more quantitative studies have been conducted on assessing the downstream effects of GSLs rather than EMS-calling behaviour. Further quantitative studies that use larger sample sizes to evaluate accurate knowledge of GSLs and EMS-calling behaviour among PWUD are needed. Also, unseen in the current literature is the utilization of EMS-level data (e.g., data from

ambulances). A future study could use EMS-level data to estimate the impact of GSLs on calls to EMS without the need for self-reported data.

Lastly, this review has several limitations. First, this review was limited to peer-reviewed literature and did not explore studies in the grey literature. It was also limited to English literature, which may have resulted in missing some relevant studies written in other languages. Further, all of the studies reviewed were conducted in the US and those in the first theme had small sample sizes ( $n < 168$ ), which reduces the reliability and generalizability of the results. Lastly, given the recency of implementation of GSLs across the US and Canada, many studies exploring the effects of GSLs on drug-related harms may have not yet been published. To our knowledge, no studies have assessed the effectiveness of GSLs in Canada.

## **2.8. Conclusion**

This review highlights the relatively limited literature on the effectiveness of GSLs in reducing overdose-related morbidity and mortality. Although the review found relatively low levels of knowledge among PWUD, there was some evidence suggesting the effectiveness of GSLs in increasing EMS-calling for overdose events among this population. This suggests the need for education programming to accompany the implementation of GSLs, especially for police officers who have been reported to have an even lower level of GSL knowledge than PWUD. In addition, the mixed findings regarding the downstream outcomes of GSLs, specifically overdose-related hospital admission and mortality rates, requires further attention. Although GSLs do not address the root causes of the opioid overdose epidemic, their potential to reduce overdose-related morbidity and mortality should continue to be investigated.

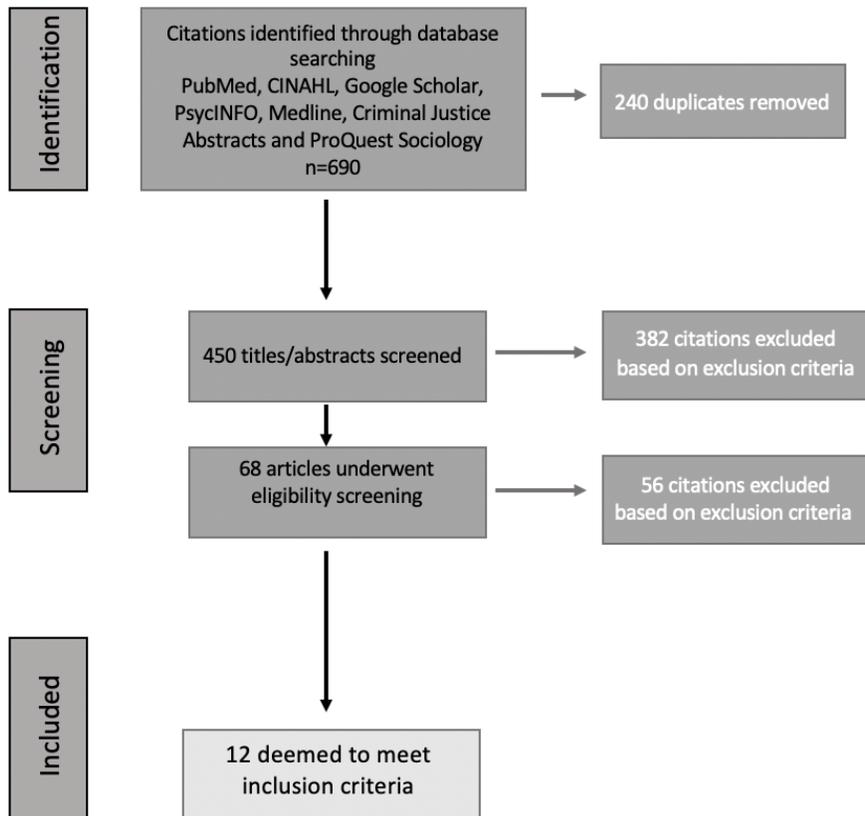


Figure 1. Literature Review attrition diagram

## **Chapter 3. Working knowledge of the GSA and its associated factors**

### **3.1. Introduction**

As described in the literature review chapter, the current body of evidence on the effectiveness of GSLs is limited. The first step to assess the effectiveness of these laws is to measure the prevalence of those who possess working knowledge of these laws. However, most studies that have evaluated knowledge of these laws have used PWUD's awareness of these laws as proxy measurements for knowledge.<sup>45,46</sup> There is an important distinction between awareness and knowledge,<sup>59</sup> specifically awareness of the law can simply be interpreted as knowing the law exists,<sup>59</sup> whereas having the correct knowledge of the law allows for full understanding and practical ability of the law. Nevertheless, among those studies that have reported PWUD's awareness of a GSL, the percentages of those reporting awareness were 45.5% (n=90)<sup>45</sup> in Indiana, US, and 77.4% (n=168) in Rhode Island, US.<sup>46</sup> To our knowledge, to date, only two studies have evaluated the accuracy of GSL knowledge among PWUD in Baltimore and New York, respectively.<sup>14,47</sup> One of these studies used data collected immediately following training that included education about a GSL.<sup>14</sup> Of concern, both studies reported low levels of working knowledge among PWUD.<sup>14,47</sup> To address the limited research on GSL knowledge among PWUD, this chapter investigated factors related to accurate knowledge of the law among a community-recruited sample of PWUD.

### **3.2. Methods**

The current cross-sectional study used data from the three cohort studies (VIDUS, ACCESS and ARYS) between June and November 2018 when a set of questions about the GSA knowledge were added to the cohort questionnaire. All participants who completed this questionnaire were included in this analysis.

In the present analyses, our outcome of interest was knowledge of the GSA, defined as accurate vs. inaccurate. To create this variable, we asked participants: "Imagine you witness an overdose in a public place. 911 is called and the police come to the scene. Do

you think the police can legally arrest you if: you have a small amount of drugs on you (scenario A), you have a larger amount of drugs on you or items (scale, etc.) that may look like you are involved in drug dealing (scenario B), and you are in a red/no-go zone (a legal area restriction) you received for a previous charge that was not simple drug possession (scenario C)". This question was created in consultation with a local lawyer who has expert knowledge about the GSA and informed by public educational material on the GSA that was created and disseminated by the local lawyer's group.<sup>60</sup> Participants were categorized as having accurate knowledge of the GSA if they correctly identified that scenario A was the only instance where the police could not legally arrest at the event of an overdose when EMS is called, owing to protections provided by the GSA.<sup>27</sup> We also explored the prevalence of those who 'underestimated protections', defined as reporting a belief that the police could arrest for all of the three scenarios (including scenario A). Also, the prevalence of those who 'overestimated protections' was explored, defined as reporting a belief that the police could not arrest during (1) all of the three scenarios; (2) scenario A and B; (3) scenario A and C; or (4) scenario C.

The explanatory variables of interest included the following socio-demographic characteristics: age (per year older, continuous); ethnicity/ancestry (white *vs.* non-white); gender (male *vs.* non-male); education (< secondary school education *vs.*  $\geq$  secondary school education); residence in the DTES;<sup>41</sup> and place of residence (homeless *vs.* SRO *vs.* other [e.g., apartment, house, no fixed address]). Drug use related variables included: daily injection drug use ( $\geq$ daily *vs.* <daily); daily use of heroin ( $\geq$ daily *vs.* <daily); daily use of stimulants ( $\geq$ daily *vs.* <daily), defined as powder/crack cocaine or crystal methamphetamine; daily use of cannabis ( $\geq$ daily *vs.* <daily); involvement in drug dealing; non-fatal overdose; and witnessed an overdose event. Additional variables of interest included in our model were: ever being incarcerated; ever had a negative police encounter (defined as stopped, searched or detained by the police); engagement in any addiction treatment; reporting inability to access addiction treatment; and currently own a take-home naloxone (THN) kit, defined as receiving a THN kit containing the equipment necessary to administer naloxone from the THN program in BC.<sup>61</sup> All variables except for age, gender, education, ethnicity/ancestry, incarceration, and negative police encounter,

referred to the past six months. All variables were coded as yes *vs.* no unless otherwise stated.

Bivariable and multivariable logistic regression was used to identify factors associated with knowledge of the GSA. To merit inclusion into the multivariable model, explanatory variables had to be associated at the  $p < 0.05$  level in bivariable analyses. All  $p$ -values were two-sided and all statistical analyses were conducted using R, version 3.4.2.62

### **3.3. Results**

In total, the analytic sample included 1258 participants, with 760 (60.4%) being male, 722 (57.4%) being white, and the median age was 46 (Interquartile Range [IQR] 1-3: 32-56) years, while 715 (56.8%) had witnessed an overdose event in the past six months. As shown in Table 1, 358 (28.5%) individuals had accurate knowledge of the GSA, with scenario A (“You have a small amount of drugs on you”) being most commonly answered incorrectly (515, 40.9%). Also, in total, 468 (37.2%) underestimated and 410 (32.6%) overestimated the protections provided by the GSA, as shown in Table 2. Among those who had overestimated the protections, 159 (38.8%) were living in a SRO, 45 (11.0%) were engaged in drug dealing and 220 (53.7%) had ever experienced a negative police encounter. Among those who had underestimated the protections, 204 (43.6%) were living in a SRO, 68 (14.5%) were engaged in drug dealing and 306 (65.4%) had ever experienced a negative police encounter. Also, among SRO residents with inaccurate knowledge, 60.0% had underestimated the protections, while 46.8% had overestimated the protections.

As shown in Table 2, the prevalence of accurate working knowledge of the GSA was similarly low among some key groups, including 29.7% among those who had witnessed an overdose event, 30.7% among those who were homeless, and 28.3% among those living in a SRO in the past six months. A higher percentage of males reported inaccurate knowledge (62.3% males *vs.* 37.7% non-males), with a statistically significant relationship present ( $p = 0.02$ ). In addition, a higher percentage of those with accurate knowledge reported living in the DTES (61.2% *vs.* 38.8%), with a statistically significant relationship present ( $p = 0.03$ ).

The multivariable results are shown in Table 3. Individuals who reported ever having a negative police encounter (Adjusted Odds Ratio [AOR] = 0.70; 95% CI: 0.55 – 0.91) were less likely to have accurate knowledge of the GSA, while those who reported involvement in drug dealing (AOR = 1.46; 95% CI: 1.04 – 2.06) were more likely to have accurate knowledge of the GSA.

### **3.4. Discussion**

Among our community-recruited sample of PWUD, the majority had witnessed a recent overdose event, but only approximately one quarter of participants had accurate knowledge of the GSA. Of concern, the prevalence of accurate knowledge of the GSA was similarly low among people who had recently witnessed an overdose and those who were living in SROs. This is concerning as private residences have consistently been shown to have reduced EMS-calling rates compared to public places.<sup>8,9,14</sup> Further, 32.6% had overestimated and 37.2% had underestimated the protections provided by the GSA. In the multivariable analysis, participants who reported ever having a negative police encounter were less likely to have accurate knowledge of the GSA, while those involved in drug dealing were more likely to have accurate knowledge of the GSA.

To our knowledge, this is the first study from a Canadian setting to assess the accuracy of knowledge of the GSA among PWUD. We observed a low prevalence of accurate knowledge of the GSA among our sample of PWUD including those who recently witnessed a drug overdose. Our study results are comparable to two previous studies.<sup>14,47</sup> In the first study, investigators found that 56 (18.8%) of people who inject drugs in Baltimore had working knowledge of Maryland's GSL. While investigators in New York demonstrated that<sup>14</sup> immediately following overdose prevention training (that includes education of a GSL) less than half of the sample (43%, n=55) had working knowledge of these laws.<sup>14</sup> After reinforcement of the correct knowledge of the GSL at the 3-, 6- and 12-month follow-up points, correct knowledge of the GSL among study participants increased at each follow-up, reaching 78% (n=94) of the total sample at the 12-month mark.<sup>14</sup> This may suggest that reinforced educational programming is needed for working knowledge to be achieved. Working knowledge is also important to achieve as we

found that about a third of the sample had overestimated the legal immunities provided at overdose events. This potentially places these individuals at risk for arrest, which could be harmful to the aims of the GSA and further perpetuate the ongoing fear of police involvement at overdose events.<sup>9,10,14–16</sup> These findings may even suggest that the ongoing federally-funded educational programming in our setting<sup>63,64</sup> may not be effective in reaching members of marginalized populations, including PWUD.

Taken together with our findings, educational programming to increase the knowledge base of these laws among high-risk populations such as PWUD are strongly needed. Another important consideration is the knowledge held by police officers, given the consequences that could arise from a police officer not knowing the law. Namely, only one study in the peer-reviewed literature<sup>52</sup> surveyed knowledge of GSLs among police officers and found that only 16% (n=40) were aware of these laws. Replicated studies are needed in other jurisdictions, as police officers have shown to exhibit gaps in knowledge of public health policy in other settings.<sup>52,55</sup> Since police officers are key contributors to the implementation of GSLs, it is important to fill any gaps in knowledge of GSLs among this population.

In addition, our finding that only about a quarter of those who lived in SROs had accurate knowledge of the GSA and that a considerable portion had overestimated the protections is concerning. More specifically, among SRO residents with inaccurate knowledge, 60.0% had underestimated the protections, while 46.8% had overestimated the protections. Between 2017 and 2019 in the province of BC private settings were the most common places where fatal overdose cases occurred.<sup>65</sup> For instance, in 2018, 372 (24.5%) fatal overdoses occurred in SROs and similar housing accommodations.<sup>65</sup> This may be attributed to the lower likelihood of EMS being called to these settings compared to public settings.<sup>9,14</sup> Previous qualitative research results indicate that fears of losing government-funded housing are among commonly cited reasons not to alert EMS in private residences,<sup>10,14</sup> as well as a fear of endangering personal relations by involving the police.<sup>10,15</sup> Therefore, educational resources are strongly warranted in areas that have a high prevalence of illicit drug use and SROs such as the DTES.<sup>41,66,67</sup> Further, there is a need to make the places PWUD reside into spaces where PWUD feel comfortable to call for EMS in any medical situation. Some work has been done in this area, specifically a recent pilot

study in the DTES has shown some success in a tenant-led overdose response team.<sup>68</sup> In particular, this program was effective in acceptability, increasing knowledge of overdose response, and increasing access to naloxone among PWUD in privately-owned SROs.<sup>68</sup> Further support is needed to alleviate the fears associated with EMS-calling at the places PWUD reside, as these fears reduce the chance for any resident to receive timely EMS for any medical concerns.

Further, the current legal immunities provided by the GSA may not be sufficient to encourage calling EMS when indicated. More specifically, our finding that those involved in drug dealing are more likely to have accurate knowledge of the GSA creates a strong uncertainty as to whether individuals engaged in drug dealing, an activity not protected by the GSA in Canada,<sup>27</sup> and who have accurate knowledge of the GSA would engage in EMS-calling. Numerous studies report PWUD's reluctance to call EMS due to the strong fear of arrest.<sup>9,10,14-16</sup> In many settings,<sup>8,17,18</sup> PWUD consistently report feeling compelled to manage overdose situations independently to avoid risking police involvement by recruiting EMS.<sup>8,17,18</sup> In this regard, there is a need to implement vigilant and harm-reduction based approaches to quell any uncertainties surrounding the effectiveness of these laws, especially as the fatalities continue to rise due to the ongoing overdose crisis. One possible approach could be the expansion of the legal immunities provided to individuals, specifically by including the immunity from drug trafficking charges in the GSA. This would likely increase the appeal to many PWUD as this activity is a part of the daily lives of many and is essential work for many PWUD's survival.<sup>57,58</sup> However, further research is needed to support the expansion of the immunities provided, specifically research on how knowledge of these laws translates to actions, such as EMS-calling.

The finding that those who have experienced a negative police encounter were less likely to have accurate knowledge of the GSA is novel. Given that socially-marginalized PWUD commonly experience police violence,<sup>10,15</sup> this finding may reflect the mistrust that PWUD have against the police due to the past negative experiences. Specifically, individuals who have had negative police encounters in the past may be more likely to believe that police will still arrest individuals at the scene of an overdose despite the legal protections provided by the GSA. This belief would then cause participants to incorrectly answer our assessment of the GSA knowledge, which is consistent with the finding that

almost half (45.8%) of those who reported having a negative police encounter underestimated the protections provided by the GSA. This hypothesis is further supported by another qualitative study,<sup>10</sup> where the most frequent concern expressed by PWUD about a GSL is whether the police and courts will respect the promise of immunity provided by these laws. Therefore, it is unclear whether GSLs are able to mitigate the fears associated with calling EMS among PWUD.<sup>15,46,69</sup> However, it is important to highlight that those with past negative experiences with the police are among high-risk populations who warrant knowledge of these types of law. To meet this exigency, overdose response training that includes knowledge of a GSL is strongly needed. Having previous incarceration experience was not significantly associated with accurate knowledge of the GSA, although the direction of effect was the same as that observed among people who reported having a negative police encounter.

Our study has several limitations. The majority of our measures are self-reported, which could introduce response bias into our results. However, self-reported measures among PWUD have been shown to be generally reliable and valid among PWUD.<sup>70-72</sup> In addition, the sample was not randomly recruited, which may reduce the external validity of our results. Also, the cross-sectional nature of this study does not allow us to address the temporal sequence of associations found in our study.

### **3.5. Conclusion**

This study adds to the current literature on GSLs by assessing the accuracy of knowledge of these laws among a large community-recruited sample of PWUD in the midst of an ongoing drug overdose crisis. Overall, our findings expand on past research by demonstrating a low prevalence of accurate knowledge of GSLs a full year after its enactment. Low levels of knowledge may undermine the potential effectiveness of this federal law in our setting, especially because we found that 32.6% of the sample had overestimated the protections provided by the GSA, potentially placing these individuals at risk for arrest. Participants engaged in drug dealing were more likely to have accurate knowledge of the GSA, however they may also be reticent to call EMS given the absence of legal protections for drug dealing in the GSA. Participants who had experienced negative

police encounters were less likely to have accurate knowledge of the GSA, and almost half (45.8%) had underestimated the protections, therefore may be less likely to act under the protections provided. Our findings suggest areas for further investigation and potential intervention to further improve the effectiveness of GSLs in the context of the ongoing crisis. Implications include the need for further education among high-risk populations such as people living precariously and who have had negative police encounters.

**Table 1.** Responses to the Good Samaritan Drug Overdose Act knowledge assessment question among people who use illicit drugs in Vancouver, British Columbia, June 2018 to November 2018 (n=1258).

<b>Question:</b> Imagine you witness an overdose in a public place. 911 is called and the police come to the scene. Do you think the police can legally arrest you if:	<b>Yes (%)</b>	<b>No (%)</b>
<b>Scenario A:</b> You have a small amount of drugs on you	515 (40.9%)	743 (59.1%)
<b>Scenario B:</b> You have a larger amount of drugs on you or items that may look like you are involved in drug dealing	914 (72.7%)	344 (27.3%)
<b>Scenario C:</b> You are in a red/no-go zone you received for a previous charge that was not simple drug possession	953 (75.8%)	305 (24.2%)
<b>Accurate knowledge of the Canadian GSA</b>	358 (28.5%)	900 (71.5%)

The Canadian Good Samaritan Drug Overdose Act (GSA) provides protections from the arrest, charge, or prosecution of drugs possessed for personal use (simple possession) and breach of conditions (e.g., probation orders, parole) related to simple possession to those involved at the overdose event when emergency medical services are called to an overdose situation.<sup>27</sup>

Participants who correctly identified that police could not legally arrest an individual in scenario A but could legally arrest individuals in scenario B and C were deemed to have accurate knowledge of the GSA.

**Table 2.** Bivariable logistic regression analyses of factors associated with accurate knowledge of the Good Samaritan Drug Overdose Act in Vancouver, British Columbia, June 2018 to November 2018 (n = 1258).

Characteristic	Accurate Knowledge (%)		Estimated Protections*		Odds Ratio (95% CI)	P Value
	Yes (n=358, 28.5%)	No (n=900, 71.5%)	Under (n=468, 37.2%)	Over (n=410, 32.6%)		
Age						
Median (IQR)	47 (34-55)	44 (32-56)	49 (39-56)	41 (29-53)	—	
Per year older	—	—	—	—	0.99 (0.98 – 1.00)	0.24
White (vs non-white)	203 (56.9%)	519 (58.2%)	210 (44.9%)	183 (44.6%)	1.02 (0.80 – 1.30)	0.88
Male (vs non-male)	199 (55.6%)	561 (62.3%)	312 (66.7%)	233 (56.8%)	0.76 (0.59 – 0.97)	0.03
< Secondary school education	189 (53.7%)	453 (51.5%)	249 (53.2%)	197 (48.0%)	1.09 (0.85 – 1.40)	0.49
DTES residency+	219 (61.2%)	490 (54.4%)	254 (54.3%)	225 (54.9%)	1.32 (1.03 – 1.69)	0.03
Place of residence+:						
Homeless	75 (21.0%)	169 (18.8%)	57 (12.2%)	76 (18.5%)	1.16 (0.84 – 1.62)	0.37
Single room occupancy	134 (37.4%)	340 (37.8%)	204 (43.6%)	159 (38.8%)	1.03 (0.79 – 1.36)	0.81
Other (e.g., apartment, house, no fixed address)	149 (41.6%)	391 (43.4%)	207 (44.2%)	174 (42.4%)	reference	
Engaged in addiction treatment+	229 (64.0%)	559 (62.2%)	295 (63.0%)	252 (61.5%)	1.08 (0.84 – 1.39)	0.56
Unable to access addiction treatment+	9 (2.5%)	23 (2.6%)	12 (12.2%)	11 (2.7%)	0.98 (0.43 – 2.07)	0.96
Ever being incarcerated	290 (81.0%)	761 (84.6%)	412 (88.0%)	330 (80.5%)	0.78 (0.57 – 1.08)	0.13
Ever had a negative police encounter+	182 (51.0%)	537 (59.7%)	306 (65.4%)	220 (53.7%)	0.70 (0.55 – 0.90)	0.01
Currently own THN kit+	244 (72.8%)	591 (67.7%)	302 (64.5%)	274 (66.8%)	1.28 (0.97 – 1.70)	0.08
Witnessed an overdose+	212 (59.2%)	503 (56.0%)	265 (56.6%)	224 (54.6%)	1.14 (0.89 – 1.47)	0.29
Experienced an overdose+	36 (10.1%)	107 (11.9%)	45 (9.6%)	61 (14.9%)	0.83 (0.55 – 1.23)	0.36
Involved in drug dealing+	64 (17.9%)	116 (12.9%)	68 (14.5%)	45 (11.0%)	1.47 (1.05 – 2.04)	0.03
At least daily drug use+:						

Injection drug use	118 (33.0%)	293 (32.6%)	274 (58.5%)	236 (57.6%)	1.13 (0.88 – 1.46)	0.89
Heroin§	174 (48.6%)	395 (43.9%)	212 (45.3%)	177 (43.2%)	1.21 (0.95 – 1.55)	0.13
Stimulants, defined as powder or crack cocaine or crystal methamphetamines§	103 (28.8%)	239 (26.6%)	125 (26.7%)	105 (25.6%)	1.11 (0.85 – 1.46)	0.43
Cannabis	207 (57.8%)	491 (54.6%)	259 (55.3%)	219 (53.4%)	1.14 (0.89 – 1.46)	0.29

DTES: Downtown Eastside neighborhood of Vancouver. THN: Take home naloxone

\* Denotes whether participants under- or over-estimated the protections provided by the GSA

† Denotes behaviours and events in the past six months

‡ Police encounter refers to being stopped, searched or detained by the police

§ Injection or non-injection drug use

Reference category = Inaccurate knowledge of the GSA

**Table 3.** Multivariable logistic regression analyses of factors associated with accurate knowledge of the Good Samaritan Drug Overdose Act in Vancouver, British Columbia, June 2018 to November 2018 (n = 1258).

<b>Characteristic</b>	<b>Adjusted Odds Ratio (95% CI)</b>	<b>P Value</b>
Male (vs non-male)	0.82 (0.64 – 1.06)	0.128
DTES residency <sup>a</sup>	1.25 (0.97 – 1.62)	0.089
Ever had a negative police encounter <sup>b</sup>	0.70 (0.55 – 0.91)	0.007
Involved in drug dealing <sup>a</sup>	1.46 (1.04 – 2.06)	0.029

DTES: Downtown Eastside neighbourhood of Vancouver

<sup>a</sup>Denotes behaviours and events in the past six months

<sup>b</sup>Police encounter refers to being stopped, searched or detained by the police

Reference category = Inaccurate knowledge of the GSA

To merit inclusion into the final multivariable model, factors must have been associated with the outcome in bivariable analyses at the  $p < 0.05$  level.

## **Chapter 4. The impact of the GSA on calling EMS during drug overdoses**

### **4.1. Introduction**

Research from within the past two decades has identified several factors associated with an increased likelihood of EMS-calling among PWUD. These include: previous naloxone administration experience,<sup>46</sup> training to administer naloxone in the previous two years,<sup>48</sup> previous experience of witnessing an overdose,<sup>11</sup> and having a female bystander at the overdose scene made others more likely to call EMS.<sup>11</sup> In contrast, characteristics that were negatively associated with EMS-calling include: prior overdose experience<sup>11</sup> and the presence of four or more bystanders at the overdose event.<sup>11</sup> Other reasons for not calling EMS include no ownership of a cell-phone<sup>16,73</sup> and fear of endangering personal relations by the potential involvement of the police when EMS is called.<sup>10,14</sup> Research also shows that EMS is more likely to be called in a public setting (e.g., on the street) rather than in a home.<sup>8,9,14</sup> The current study in this chapter sought to compare the prevalence of calling EMS a full year before and after the enactment of the GSA among PWUD who witnessed an overdose event, and identify factors associated with calling EMS. We further explored the relationship between working knowledge of the GSA and calling EMS during the post-enactment period.

### **4.2. Methods**

#### **Study setting and design**

Data were drawn from the VIDUS, ACCESS and ARYS cohorts. In the primary analysis, data from four semi-annual questionnaires administered between December 2014 – May 2016 (“pre-enactment period”) and June – November 2018 (“post-enactment

period”) were utilized, with a gap in data between May 2016 – May 2018 that corresponds to a year before and after enactment of the GSA (enacted May 2017). The witnessed overdose and response questions were removed from the questionnaire between May 2016 – May 2018, which caused the gap in our data. In the four semi-annual questionnaires used, questions regarding witnessed overdose events and responses were asked. In addition, questions used to evaluate the accuracy of knowledge of the GSA (described below) among participants were added to the post-enactment period questionnaire.

### **Primary outcome measure and study sample**

The primary outcome of interest was a binary measure (yes vs. no) of ‘Called EMS’ derived from participants who responded ‘yes’ to the question: “Have you witnessed an overdose in the last 6 months?” and responded ‘I called 911’ (an emergency number) to the subsequent question: “What happened in response to this last time?”. Other possible responses to this question included: “I administered Narcan”, “Someone else called 911”, “Person came to on their own”, “I helped”, “Someone else helped”, “Ambulance came”, “I left”, or “I was at a supervised consumption site”.

As the first step, we restricted the sample to those who had witnessed an overdose event and used any drugs in the past six months during the study period. The sample was further restricted by the exclusion of witnessed overdose events where the respondent did not call EMS, but EMS arrived at the scene or was not needed. To do this, we excluded overdose events where participants responded to the event with the following: “Someone else called 911”, “Ambulance came”, “At a supervised consumption site”, and “Person came to on their own”.

### **The impact of the GSA on EMS-calling**

An interrupted time series analysis with segmented regression was used to evaluate the impact of the GSA enactment on the monthly prevalence of EMS-calling, using all eligible observations.<sup>74,75</sup> This analysis required the data to be divided into two segments, pre- and post-intervention (enactment of GSA).<sup>74,75</sup> Using linear regression, we computed the change in intercept post-enactment to measure the level change of EMS-calling pre-

and post-enactment, as well as trends (slope) that may have occurred following the GSA enactment.<sup>74,75</sup>

In the sub-analysis, we evaluated the accuracy of ‘knowledge of the GSA’ (described in Chapter 3: 3.2 Methods). This GSA knowledge evaluation was only present in the post-enactment period questionnaire, thus we examined the association between this variable and the outcome using the Pearson’s  $\chi^2$  test.

### **The analysis of factors associated with calling EMS**

For this part of the analyses, we further restricted the sample to the most recent observation contributed by each participant because the majority of the sample contributed only one observation during the study period.

The explanatory variables of interest included the following socio-demographic characteristics: age (continuous); ethnicity/ancestry (white *vs.* non-white); gender (male *vs.* non-male); education (< secondary school education *vs.*  $\geq$  secondary school education); residence in the DTES; place of residence (homeless *vs.* SRO *vs.* other [e.g., apartment, house, no fixed address]). Drug use related variables included: injection drug use ( $\geq$ daily *vs.* <daily); use of heroin ( $\geq$ daily *vs.* <daily); use of stimulants ( $\geq$ daily *vs.* <daily), defined as powder/crack cocaine or crystal methamphetamine; use of cannabis ( $\geq$ daily *vs.* <daily); and ever experienced a non-fatal overdose. Other social/structural exposures included: involved in drug dealing; ‘witnessed a known person’s overdose’, derived from asking the participant if they knew the person who they witnessed overdose; ever had a negative police encounter, defined as being stopped, searched or detained by the police; ever experienced incarceration; involved in sex work, defined as exchanged sex for gifts, food, shelter, clothes, or money; ever own a THN kit; and ever administered naloxone, derived from the question: “Have you administered Narcan/naloxone to anyone in the last 6 months?” and the subsequent question: “(If yes) How many times?”. Responses from participants were then coded as: “Did not administer” (reference group), “1 or 2 times”, “3 or 4 times” or “5 or more times”. To increase statistical power, the “3 or 4 times” and “5 or more times” categories were merged into one (“3 or more”). We also included a variable of ‘time’ to adjust for any time-related effects between the pre- (time=0) and post-enactment period (time=1). All variables except for age, gender, education,

ethnicity/ancestry, ever own a THN kit, ever administered naloxone, ever overdosed, and ever incarcerated referred to the past six months. All variables were coded as yes vs. no unless otherwise stated.

We used bivariate logistic regression to estimate the crude relationship between the explanatory variables of interest and the outcome. All explanatory variables associated at the p-value <0.05 level in bivariate analysis were included in the construction of a multivariable logistic regression model, except for time which was forced into the multivariable model to adjust for its effect on other covariates. In the sub-analysis, we used descriptive statistics to explore the other responses to the witnessed overdose event among those who called EMS. All p-values were two-sided. All statistical analyses were performed using R, version 3.6.3 (R Foundation for Statistical Computing, Vienna, Austria).

### **4.3. Results**

A total of 660 observations reported by 540 participants were included in the interrupted time series analysis. The median number of questionnaires completed by these participants was 1 (quartile 1-3: 1-1, range = 1-4). Using the most recent observations, 262 (48.5%) of 540 participants reported witnessing an overdose event in the pre-enactment period and 278 (51.2%) in the post-enactment period. The sample characteristics are shown in Table 1. Among this sample, 284 (52.6%) reported calling EMS at an overdose event and 310 (57.4%) had witnessed a known person overdose. The sample included 321 (59.4%) males, 288 (53.3%) of white ethnicity/ancestry, 307 (56.9%) with less than secondary school education, and the median age was 40.4 (quartile 1-3: 28-52) years. Also, 387 (71.7%) reported having ever personally experienced an overdose, 365 (67.6%) reported ever owning a THN kit and 273 (50.6%) had never administered naloxone. In addition, 141 (26.1%) reported involvement in drug dealing, 464 (85.9%) had ever experienced incarceration, and 361 (66.9%) had ever experienced a negative police encounter.

In the interrupted time-series analysis (Figure 2), the mean monthly prevalence of EMS calling in the pre-enactment period was 53.7% (range = 50.3%-58.8%) and remained similar to that in the post-enactment period with 52.1% (range = 48.0%-55.7%). There was no statistically significant evidence in the change of the intercept ( $p = 0.465$ ) and slope ( $p = 0.478$ ) following enactment, compared to the pre-enactment slope ( $p = 0.859$ ).

In bivariate analyses, as shown in Table 1, factors significantly associated with EMS-calling included: older age (Odds Ratio [OR]: 1.02; 95% Confidence Interval [CI]: 1.01 – 1.03), residency in the DTES (OR: 1.93; 95% CI: 1.36 – 2.74), ever administered naloxone one or two times (OR: 1.60; 95% CI: 1.06 – 2.42), and three or more times (OR: 1.80; 95% CI: 1.09 – 3.01). A negative association was observed between those who used daily cannabis and called EMS (OR: 0.68; 95% CI: 0.47 – 0.98). In the multivariable analyses, the results were attenuated with older age (OR: 1.02; 95% CI: 1.00 – 1.03), residency in the DTES (AOR: 1.68; 95% CI: 1.15 – 2.46) and ever administering naloxone three or more times (AOR: 1.75; 95% CI: 1.03 – 3.02) remaining significantly and positively associated with EMS-calling.

Among the 284 participants who called EMS, 213 (75%) reported that the ambulance arrived at the overdose scene, as shown in Table 3. In addition to calling EMS, 111 (39.1%) reported helping the individual (e.g., first aid), 102 (35.9%) reported administering naloxone, and 28 (9.9%) reported someone else helped the individual.

In the sub-analyses, in total 278 participants responded to the post-enactment period questionnaire (data not shown). Among this sample 154 (55.4%) individuals reported calling EMS at an overdose event, and 81 (29.1%) were identified as having accurate knowledge of the GSA. The prevalence of EMS-calling was 51 (33.1%) among those who had accurate knowledge of the GSA and 30 (24.2%) among those who did not. In the Pearson's  $\chi^2$  test, working knowledge of the GSA was not significantly associated with EMS-calling ( $p = 0.095$ ).

## 4.4. Discussion

Among the 540 community-recruited PWUD who witnessed an overdose event, this study assessed these events a year before and after the national-enactment of the GSA in Canada. Among these overdose events, EMS was called approximately half of the time, which is similar to the rate reported in other settings.<sup>13</sup> In the interrupted time-series analysis, we did not observe any statistically significant differences in the monthly prevalence of EMS-calling between pre- and post-GSA enactment periods. In the multivariable results, those who reported older age, residence in the DTES, and three or more naloxone administrations were more likely to call EMS at the witnessed overdose event. In the sub-analysis, less than one third of those who witnessed an overdose had accurate knowledge of the GSA, and there was no statistically significant relationship between accurate knowledge of the GSA and EMS-calling.

To our knowledge, this is the first investigation of changes in the monthly prevalence of EMS-calling between the pre- and post-GSA enactment periods, and we found no statistically significant differences. Further, in the post-enactment period, the sub-analysis found no association between having accurate knowledge of the GSA and calling EMS. The sub-analysis finding is contrary to a previous longitudinal study in the US conducted by Jakubowski et al. (2018), which found a three-fold increase in the odds of calling EMS among PWUD with accurate knowledge of New York's GSL compared to those with incorrect knowledge.<sup>14</sup> However, it is important to note that this previous study reinforced GSL knowledge at each study visit among participants and those with no knowledge were also significantly more likely to call EMS compared to those with incorrect knowledge.<sup>14</sup> Given the contradictory findings between our findings and the findings of Jakubowski et al. (2018), further research is needed to determine the effectiveness of PWUD having working knowledge of these law and the impact of this on EMS-calling rates. Although we were unable to observe the effectiveness of the GSA on increasing EMS-calling in our setting, some PWUD may find these laws beneficial. Therefore, it is concerning to observe only about a third of our participants had accurate knowledge of the GSA, warranting additional education of this law to those likely to witness an overdose.

The finding that those who resided in the DTES were more likely to call EMS is a finding contrary to past research in this setting. Despite having a non-attendance policy at overdose events, the Vancouver Police Department (VPD) maintains routine police surveillance in the DTES and increased this surveillance in 2018,<sup>18,76,77</sup> an action that undermines the non-attendance policy. A recent ethnographic study found that in response to the regular police presence in the DTES, some PWUD felt compelled to choose between responding to the overdose independently, not responding or risking potential arrest by recruiting EMS.<sup>18</sup> In this regard, the DTES may not be an environment conducive to EMS-calling for PWUD. However, since there are many low-threshold harm reduction and health services sites where PWUD work as peer workers in this neighbourhood,<sup>66,78</sup> it may be that DTES residents were more likely to work as peer workers and be aware of the importance of calling EMS or used to call EMS through their work.

In addition, we found that those who had ever administered naloxone three or more times were more likely to report calling EMS. Among those who called EMS, over a third (35.9%) reported also administering naloxone at the witnessed overdose event. To date, the evidence regarding the association between naloxone administration and EMS-calling has been mixed. A previous longitudinal study found no association between at least one naloxone administration and EMS-calling,<sup>14</sup> while another cross-sectional study had reported previous naloxone administration as a factor that likely increases EMS-calling among PWUD.<sup>46</sup> Our finding is broadly consistent with the latter finding. Previous studies have also shown that some PWUD would prefer to manage the overdose situation independently without risking the potential involvement of the police by calling EMS.<sup>8,17,18</sup> For instance, 62% of PWUD in a San Francisco study reported a reticence to call EMS if naloxone was available.<sup>17</sup> In addition, in 2016, data from the British Columbia THN program has shown that the most commonly reported reason for not calling EMS was due to the situation being under control.<sup>9</sup> However, if the situation was not under control, such as when naloxone administration was ineffective in reversing the overdose, then some PWUD have reported resorting to calling EMS.<sup>8</sup> This was the case in another New York study where a third of PWUD reported delaying the call to EMS due to the belief that the overdose situation could have been independently managed.<sup>8</sup> Therefore, our finding may suggest that those who administered naloxone many times experienced an ineffective

overdose response, and called EMS.<sup>79,80</sup> This interpretation is consistent with another study that found that bystanders who administered three or more naloxone ampules at an overdose event were more likely to call EMS.<sup>81</sup> Taken together, innovative strategies are needed to reduce all possible repercussions associated with EMS-calling for PWUD, as these have been shown to cause PWUD to delay and avoid EMS-calling.<sup>8–10,14–16</sup> Additionally, our finding could also be indicative of the amount of experience PWUD have in managing an overdose situation. For instance, those who administer naloxone frequently could be more comfortable or better recognize the need to call EMS, but research is needed to confirm this.

Taken all together, our findings suggest that additional measures are needed to strengthen GSL policies to increase the appeal to PWUD, as some PWUD have reported a disbelief that the police and legal courts will respect the promise of legal immunities provided by the GSL.<sup>10</sup> One possible measure to address this issue could be a police non-attendance policy, which aims to restrict police attendance at overdose events.<sup>56</sup> The Vancouver Police Department (VPD) has implemented a non-attendance policy where police do not attend an overdose situation unless requested to attend by EMS or if the overdose results in a fatality.<sup>56</sup> In addition to the police non-attendance policy, the British Columbia Emergency Health Services (BCEHS) have a similar policy where police are only notified of the overdose situation if responders deem the situation to be dangerous, or if the overdose is suspected to be an attempted suicide.<sup>82</sup> However, direct evidence of the effectiveness of the VPD's non-attendance policy and the BCEHS policy are currently lacking. Another possible method to strengthen these laws is to include legal immunities for drug trafficking charges. Over a quarter of our sample (26.1%) had reported being involved in drug dealing, which may indicate a higher reticence to call EMS given the lack of immunities provided for drug trafficking charges. Given that many PWUD are engaged in drug dealing for survival<sup>57,58</sup> and that this activity is part of the daily lives of PWUD, legal immunities for drug dealing are needed to better appeal to PWUD.

Our findings should be considered in light of several limitations. Firstly, in the interrupted time series analysis, we had a gap in our data that corresponds to a full year before and after the May 2017 enactment of the GSA. This reduces our ability to make inferences of the longitudinal impact of the GSA on witnessed overdose events. However,

by looking at the year following the enactment of the GSA, we are consistent with another longitudinal study that assessed the potential effectiveness of a GSL, specifically with no gap in data this study had lagged GSA policy in the year the law was enacted to account for the lagged effects of implementation.<sup>29</sup> Secondly, due to the cross-sectional study design used in the multivariable logistic regression model, we are unable to determine the temporal relationship between the exposures and the outcome. In addition, the non-random nature of our sample reduces the ability for our results to be generalized to all PWUD. Lastly, the majority of our measures were self-reported, which may introduce some response bias into our study. However, self-reported measures have been shown to be generally reliable and valid among PWUD.<sup>70-72</sup>

## **4.5. Conclusion**

We did not observe statistically significant differences in the rates of EMS-calling pre- and post-enactment of the GSA among our community-recruited sample of PWUD in Vancouver. Similarly, no statistically significant relationship was found between having accurate knowledge of the GSA and EMS-calling. Of concern, only a third of our study population had accurate GSA knowledge, warranting additional education of these laws to these high-risk populations. The finding that those who resided in the DTES were more likely to call EMS may be reflective of the high number of peer workers in this setting. Further, the finding that those who administered naloxone three or more times were more likely to call EMS could be interpreted as an ineffective overdose reversal situation that required the attention of EMS. This may indicate a preference for responding to the overdose event independently using lay-responses without assistance from EMS due to the risk of police involvement associated with EMS-calling. Therefore, further effort is needed to reduce all possible repercussions associated with EMS-calling to increase EMS-calling rates and to mitigate overdose-related harms.

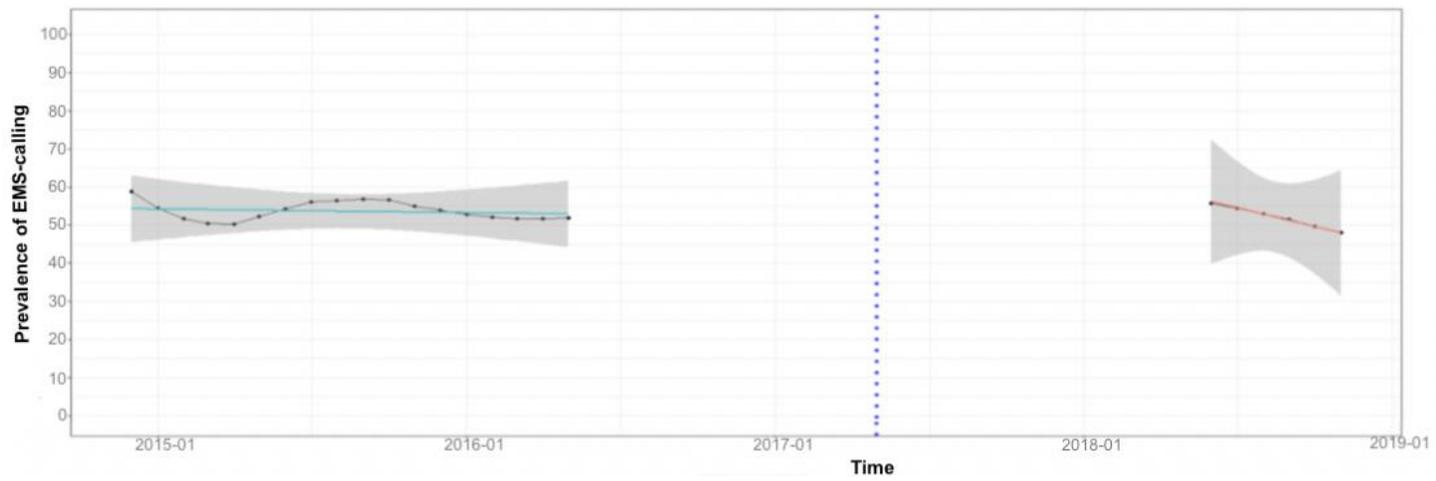


Figure 2: An interrupted time-series analysis of the GSA and ‘Called EMS’ (outcome) across time in months (December 2014 - May 2016 and June 2018 – November 2018).

**Table 4.** Bivariable logistic regression analyses of factors associated with calling emergency medical services at an overdose event in Vancouver, British Columbia, December 2014 – May 2016 and June 2018 - November 2018 (n = 540).

<b>Characteristic</b>	<b>Called EMS (% (n = 284, 53%)</b>	<b>Did not call EMS (% (n = 256, 47%)</b>	<b>Odds Ratio (95% CI)</b>	<b>P Value</b>
Age				
Median (IQR)	42.6 (31-53)	35.2 (26-52)	—	—
Per year older	—	—	1.02 (1.01 - 1.03)	0.004
White (vs non-white)	152 (53.5%)	134 (52.3%)	1.02 (0.73 - 1.44)	0.897
Male (vs non-male)	167 (58.8%)	154 (60.2%)	0.88 (0.61 - 1.27)	0.493
< Secondary school education	167 (58.8%)	140 (54.7%)	0.91 (0.64 - 1.27)	0.570
DTES residency <sup>a</sup>	192 (67.6%)	133 (52.0%)	1.93 (1.36 - 2.74)	<0.001
Place of residence <sup>a</sup> :				
Homeless	66 (23.2%)	64 (25.0%)	0.80 (0.50 - 1.27)	0.347
Single room occupancy	129 (45.4%)	123 (48.1%)	0.81 (0.54 - 1.21)	0.310
Other (e.g., apartment, house, no fixed address)	89 (31.3%)	69 (27.0%)	reference	
Ever incarcerated	250 (88.0%)	214 (83.6%)	1.44 (0.89 - 2.36)	0.140
Ever had a negative police encounter <sup>b</sup>	250 (88.0%)	171 (66.8%)	1.00 (0.70 - 1.44)	0.979
Ever own THN kit <sup>a</sup>	202 (71.1%)	163 (63.7%)	0.81 (0.54 - 1.21)	0.074
Ever administered naloxone <sup>a</sup> :				
Did not administer	129 (45.4%)	144 (56.3%)	reference	—
One or two times	83 (29.2%)	58 (22.7%)	1.60 (1.06 - 2.42)	0.026
Three or more	50 (17.6%)	31 (12.1%)	1.80 (1.09 - 3.01)	0.023
Witnessed a known person overdose <sup>ac</sup>	169 (59.5%)	141 (55.1%)	1.20 (0.85 - 1.69)	0.299
Ever experienced an overdose <sup>a</sup>	206 (72.5%)	181 (70.7%)	1.09 (0.75 - 1.59)	0.637
Involved in the sex trade <sup>ad</sup>	40 (14.1%)	31 (12.1%)	1.18 (0.71 - 1.96)	0.520
Involved in drug dealing <sup>a</sup>	77 (27.1%)	64 (25.0%)	1.12 (0.76 - 1.64)	0.577
At least daily drug use:				
Injection drug use	136 (47.9%)	107 (41.8%)	1.28 (0.91 - 1.80)	0.156
Heroin	113 (39.8%)	94 (36.7%)	1.14 (0.80 - 1.61)	0.464
Stimulants, defined as powder or crack cocaine or crystal methamphetamine <sup>e</sup>	110 (38.7%)	90 (35.2%)	1.17 (0.82 - 1.66)	0.390
Cannabis	76 (26.8%)	89 (34.8%)	0.68 (0.47 - 0.98))	0.037
Post-enactment period	146 (51.4%)	132 (51.6%)	0.99 (0.71 - 1.39)	0.971

EMS: Emergency medical services. DTES: Downtown Eastside. GSA: Good Samaritan Drug Overdose Act. THN: Take Home Naloxone

<sup>a</sup> Denotes behaviours and events in the past six months

- ↳ Police encounter refers to being stopped, searched or detained by the police
  - ↳ A known person includes a sex partner or a friend
  - ↳ Sex trade refers to exchanged sex for gifts, food, shelter, clothes, or money
  - ↳ Injection or non-injection drug use
- Reference category = Did not call EMS

**Table 5.** Multivariable logistic regression analysis of factors associated with calling emergency medical services at an overdose event in Vancouver, British Columbia, December 2014 – May 2016 and June 2018 - November 2018 (n = 540).

Characteristic	Adjusted Odds Ratio (95% CI)	<i>P</i> Value
Age		
Per year older	1.02 (1.00 - 1.03)	0.034
DTES residency <sup>a</sup>	1.68 (1.15 – 2.46)	0.008
Ever administered naloxone <sup>a</sup> :		
Did not administer	reference	—
One or two times	1.40 (0.91 - 2.16)	0.124
Three or more	1.75 (1.03 - 3.02)	0.041
At least daily drug use <sup>a</sup> :		
Cannabis	0.78 (0.52 - 1.17)	0.230
Post-enactment period	0.87 (0.59 - 1.28)	0.494

DTES: Downtown Eastside.

<sup>a</sup> Denotes behaviours and events in the past six months

Reference category = Did not call EMS

To merit inclusion into the final multivariable model, factors must have been associated with the outcome in bivariate analyses at the  $p < 0.05$  level, except for time which was included to adjust for its effect on other covariates.

**Table 6.** Other responses to the reported witnessed overdose event among those who called EMS (n=284).

<b>Response</b>	<b>n=284 (%)</b>
I called EMS and the ambulance came	213 (75.0%)
I called EMS and I helped (e.g., provided first aid)	111 (39.1%)
I called EMS and administered naloxone	102 (35.9%)
I called EMS and someone else helped	28 (9.9%)
I called EMS only	17 (6.0%)
I called EMS and I was at an OPS/SCS	13 (4.6%)
I called EMS and the person came on their own	9 (3.2%)
I called EMS and then I left	1 (0.4%)

EMS: Emergency medical services. OPS: Overdose prevention site

SCS: Supervised consumption site

Participants could provide more than one response.

## **Chapter 5. Conclusion**

### **5.1. Summary of Findings**

To reduce the fatalities associated with the ongoing drug poisoning crisis, there exists an exceptional public health need to increase the rate of EMS-calling among PWUD. Although the GSA has been introduced to address this exigency in Canada, to date, little is known about its effectiveness. In this context, the overarching goals of this thesis were to characterize the effectiveness of GSLs in the scientific literature through a literature review, as well as provide insight into the effectiveness of the GSA in increasing EMS-calling among a community-recruited sample of PWUD in Vancouver, Canada. Chapter 2 of this thesis undertook, to our knowledge, the first literature review of the evidence of the effectiveness of GSLs among PWUD. Following this, in Chapter 3, an assessment of the working knowledge of these laws and factors associated with this knowledge were assessed among a large community-recruited sample of PWUD. Then in Chapter 4, we examined the impact of the GSA on the EMS-calling rates longitudinally and assessed factors associated with EMS-calling among those who had witnessed an overdose event.

In Chapter 2, a total of 12 articles were reviewed in the literature review, with two major themes outlined: knowledge of GSLs and EMS-calling; and overdose-related hospital admissions and mortality assessment. In the first theme, prevalence of awareness and accurate knowledge of these laws were relatively low among these studies, especially among police officers.<sup>52</sup> The majority of these studies assessed awareness of GSLs and only one study had assessed the accuracy of this knowledge among PWUD, where a positive association was found between working knowledge and EMS-calling among PWUD. Several possible repercussions associated with EMS-calling for PWUD were also identified (e.g., loss of publicly-funded housing, custody of children, arrest, and harassment).<sup>9,10,14–16</sup> In the second theme, five studies that had examined the potential downstream effects of GSLs were reviewed. These studies revealed mixed findings regarding the effectiveness of GSLs in reducing overdose-related hospital utilization and mortality rates.

Chapter 3 employed a cross-sectional study design and multivariable logistic regression to identify the level of working knowledge of the GSA and factors associated

with this knowledge among PWUD in 2018. Despite a full year following the enactment of the GSA, the majority of the sample did not have working knowledge of a GSL and concerningly, about a third of the sample had overestimated the protections provided, potentially placing these individuals at risk for arrest. In the multivariable analyses, drug dealing was found to be positively associated with accurate knowledge of the GSA, while those who have had past negative encounters with the police were less likely to have accurate knowledge of the GSA.

Chapter 4 evaluated the impact of the GSA on the monthly prevalence of EMS-calling longitudinally among PWUD who had witnessed an overdose event using an interrupted time-series (ITS) analysis. As well, multivariable logistic regression was used to determine factors associated with EMS-calling. In sub-analysis, we tested the relationship between those with accurate knowledge and EMS-calling. No statistically significant differences in the rates of EMS-calling pre- and post-enactment of the GSA was observed among our sample. Similarly, no statistically significant relationship was found between having accurate knowledge of the GSA and EMS calling. In the multivariable analyses, those who resided in the DTES and administered naloxone three or more times were found to be more likely to call EMS.

## **5.2. Discussion of novel contributions and study strengths**

This thesis expands on the current literature on GSLs through several novel contributions. First, this thesis provides the first literature review of the evidence of the effectiveness of GSLs (Chapter 2), which has been published in *International Journal of Drug Policy*. This literature review fills an important knowledge gap in the literature, by highlighting that the effectiveness of GSLs remains indeterminate.

Second, this thesis utilized a community-based approach to research, where stakeholders and potential research knowledge users were engaged in the research process. More specifically, the evaluation of the working knowledge of the GSA used in Chapter 3 and 4 were created in consultation with a local lawyer from Pivot Legal Society (PVL), a legal advocacy organization that has expert knowledge in the field. It was important to collaborate with PVL to produce research findings that would be useful in legal advocacy

activities aimed to amend this policy.<sup>60</sup> The evaluation of the working knowledge of the GSA was also modeled after public educational material created by PVL,<sup>60</sup> which is a study strength as it ensures the legal correctness of this evaluation. Third, knowledge translation was integrated into the research process. Specifically, PVL's educational material was made available to participants and the interviewers for the VIDUS, ACCESS and ARYS cohorts were instructed to correct inaccuracies in the knowledge evaluation. This type of integrated knowledge translation is a specific strength of this thesis given that it may have increased the level of working knowledge in our community-recruited sample, especially since three-quarters of the sample had incorrect knowledge in Chapter 3.

Third, this thesis undertook the first evaluation of the Canadian GSL and its potential longitudinal impact on EMS-calling rates among PWUD in Canada. The evaluation was conducted a full year after the federal enactment of the law. This may have accounted for any lagged effects in the implementation of the GSA, which has been a concern in other studies that have evaluated the effectiveness of GSLs.<sup>29,51</sup> Also a strength of this longitudinal analysis was that it evaluated the first-stage outcomes of GSLs (i.e., EMS-calling), which was deemed to be the most direct outcome to assess the impact of these laws in the review of the literature. Lastly, the ability to draw on several years of rich data amid the ongoing drug poisoning crisis and derive data from three well-characterized cohort studies of PWUD were also significant strengths of this thesis.

### **5.3. Implications for policy and practice**

Since the enactment of the GSA, the federal government of Canada has allocated \$2.1-million dollars for Health Canada to deliver an opioid education campaign through social media and poster advertising.<sup>32</sup> Our findings indicated that a significant portion of PWUD in the DTES did not possess working knowledge of this law a full year after enactment. This may suggest that the educational campaign run by Health Canada has not been effectively delivered to the PWUD communities, particularly those living in one of the epicenters of the drug poisoning crisis in Canada.<sup>4</sup> Although we did not observe a significant link between those with accurate knowledge and EMS-calling behavior, some PWUD may find these laws beneficial. Therefore, there exists a considerable public health

need to augment educational efforts to increase the working knowledge of the GSA among high-risk PWUD populations.

This thesis has also suggested that additional measures may be needed to increase the appeal of GSLs to PWUD, as well as implement additional policies to support the aims of GSLs. Based on the Chapter 3 and 4 findings, a considerable portion of our study population were engaged in drug dealing which could indicate an increased reticence to call EMS due to the lack of legal protections for this activity in the GSA. Further, those who were engaged in drug dealing were more likely to possess accurate knowledge of the GSA, while those who had ever experienced a negative police encounter were less likely to have accurate knowledge. This creates an uncertainty as to whether these individuals would engage in EMS-calling. In our analyses in Chapter 4, we were unable to clarify this relationship as no statistically significant relationship between involvement in drug dealing or past negative encounters with the police and EMS-calling were found. Given that drug dealing is an activity that is an integral part of the daily lives of many PWUD, especially for survival,<sup>57,58</sup> including immunities for drug trafficking and related charges in the GSA may assist efforts to increase the rate of EMS-calling among PWUD. Also, the GSA currently does not address other significant possible repercussions associated with police involvement at overdose events. Namely, in some of the studies reviewed in Chapter 2, some PWUD have reported that police involvement can lead to losing publicly-funded housing and custody of children.<sup>9,10,14,15</sup> In this regard, many PWUD have reported feeling compelled to manage an overdose independently without enlisting the help of EMS, increasing the risk of a fatality occurring.<sup>8,17,18</sup> This has been documented in many settings.<sup>8,17,18</sup> Therefore, measures are needed to remove all possible repercussions associated with EMS-calling, especially police involvement at overdose situations as it can be detrimental to the rescue of overdosing individuals. This provides a rationale for police to implement non-attendance policies at overdose events, especially for overdose situations that are non-violent.

In addition, as discussed throughout the thesis, the VPD had implemented a non-attendance policy where the police only attend the overdose scene if EMS requests for their presence or if the overdose results in a fatality. In theory, this non-attendance policy has the potential to significantly reduce the fear of police involvement at overdose events.

However, no studies have investigated its effectiveness. This thesis was also unable to assess the effect of the VPD policy given that virtually all participants in our cohorts lived in areas of the VPD jurisdiction. Moreover, based on the VPD's policy, the rate of police attendance at overdose events is supposed to increase with the number of overdose deaths, which means police attendance at overdose events has likely increased since the start of the overdose crisis. In this regard, it is unclear whether policies that do not completely restrict police attendance at overdose events could be effective. It is also important to recognize that police non-attendance policies can be undermined by law enforcement practices that involve an increased police surveillance of PWUD.<sup>18</sup> For instance, the DTES is an area under the jurisdiction of the VPD's non-attendance policy, but the VPD had increased routine police surveillance in this area in 2018.<sup>18</sup> Recent ethnographic research has indicated that this increased surveillance by the police has contributed to several risks for PWUD, which included being compelled to manage overdose situations independently without wanting to risk police involvement by recruitment of EMS.<sup>18</sup> A large part of this research was conducted with the GSA enacted, which could also be an indication that police practices may also be undermining the GSA in this regard. Therefore, attention needs to be placed on how policies and laws can be undermined by practices, which warrants additional training and effort from police departments to align their practices with the aims of laws like the GSA.

Another equally important aspect to consider is the knowledge held by police officers. The review of the literature (Chapter 2) demonstrated that only one study had assessed the knowledge of a GSL among police officers, with only 16% of the sample showing knowledge.<sup>52</sup> In order to address the strong mistrust PWUD have with the police, police officers need to have working knowledge of these laws, otherwise wrongful arrests can occur which could intensify the pre-existing of mistrust of the police PWUD have. Therefore, educational training for public health laws and knowledge are warranted among police officers.

Our results speak to the need for improved educational interventions. Additionally, conceptualizing our findings within the context of the risk environment suggests additional areas for research and further potential opportunities for prevention. Specifically, the macro

risk environment likely continues to contribute to high rates of marginalization among PWUD, affecting the decision to call EMS through dynamics such as fear of precipitating police action. To illustrate this point, several state-induced practices have and continue to socially exclude PWUD, including: the historic lack of adequate mental health and addiction services in this setting,<sup>41,42</sup> which has led many to manage their afflictions through the illicit drug market; inadequate social housing (such as SROs), which have been linked to continued intensive illicit drug use and poor health status;<sup>83</sup> and insufficient income assistance, which has led many to engage in crime for survival.<sup>58,84</sup> All of which contributes to the preventable criminalization of PWUD,<sup>18,85,86</sup> which perpetuates the ongoing fear of police involvement among PWUD at overdose events. Through conceptualizing and situating the findings of this thesis within this risk environment, it is clear that education is only one piece in the larger puzzle of why EMS-calling rates remain low among PWUD, especially among marginalized PWUD. In order to fully address the ongoing fear of the police among PWUD, we must first address the state-level influences that contribute to the vicious cycle that inextricably links poverty, addiction, and crime.

In the context of the risk environment, the GSA can be viewed as an intervention that socially excludes marginalized PWUD, as the protections provided only serve to protect those whose sole fear is possession of illicit substances. Concerns related to drug possession are only one of many fears reported by PWUD, including arrest and harassment by the police, and a subsequent loss of publicly-funded housing or removal of children.<sup>9,10,14–16</sup> Therefore, there is a significant need to connect the GSA with evidence-based, macro-level interventions that have been shown to provide PWUD with opportunities to exit dangerous risk environments. This includes a strategy for rehousing,<sup>87</sup> economic empowerment,<sup>84,88</sup> and the integrated treatment of addiction and mental health comorbidities.<sup>89</sup>

## **5.4. Implications for future research**

Overall, the literature review (Chapter 2) had demonstrated that there is a dearth of research that has investigated working knowledge of GSLs and the impact of this on EMS-calling among PWUD. This thesis has identified several areas for further investigation.

First, to date, there has been no systematic review on the effectiveness of GSLs. More empirical studies need to be undertaken to facilitate a systematic review, including studies that evaluate the first-stage outcomes of GSLs (e.g., calls to EMS). Also, unseen in the current literature is the utilization of EMS-level data (e.g., data from ambulances), which a future study could use to estimate the impact of GSLs on calls to EMS without the need for self-reported data. Second, there is a need for future investigations into the levels of working knowledge held by PWUD in other settings, especially given the low levels of knowledge found in this thesis. Third, future investigations are also needed to clarify the relationship between working knowledge of a GSL and EMS-calling among PWUD, as it is currently unclear whether knowledge of these laws translates into an increased readiness to call EMS.

Lastly, there is a need to understand the level of working knowledge of GSLs among police officers, as only one study has assessed GSL awareness among police officers.<sup>52</sup> Given the developing body of research documenting the gaps in knowledge among police officers with regard to public health policies,<sup>52,55</sup> and that such a knowledge gap with the GSA could potentially lead to wrongfully arresting PWUD at overdose events, there is a need to examine the knowledge held by police officers.

## **5.5. Conclusion**

Despite being an emergency response measure to the overdose crisis, we did not observe statistically significant differences in the rates of EMS-calling pre- and post-enactment of the GSA. Similarly, no statistically significant relationship was found between having accurate knowledge of the GSA and EMS-calling. Of concern, only a third of our sample were found to have working knowledge of the GSL a full year after

enactment. Worse still, about a third of the sample had overestimated the protections provided by the GSL, potentially placing these individuals at risk for arrest. This indicates an urgent need to revise the multi-million-dollar opioid education campaign in this setting to account for the disparity in knowledge among PWUD. In this regard, it remains unclear whether GSLs are effective enough to reduce all possible repercussions that may discourage EMS-calling among PWUD. Although the GSA has the potential to reduce some overdose-related fatalities, in order to fully address the ongoing fear of the police among PWUD, further attention needs to be placed on improving the risk environment that surrounds overdose events.

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