

Rates of Use of Force by Police Officers in Canada:
A Move Toward Standardized Reporting

by

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Abstract

The use of force by police officers remains an unfortunate reality of policing. This study gathered data from a sample of Canadian police services in an effort to determine how often force is applied, what type of force is employed, and what impact this has (in terms of effectiveness and injury, both to the subject and the officer). Results indicated that across jurisdictions in Canada, police officers rarely use force. Moreover, the rates at which officers apply force are unrelated to organizational factors such as the size of the policing jurisdiction or the gender demographics of the individual agency. Collectively, the results of this study suggest that the use of force by police is very much the result of the circumstances in which individual officers find themselves at the time the force is applied.

Keywords: Use of force, police, training, intervention option, effectiveness

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List of Acronyms

CACP	Canadian Association of Chiefs of Police
CEW	Conducted Energy Weapon
CID	Crisis Intervention and De-escalation
CIT	Crisis Intervention Team(s)
ERIW	Extended Range Impact Weapon
GFF	Graham Factor Filtering
NUFF	National Use of Force Framework
OC	Oleoresin Capsicum [spray]
U.S.	United States

Rates of Use of Force by Police Officers in Canada:**A Move Toward Standardized Reporting**

Use of force by police is a topic of interest in Canada. Highly publicized incidents such as the death of Paul Boyd and Robert Dziekanski in 2007, Sammy Yatim in 2013, and Abdirahim Abdi in 2016 have kept the Canadian public's attention on police use of force and have resulted in numerous recommendations to promote increased police accountability (Braidwood 2009; Braidwood, 2010; Court, 2007; Dubé, 2016; Gillis & Hong, 2016; Iacobucci, 2014). More recently, the death of George Floyd on May 25, 2020, in Minneapolis, Minnesota, has increased the public's focus on police use of force and, on an international scale, has sparked a debate over perceived racial inequality in how often, and to what extent, the police apply force during their interactions with the public (Gabbatt, 2020).

Although the body of research on the use of force by police continues to grow (Terrill et al., 2008), shortcomings exist within the literature, especially when considering it in the Canadian context as much of the research has been conducted in the United States (U.S.). While Parent (2011) noted that "the general laws and procedures within the United States governing the use of force can be considered to be in harmony with Canadian legislation" (p. 60), there are also many differences between the two countries, which limits the generalizability of American research. Most notably, officers in the U.S. apply lethal force with greater frequency than officers in Canada (Parent, 1996; 2004; 2011; Parent & Parent, 2016).

When considering current Canadian research on the topic, little is known about how frequently police officers in Canada apply force, the level of force that is applied, whom that force is applied to, and what, if any, factors (e.g., presence of a union, gender demographics, crisis intervention de-escalation training, etc.) affect how officers are applying force across

Canada. The current study sought to examine these issues using data collected from a number of Canadian police services. Before describing the study and its results, a literature review will be presented.

The literature review will begin by providing some context for the present study. Information will be provided to explain where the police get their authority to use force in Canada and I will describe some of the considerations for when that force is actually applied. In addition, details of the Canadian Association of Chiefs of Police (CACP) National Use of Force Framework (NUFF) will be presented to provide the reader with an understanding of the assessment process that guides an officer's response when managing a use of force incident. I have also included information on some of the attempts researchers have made to quantify the magnitude of the force applied by an officer(s) in a given situation. This is done to reinforce how complex and nuanced it is to examine use of force by police – even if it were possible to accurately distill the magnitude of applied force down to a number, this number would still only be a small part of a much bigger picture. This information will be followed by a review of existing research that has focused on use of force prevalence rates and factors that influence these rates.

Literature Review

Authority to Use Force

There are approximately 69,000 police officers in Canada (Statistics Canada, 2019). This translates to approximately 197 officers for every 100,000 citizens (Statistics Canada, 2019). These officers have a unique role in Canadian society as they alone have the authority to compel a person's behaviour through the application of force. Alpert and MacDonald (2001) described this aptly stating, "The power or authority to use force is the most important factor that

distinguishes police from all other citizens” (p. 393). This authority extends to the use of lethal force and even exceeds that of the Canadian courts; the death penalty in Canada was abolished in 1976 (Capital punishment in Canada, 2010). Authority to use force is granted to the police by section 25 of the *Criminal Code* (1985), whereby, provided that the officer(s) is acting on *reasonable grounds*, they may use as much force *as necessary* in the administration or enforcement of the law. Therefore, two important requirements are to be met if an officer’s use of force is to be determined as justified: (a) the officer must have been acting on reasonable grounds, and (b) the officer must not have used more force than necessary.

The exact threshold at which *reasonable grounds* has been met, whether it be to effect an arrest or detention, or apply force, cannot be measured using any instrument or device; indeed, when *reasonable grounds* is satisfied continues to be debated in Canadian courts (*Cacha Collas v. Canada*, 2016; *R. v. Fraser*, 2016; *R. v. Jacob*, 2013; *R. v. MacDonald*, 2014); however, two components to *reasonable grounds* exist that assist in defining this concept: a *subjective* component and an *objective* component. The *subjective* component of *reasonable grounds* defines that a police officer must subjectively have an honest belief that the suspect or accused has committed an offence (*R. v. Jacob*, 2013). The *objective* component of *reasonable grounds* defines that a reasonable person, placed in the position of the police officer, would come to the same conclusion as the officer (*R. v. Storrey*, 1990).

Rather than quantifying reasonable force (i.e., what force was *necessary*), Canadian case law gives guidelines as to what constitutes excessive force: (a) the force was disproportionate to the need for action, (b) the force applied was inspired by malice, or (c) the force applied shocks the conscience of the court. The courts have held that officers cannot be expected to use only the least amount of force, nor can they be expected to measure with exactitude the amount of force

to apply in a specific situation (*Allarie v. Victoria (City)*, 1994; *Levesque v. Sudbury Regional Police Force*, 1992; *Wacket v. Calder*, 1965). A synopsis of these cases follows to illustrate some judicial interpretations of the aforementioned allowances.

In *Wacket v. Calder* (1965), the plaintiff and defendant were in an altercation at an alcohol serving establishment. The defendant had been charged for damages as he was convicted of using too much force in his fight with the plaintiff. The defendant appealed his conviction. The appeal was allowed with one of the judges citing, “it has been long held that an attacked person defending himself and confronted with a provoking situation is not held down to measure with exactitude or nicety the weight or power of his blows” (*Wacket v. Calder*, 1965, para. 16).

In *Levesque v. Sudbury Regional Police Force* (1992), the plaintiff was arrested by the police for interfering with their attempts to arrest and search her boyfriend. The plaintiff alleged that the officers used excessive force in arresting her, which caused further damage to a pre-existing back condition. The plaintiff launched a civil suit against the arresting officers. The presiding judge dismissed the case stating:

It is both unreasonable and unrealistic to impose an obligation on the police to employ only the least amount of force which might successfully achieve their objective. To do so would result in unnecessary danger to themselves and others. They are justified and exempt from liability in these situations if they use no more force than is necessary having regard to their reasonably held assessment of the [sic] the circumstances and dangers in which they find themselves (*Levesque v. Sudbury Regional Police Force*, 1992, p. 3).

Finally, in *Allarie v. City of Victoria* (1994), the police responded to an intoxicated male who had been threatening some acquaintances with a knife. The plaintiff became violent and

during the resulting melee, was struck in the head with a police baton. The plaintiff launched a civil suit against the City of Victoria alleging the police had used excessive force. At trial, the judge cited that a person cannot be expected to measure the level of force that the situation calls for and dismissed the plaintiff's claim.

The Canadian courts have even cited case law from the U.S. to make clear that precision cannot be expected of officers: "Detached reflection cannot take place in the presence of an uplifted knife (*Brown v. United States*, 1921)" (*R. v. Bogue*, 1976, para. 20).

A final and important note on reasonable force (no more force than necessary) to conclude this section – if reasonable grounds did not exist, then any level of force applied by the officer(s) would be considered excessive.

The National Use of Force Framework

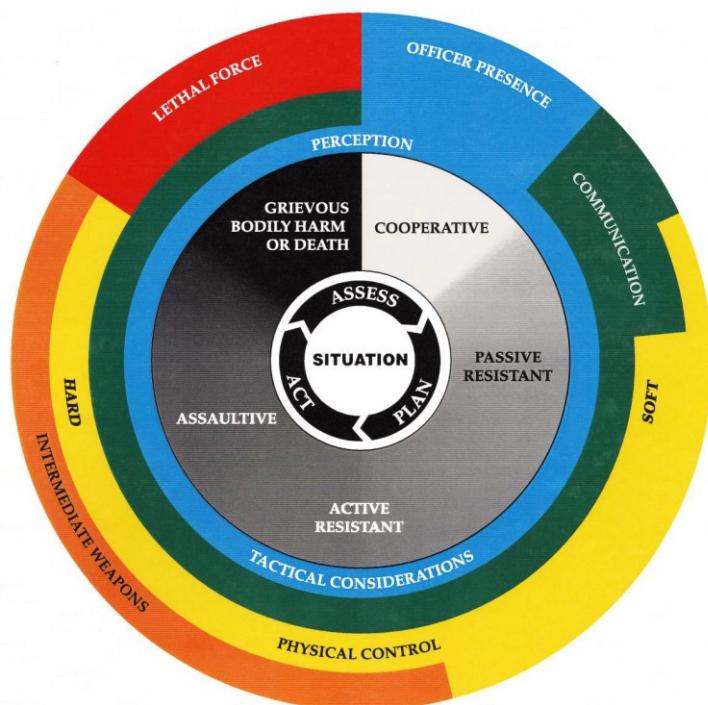
The National Use of Force Framework (NUFF) acts as the governing use of force model for police agencies in Canada (Parent, 2016). The model (depicted in Figure 1) was finalized in 2000 and was the result of a national collaborative effort overseen by the Canadian Association of Chiefs of Police (CACP; CACP, 2000). The undertaking utilized the expertise of numerous use of force specialists and educators from each policing jurisdiction in Canada and included partnerships with both the Canadian and Ontario Police Colleges (CACP, 2000). The goal of developing the model was to, "bring into one framework all of the best theory, research and practice about officer use of force" (CACP, 2000, p. 3), as well as support officer training and public understanding of police use of force (CACP, 2000). Some Canadian police agencies have developed their own use of force models (Butler, 2009); however, since the Criminal Code of Canada has traditionally been used as the standard (e.g., authorities to use force, arrest authorities) around which agencies design their use of force policies and practices (Parent, 2011),

the general principles of these individual models are consistent with the NUFF (Ontario Provincial Police, personal communication, July 5, 2019; Royal Canadian Mounted Police, 2019).

As seen in Figure 1, the NUFF includes a graphical representation of the ‘assess-plan-act’ process an officer employs during his or her reasonable management of a situation to ensure public and police safety (CACP, 2000). The officer’s assessment of the situation is continuous and is based on the totality of the circumstances, taking into account: (a) the situation, (b) the subject’s behaviours, and (c) the officer’s perceptions and the tactical considerations of the incident. It is this assessment process that guides the officer’s response and may include the application of a force option (CACP, 2000).

Figure 1

National Use of Force Framework (CACP, 2000).



The officer continuously assess the situation and acts in a reasonable manner to ensure officer and public safety.

The situation. There are a number of situational factors that an officer may assess in relation to the situation they have encountered to help them determine what level of force (if any) is reasonable and necessary. The NUFF outlines that at least six of these factors are: (a) the environment, (b) the number of subjects, (c) the subjects' perceived abilities, (d) the officer's knowledge of the subject, (e) the time and distance afforded to the officer, and (f) any potential attack signs (threat cues) that the subject may be displaying (CACP, 2000).

Subject behaviours. The NUFF also recognizes categories of subject behaviour that should be factored into an officer's assessment. These categories include: (a) cooperative, (b) resistant (passive), (c) resistant (active), (d) assaultive, and (e) grievous bodily harm or death. Each category is defined as follows:^{1,2}

Co-operative. The subject responds appropriately to the officer's presence, direction and control. (CACP, 2000, p. 7)

Resistant (passive). The subject refuses, with little or no physical action, to cooperate with the officer's lawful direction. This can assume the form of a verbal refusal or consciously contrived physical inactivity. (CACP, 2000, p. 7)

Resistant (active). The subject uses non-assaultive physical action to resist, or while resisting an officer's lawful direction. Examples would include pulling away to prevent or escape control, or overt movements such as walking toward, or away from an officer.

¹ The material in this section related to subject behaviours and officer responses is directly quoted from *A National Use of Force Framework* (the supporting documentation for the NUFF). Arguably, within the design of the NUFF, it is the subject's behaviour and officer's response that garners the most attention from the public when a use of force encounter comes to light via the media; therefore, I wanted the reader to be introduced to this language precisely, as this is the language chosen by over 60 educators and use of force specialists. Furthermore, since the NUFF has been referred to in court numerous times and, as aforementioned, has acted as a Use of Force model or resource guide to numerous Canadian police agencies, I wanted to give the reader the benefit of understanding the language specifically used to describe these two areas.

² The information on the NUFF and the NUFF graphic are used with permission.

Running away is another example of active resistance. (CACP, 2000, p. 7)

Assaultive. The subject attempts to apply, or applies force to any person; attempts or threatens by an act or gesture, to apply force to another person, if he/she has, or causes that other person to believe upon reasonable grounds that he/she has, present ability to effect his/her purpose. Examples include kicking and punching, but may also include aggressive body language that signals the intent to assault. (CACP, 2000, p. 7)

Grievous bodily harm or death. The subject exhibits actions that the officer reasonably believes are intended to, or likely to cause grievous bodily harm or death to any person. Examples include assaults with a knife, stick, or firearm, or actions that would result in serious injury to an officer or member of the public. (CACP, 2000, p. 8)

Perceptions and tactical considerations. The NUFF also makes clear that the individual characteristics of an officer (e.g., their confidence, level of fatigue, experience, etc.) will affect his or her perception of a situation, which will in turn influence their risk assessment (CACP, 2000). In addition, tactical considerations will influence their assessment and resulting response. For example, the availability of tactically advantageous options (e.g., cover, back-up, specialized equipment, etc.) may lead an officer to utilize one or more of these options in his or her response (CACP, 2000). As well, the availability, or conversely, the unavailability of these factors may impact on an officer's assessment of a situation (CACP, 2000).

Force options. Finally, the force options the officer may utilize in the management of a situation are included in the NUFF. These are: (a) officer presence (b) communication, (c) physical control (soft), (d) physical control (hard), (e) intermediate weapons, and (f) lethal force. These options are defined as follows:

Officer presence. While not strictly a use of force option, the simple presence of an

officer can affect both the subject and the situation. Visible signs of authority such as uniforms and marked police cars can change a subject's behaviour. (CACP, 2000, p. 10)

Communication. An officer can use verbal and non-verbal communication to control and/or resolve the situation. (CACP, 2000, p. 10)

Physical control. The model identifies two levels of physical control: soft and hard. In general, physical control means any physical technique used to control the subject that does not involve the use of a weapon. *Soft* techniques are control oriented and have a lower probability of causing injury. They may include restraining techniques, joint locks, and non-resistant handcuffing. *Hard* techniques are intended to stop a subject's behaviour or to allow application of a control technique and have a higher probability of causing injury. They may include empty hand strikes such as punches and kicks. (CACP, 2000, p. 10)

Intermediate weapons. This use of force option involves the use of a less-lethal weapon. Less-lethal weapons are those whose use is not intended to cause serious injury or death. Impact weapons and aerosols fall under this heading. (CACP, 2000, p. 11)

Lethal force. This use of force option involves the use of any weapons or techniques that are intended to, or are reasonably likely to cause grievous bodily harm or death. (CACP, 2000, p. 11)

Measuring the Magnitude of Force

As previously mentioned, to give the reader a further sense of the complexities inherent in examining a police use of force encounter, I have included information on some of the attempts researchers have made to quantify instances of police use of force. This was done to build upon the understanding that the reader has likely begun to develop from being introduced

to the concepts of lawful authority, *reasonableness*, and the NUFF.

Quantifying the use of force is difficult for the police as well as academics (Adams, 1999; Atherley & Hickman, 2014). Force cannot be easily measured, nor is the concept of use of force by police simple to understand (Garner & Maxwell, 1999). There are many facets to a violent encounter between a citizen and a police officer; therefore, any evaluation of the application of force is necessarily complex (Binder & Scharf, 1980). Phrases describing the use of force by police, such as “excessive” or “police violence,” can mean different things to different people and people interpret encounters involving force differently (Lersch & Mieczkowski, 2005). For example, as noted by Adams (1999), “Judges apply legal standards [to use of force encounters]; police administrators apply professional standards; and citizens apply “common sense” standards” (p. 62). However, in an effort to enumerate the evaluation of force applied by the police, attempts have been made to provide some type of definable measurement.

A study by Garner and Maxwell (1999) used officers’ perceptions of the level of force they applied to help ascertain the degree of force that could be attributed to each type of police behaviour (intervention). The researchers had 503 experienced officers rank the degree of force for 60 hypothetical types of use of force intervention. The level of force was ranked from 1 (least forceful) to 100 (most forceful). The officers ranked the full spectrum of possible police interventions from taking no action (which received an average score of 1) to using a handgun (which received an average score of 81.7 and was rated the most forceful). Other common intervention options, such as using handcuffs (average score = 28.2) and grabbing the suspect (average score = 33) fell near the middle of the range. Just over 7500 adult custody (arrest) reports were then analyzed from six separate policing jurisdictions in the U.S.. The researchers found that “officers used or threatened to use physical force in fewer than one of every five adult

custody arrests" (Garner & Maxwell 1999, p. 41). Moreover, when force was used, the force was at the low end of the scale (based on the ratings provided by the officers, as described above) in the majority of cases.

Alpert and Dunham (1997) also sought to quantify the degree of force used by police by calculating a *force factor* that compared an officer's level of force to a subject's level of resistance. Data from three American police agencies with a combined total of 2929 officers were analyzed. The suspects' level of resistance and officers' level of force were placed on ordinal scales. For two sites, the suspect scales were defined as: (a) no resistance, (b) slight resistance, (c) moderate or high resistance, and (d) violent or explosive resistance. The officer scale was defined as: (a) no force, (b) slight force, (c) forcibly subdued suspect with hands, and (d) forcibly subdued suspect with methods other than hands. For the other site, suspect resistance categories remained the same, however the scale for officer force was slightly different, being defined as: (a) no force, (b) minimal force, (c) forcibly subdued suspect with hands, and (d) forcibly subdued suspect with methods other than hands. The *force factor* was calculated by subtracting the subject's level of resistance (1 to 4) from the officer's level of force (1 to 4). If the level of force was greater than the level of resistance, the result was a positive *force factor* (more force than resistance); if the level of force was less than the level of resistance, the result was a negative *force factor* (more resistance than force). When the suspect's level of resistance was equal to the officer's level of force, the *force factor* was 0.

For all three agencies, the majority of cases fell in the middle (between -1 and 1) of the *force factor* range, suggesting a general sense of proportionality between officer force and subject resistance. However, a large positive or large negative *force factor* could not, on its own, be taken to mean that too much force or not enough force was used by the officer as a fulsome

analysis of the totality of the circumstances surrounding each incident had not been undertaken (e.g. considering situational factors, the officer's perceptions etc.).³ That being said, the authors of the research suggest that *force factors* could be used for comparison between units in the same department to provide insights into training or unit policy requirements.

Building upon the work of Alpert and Dunham (1997), Atherley and Hickman (2014) defined a use of force measurement system based on the landmark case of *Graham v. Connor* (1988) in the U.S.. As they state in their paper:

Under *Graham*, the government must weigh the need for force against the impact of force on the subject, and in so doing establish a compelling governmental interest for the intrusion. Under this guidance, *Graham* held the 'split-second' decision making required of police officers takes precedent over the benefit of hindsight. Force is to be judged from the reasonable observations of the facts as they presented themselves at the time force was applied; as such, *Graham* gives deference to the reasonable assumptions of the officer over facts as they may appear later (p. 124).

Atherley and Hickman (2014) analyzed 1240 use of force reports from a large metropolitan police agency in the U.S.. The officer's level of force and the suspect's level of resistance were reviewed and coded using a scale similar to Alpert and Dunham's (1997) force factor, as seen in Table 1. The *force factor* was calculated by subtracting the subject's level of resistance (1 to 7) from the officer's level of force (1 to 7).

³ It is the totality of the circumstances that must be examined when trying to understand a use of force incident. In the case of a very large subject and an officer of smaller stature, a positive force factor (more force than subject resistance) may be reasonable; however, in the case of an officer and an infirm subject, a positive force factor may not be reasonable. *Reasonableness* cannot be determined in the absence of an understanding of the totality of the situation.

Table 1*Atherley and Hickman Suspect Resistance and Officer Force Levels*

Level	Description	Level	Description
Resistance 1	No resistance. The Subject is offering no resistance or threat.	Force 1	Officer presence in uniform or marked police vehicle.
Resistance 2	Verbal resistance to complying with lawful orders. Subject may challenge authority or standing and may present as 'dead weight'.	Force 2	Issuance of lawful orders and light physical contact to include guiding, leading and/or handcuffing. No intentional infliction of pain for the purpose of compliance.
Resistance 3	Use of posture and verbal threats of physical violence. Subject may attempt to intimidate or otherwise pose a physical threat to officers.	Force 3	Chemical agents for the purpose of crowd dispersal or distraction. Tactic is often reserved for large gatherings, civil disobedience, and fight disturbances.
Resistance 4	Physical non-compliance including refusal to give up hands for cuffing and attempts to flee.	Force 4	Physical control tactics such as pain compliance holds, joint manipulations, and open handed strikes.
Resistance 5	Active physical resistance to compliance. Subject may attempt to strike officers, kick and struggle free from holds, and compliance positions.	Force 5	Advanced physical control tactics including closed fisted strikes, knee and elbow strikes to the body and the extremities.
Resistance 6	Use of non-lethal weapons to injure or otherwise actively assault officers. Drug paraphernalia, beverage containers, and rocks may be employed as cutting and impact weapons.	Force 6	Intermediate weapon use, deployment of electronic control weapons and impact weapons for pain compliance and strikes to the body and extremities.
Resistance 7	Use of lethal force as presented by whatever means are available: firearms, knives, and motor vehicles.	Force 7	Use of lethal force including carotid artery holds, head strikes, and intentional discharge of firearms.

Note: Reprinted from "Controlling Use of Force: Identifying Police Use of Excessive Force Through Analysis of Administrative Records" by Loren T. Atherley and Matthew J. Hickman, 2014, *Policing*, 8(2), 123-134. Copyright year by Oxford University Press. Used with permission.

After a *force factor* assessment, Atherley and Hickman applied their Graham Factor Filtering (GFF) to the data. The GFF did not further quantify the level of force or make a determination on reasonableness or excessiveness specifically; rather, it sought to identify use of force cases that may lack justification through the application of the principles laid out in *Graham v. Connor* (1988). Analysis revealed that 43 of the 1240 use of force occurrences (or 3.5%) represented potential excessive force cases. Similar to Alpert and Dunham's results, Atherley and Hickman's findings using GFF could not, on their own, be used to make a determination of excessive force, as similar to Alpert and Dunham, an examination of the totality of the circumstances for each incident had not been undertaken. However, the findings could be used to identify cases requiring such an examination by a supervisor or an agency's Professional Standards unit.

Frequency of Force

The use of force by police is understood to be a necessary part of policing (Prenzler et al., 2013) and central to their role (Bittner, 1970). Indeed, the father of professional policing himself, Sir Robert Peel, recognized that under some circumstances, the police would be required to use force to maintain public order:

The police should use physical force to the extent necessary to secure observance of the law or to restore order only when the exercise of *persuasion, advice and warning* is found to be insufficient to achieve police objectives; and police should use only the minimum degree of physical force which is necessary on any particular occasion for achieving a police objective. (Peel, 1829, para.6)

The police play a Guardian role in society and act as the face of the justice system (Palango, 1998). They are often the first agency tasked with handling threats of civil instability

(Carmichael & Kent, 2015) and, as noted by Parent (1996), “society expects police personnel to enter into situations that most individuals would avoid” (p. 57). Hence, the use of force by police is not entirely avoidable; however, it is best that the police exercise this authority sparingly as the application of force by the police can weaken social cohesion (Carmichael & Kent, 2015; Peel, 1829). Unfortunately, neither Canada nor the U.S. have a standard use of force data collection procedure to allow us to understand how often the police are exercising this authority at a national level; therefore, we must rely on study-specific estimates to ascertain how often force is being applied.

Such study-specific estimates indicate that the use of force by police rarely occurs. For example, Croft (1985), after an analysis of over 2000 reported use of force incidents in Rochester, New York (spanning the years of 1973 to 1979) determined that the police applied force in less than 2% of arrests. A few years later, Bayley and Garofalo (1989) undertook a study to determine, among other things, “the frequency of violent encounters in patrol work” (p. 1). During the summer of 1986, the researchers observed patrol officers in New York City daily from 4 a.m. to midnight in three of the cities busier precincts. The precincts were specifically selected as they were known to be in areas where the officers were likely to encounter problematic situations with the public. The study yielded a data set of 467 encounters that had some possibility of violence. Force was used by the police in only 42 of those incidents (approximately 9%), and in the majority of those cases, the force applied by the police was limited to grabbing and restraining. Similarly, Garner et al. (1996) conducted a two-week study on the force used by and against members of the Phoenix Police Department in Arizona. The study found that police used no force in nearly four out of five arrests, and in the cases where force was used, it tended to be at the low end of the force spectrum.

Lersch and Mieczkowski (1996) collected data on complaints made against officers from a large police agency in the south-eastern U.S. The agency had approximately 508 sworn officers and was responsible for policing approximately 240,000 residents. Data were collected over a three-year period and revealed a total of 682 allegations of misconduct. Only 149 of those allegations were related to use of force (approximately 22%). Of all complaints in the study, approximately 11% were found to be substantiated. It is therefore possible that only approximately 16 of the 682 allegations were in fact founded; put another way, allegations of misuse of force made up only two percent of all complaints.

Statisticians for the Bureau of Justice Statistics (1997), analyzed survey results from 6421 participants who had completed the *Police-Public Contact Survey*. The data were collected on behalf of the U.S. Congress, as required by the Violent Crime Control and Law Enforcement Act of 1994 (Chaiken & Travis, 1997). Less than 1% of the respondents indicated that the police used or threatened the use of force against them. A follow up study completed in 1999, which included an improved version of the *Police-Public Contact Survey*, yielded nearly identical results (Bureau of Justice Statistics, 2001).

Hall and Votova (2013) examined both situational and subject characteristics in circumstances where subjects had been restrained by police officers in Canada in an effort to determine mortality rates proximal to the use of police restraint. The authors gathered data from seven urban police agencies for a total of 3,594,812 interactions between the public and the police. Hall and Votova found that police had applied force in only 4992 of these interactions (.14%). In another study, Hall et al. (2013) examined the frequency with which various features of Excited Delirium Syndrome (ExDS) appeared in subjects to whom the police had applied

force.⁴ Data was collected from a single police agency over the course of three years. The authors found that the use of force by police had occurred in approximately .08% of all public and police interactions.

Most recently in Canada, Baldwin et al. (2016), building upon the 2013 work of Hall and her colleagues, collected data from one large Canadian police service to examine whether previously published features of ExDS were recognizable across policing populations. In this study, the authors found that police had applied force in only .09% of 5.4 million documented police-public interactions (4799 times).

Factors That Influence Use of Force

Researchers have attempted to identify the extent to which various factors (e.g., officer characteristics, subject characteristics, organizational characteristics, situational characteristics) affect the use of force by police officers.

Officer and subject characteristics. Friedrich (1980) set out to explore what effect officer characteristics, situational characteristics, and organizational characteristics have on the use of force by police. Using observational data that had been gathered in 1966 from three large police agencies for *The President's Commission on Law Enforcement and Administration of Justice*, Friedrich found that only the subject's behaviour and the visibility of the encounter (whether the occurrence was being observed) had any significant influence on the application of force. More specifically, agitated, antagonistic, or intoxicated subjects were more likely to have

⁴ Farnham and Kennedy (1997) define ExDS as, “a state of mental and physiological arousal, agitation, hyperpyrexia with epiphora, and hostility” (p. 1107). Typical features of a subject suffering from ExDS include: pain tolerance, constant/near constant activity, unresponsive to police presence, super human strength, rapid breathing, naked/inappropriately clothed, profuse sweating, tactile hyperthermia (hot to the touch), and glass attraction/destruction (Baldwin et al., 2016).

force used against them and the occurrence being observed rather than unobserved had the surprising effect of increasing the likelihood of police using force.

Engel et al. (2000) completed a study to determine the interaction effect of suspect demeanour and a number of suspect characteristics (e.g., non-white subject, female subject, juvenile subject, etc.) on police behaviour. The authors specifically examined whether interactions between these variables would affect patterns of citation, arrest, and use of force. The study found that uncooperative or verbally resistant subjects were much more likely (5.8 times) to have force used against them than compliant subjects.

Terrill and Mastrofski (2002) undertook a study to shed light on why the police resort to force in some situations by examining variables related to the subject (e.g., gender, race, level of resistance, possession of a weapon, demeanour of disrespect, etc.) and variables related to the officer (e.g., gender, race, experience, training in verbal mediation, etc.). Data were collected in two large American cities where researchers accompanied officers in a number of districts for approximately 240 hours per district. Observations were noted on contacts with the public that were more than simply passing acknowledgements. In total, observations were made on contacts with approximately 12,000 citizens. The authors found that subject gender, race, resistance, and possession of a weapon were all significantly related to the use of force, as was officer experience. More specifically, there was an increased likelihood of higher levels of force being used when the subject was a male or non-white, and when the subject was resistant or in possession of a weapon. There was also an increased likelihood of more force being used if the officer was less experienced. Officer gender, race, and training in verbal mediation, however, were not associated with use of force. Of note, and in contrast to Engel et al. (2000), Terrill and

Mastrofski found that subject demeanour, specifically, disrespectful language or gestures toward the officer(s), was not associated with the use of force by police

Noting that one of the limitations of prior research had been that studies were generally confined to one or two jurisdictions, Garner et al. (2002) examined data from 7512 adult custody arrests spanning six large urban policing jurisdictions to determine how a variety of factors were associated with the prevalence and severity of police use of force. The authors examined five broad domains, each broken down into a number of characteristics. The specific domains they examined included: (a) location (e.g., jurisdiction being studied, area known for criminal activity, area known to be hazardous, etc.), (b) nature of the offense (e.g., violent offence, weekend arrest, number of suspects, etc.), (c) how the police were mobilized (e.g., dispatched, called for back-up, number of officers present, etc.), (d) officer's characteristics (e.g., age, race, gender, etc.), and (e) suspect's characteristics (e.g., age, race, gender, etc.). In total, 34 characteristics were examined. A number of interesting findings emerged with respect to use of force prevalence. For example, the authors found that use of force was more likely if the area was known for criminal activity, if antagonistic bystanders were present during the arrest, if the arresting officer called for back-up or if there were other officers on scene, and if officers initiated the contact with the subject as opposed to being dispatched to a call for service.

Bazley et al. (2007), utilizing data from a large urban police agency, studied the exposure(s) to subject resistance by police officers, and the use of force by patrol officers, across officer genders. The research team examined one year of data from a sample of 558 front line officers (excluding supervisors and plain-clothes officers). Using a modified version of Alpert and Dunham's (1997) *Force Factor* (but in this case, there were six levels of resistance and six levels of officer force) the researchers found that, for both genders, the majority of the time force

was applied by the police, it was at the low end of the scale and tended to be at lower levels than the encountered subject resistance. That being said, the results also indicated that female officers tended to use a narrower range of use of force options. The authors also found that male officers were involved in significantly more use of force encounters than their female counterparts.

Castillo et al. (2012) undertook a study to examine the factors associated with subject and officer injuries during use of force encounters. The authors analyzed 1174 use of force incidents from a large American police agency and found that the factors most associated with physical injury to the subject were: (a) subject resistance and (b) the application of force by the police was to prevent a violent felony. Officer injuries were most associated with: (a) instances where the subject had a weapon and (b) instances where the subject resisted arrest. Surprisingly, incidents where the subjects were *not* suspected of substance use were associated with both subject and officer injuries.

Finally, Carmichael and Kent (2015) assessed the variations in police shooting deaths in 39 of Canada's largest cities. The authors utilized data covering a 15-year period (1996 to 2011) and sought to determine if individual factors (i.e., percentage of female officers within a police force) and social factors (e.g., percentage of the population made up by visible minorities, the rate of unemployment among young males, etc.) had any effect on the number of shooting deaths in the cities under examination. Carmichael and Kent found that cities with a greater proportion of female officers had fewer police shooting deaths. In fact, they calculated that once a police agency reaches a threshold of 11% female officers, the agency will begin to see a reduction in police shootings.

Agency and situational characteristics. White (2000) completed a study designed to assess the impact of administrative policy on the use of deadly force by on- and off-duty officers

in the Philadelphia Police Department. The administrative policy placed greater restrictions on the use of deadly force by Philadelphia police officers regardless of on/off duty status; however, it remained silent on when off-duty officers should carry firearms, when off-duty officers should intervene in situations, and if they did intervene, what procedures the off-duty officers should follow. The study compared data from two time periods; one before the administrative policy was put in place, and one after. In addition to its findings on the effects of the administrative policy, most notably, an overall decrease in overall use of deadly force, the study found some interesting differences in the circumstances associated with on-duty and off-duty police shootings. For instance, off-duty shootings tended to occur in bars and social clubs and were more likely to be a one-on-one encounter than on-duty incidents. In addition, off-duty incidents involved a greater percentage of female subjects, female officers, and a greater percentage of black officers.⁵ Also, off-duty incidents involved a higher percentage of white subjects and a lower percentage of black subjects than on-duty incidents.

Alpert and MacDonald (2001) undertook a study to examine the effect of agency-related characteristics on aggregate use of force rates. This ambitious project utilized data collected from 265 agencies. The authors had each of the participating agencies complete a questionnaire, which included a question on the agencies' number of use of force occurrences within a single calendar year. Five agency-related characteristics were analyzed: (a) was the agency accredited by the Commission on Accreditation for Law Enforcement Agencies (CALEA), (b) was the agency accredited by their state, (c) were officers represented by a union, (d) did the agency use its use of force data for specific management or administrative purposes, and (e) was the agency's use

⁵ White suggests that the greater percentage of female subjects and female officers in off-duty shootings, as compared to on-duty shootings, may be a reflection of the domestic disputes between officers and their spouses, which are more likely to occur in the home while the officer is off-duty (White, 2000).

of force form completed by a supervisor or multiple individuals. The researchers found that jurisdictions that use their data for explicit purposes reported higher use of force rates and those agencies in which multiple persons or supervisors fill out the use of force form report lower use of force rates. The presence of a union, CALEA accreditation, and state accreditation, however, had no significant association with the variance in use of force. In terms of overall use of force rates, Alpert and MacDonald found that “the median use-of-force rate for the 265 reporting agencies was 76 incidents per 100,000 citizens” (p. 402); or, put another way, .00076 (.076%) incidents per citizen.

Lersch et al. (2008) examined the relationship between the level of force used by police and the characteristics of the neighbourhoods where each of the instances took place. Specifically, the researchers sought to answer: (a) whether the use of force by police is more likely in particular neighbourhoods, (b) whether neighbourhood characteristics (e.g., race/ethnicity, family composition, residential turnover, etc.) are useful in predicting frequency and type of force, and (c) whether the neighbourhood level of active physical resistance (instances of subject resistance) had an impact on use of force when controlling for other neighbourhood characteristics. Data were collected from a large municipal police agency in the U.S. and focused on the use of force by patrol officers for a one-year period. The study found that only the neighbourhood level of active physical resistance and racial/ethnic composition of a neighbourhood were consistent predictors of use of force; neighbourhoods with higher levels of subject resistance or a greater number of minority residents had increased levels of police use of force.

Boivin and Lagace (2016) analyzed 1174 self-reported use of force incidents from a single Canadian police agency in an effort to examine the relationship between force used by the

police and subject resistance. The authors evaluated how individual characteristics (e.g., officer gender) and situational characteristics (e.g., presence of more than one officer, presence of a weapon, presence of bystanders, resistance toward officer, subject in conflict with another citizen) related to three separate outcomes: (a) the force used was lower than the level of subject resistance, (b) the force used was equal to the level of subject resistance, and (c) the force used was greater than the level of subject resistance. With respect to situational characteristics, all were significantly associated with the level of force except the presence of bystanders. More specifically, the presence of a weapon, subject resistance toward the officer, the subject being in conflict with another citizen, and the subject being intoxicated, decreased the odds that less force than expected would be used. The presence of a single officer, on the other hand, increased the odds that less force than expected would be used. Interestingly, and contrary to Bazley et al.'s (2007) study, the researchers found that officer gender had a negligible association with force.

The Current Study

Past research has taught us about some of the factors that influence police use of force and study-specific estimates have taught us that individual police agencies do not often apply force. Despite this research, little is known about these issues in Canada. Very few studies have examined these issues within a Canadian police context, and those that have, have often focused on one particular police jurisdiction or agency. This leaves police personnel, police administrators, and police legislators in Canada at a disadvantage. How can an agency, or jurisdiction (municipal, provincial, or federal), measure its results if it has nothing to compare itself to? How can an industry maintain or seek to improve a standard if an industry standard has yet to be established? This study seeks to identify such a standard.

The purpose of the current study was to gather data from a large sample of Canadian police agencies in an effort to determine how frequently officers apply force in their interactions with members of the public. This study also sought to determine whether significant variance in use of forces rates exists across policing jurisdictions (municipal, provincial, and federal) and if so, what factors are responsible for this variance? In examining the aforementioned, the following hypothesis was explored: Based on previous study-specific research suggesting that police use of force rates are low, the present study expected to find that, at the national level, police use of force rates in Canada would be low (as a proportion of total police occurrences). In addition, the study endeavoured to examine the following issues, presented here as research questions rather than formal hypotheses given the lack of relevant research to draw from:

1. What is the relationship between agency demographics (e.g., total population policed) and use of force?
2. What is the relationship between training (frequency and nature) and use of force?
3. What is the relationship between officer gender and use of force?
4. What is the relationship between intervention option (e.g., physical control, police defensive baton, Conducted Energy Weapon) and effectiveness?
5. What is the relationship between intervention option and subject injury?
6. What is the relationship between intervention option and officer injury?

I hope that the results from this study will provide a series of benchmarks against which police agencies, police trainers, and relevant administrators and legislators, can measure the frequency of the use of force by their officers and evaluate the effectiveness of their use of force training programs. I also hope that this study can be used to further inform the discussion on gender differences in police use of force. Furthermore, I anticipate that this study can be used to

provide members of the public, the media, and government officials with reliable statistical information on how frequently/infrequently police officers in Canada apply force. Finally, this study sought to shed light on some of the challenges of collecting use of force data across policing jurisdictions so that recommendations could be made on solutions to overcome these challenges in support of standardized use of force reporting at the national level.

All of this information has the potential of presenting Canada as a leader on the world stage. Periodically, Canada's human rights record is reviewed by other United Nations (UN) member states - policing has been examined in the past. Having reliable statistical information at the national level would assist Canada in demonstrating its commitment to police accountability and provide accurate data that could be shared with the UN.

Method

Participants and Materials

Police agency participation was requested through the CACP's Use of Force sub-committee and the Ontario Police College. Agencies were provided a link to an online survey that was developed using online software from SimpleSurvey.⁶ The survey was ambitious, and sought: (a) demographic information (e.g., number of officers, number of officers by gender, size of population policed, number of occurrences, etc.), (b) information on training (e.g., course length for initial training on the CEW, frequency of recertification training for the CEW, etc.), (c) annual totals for the use of intervention options, (d) annual totals for effectiveness of each of the intervention options, and (e) annual totals for officer and subject injury. See Appendix A for a list of the survey's data-related questions. The agencies were asked to complete the survey for the years 2016, 2017, and 2018.

⁶ SimpleSurvey is a division of OutSideSoft Solutions incorporated (OutSideSoft Solutions, 2020).

Twenty-two responses were received from 16 different agencies. The survey had been distributed electronically to 103 agencies and had been designed so that each agency would submit data for each of the requested years separately; therefore, the total separate survey responses possible was 309. By agency, the response rate for the survey was 15.5%; by possible responses, the response rate was 7.12%.

The sample of participant agencies proved to be large and geographically diverse. The collection of aggregated data was gathered from officers within every province and territory. All manner of policing district was reflected to a varying degree (e.g., higher crime, urban, rural, remote). Unfortunately, while some agencies provided some of the requested data for 2016 and 2017 (e.g., demographic information), they provided very little information related to use-of-force. As such, no meaningful analyses could be conducted on this data and analysis of all 2016 and 2017 data had to be abandoned.

Thirteen agencies provided data for 2018. These 13 agencies represented a total of 39,903 of the country's police officers. According to Statistics Canada (2020), there were approximately 68,562 police officers in Canada in 2018; therefore, this sample of data accounted for approximately 58.2% of the population of Canadian police officers. These agencies provided much of the requested demographic data. One agency submitted two responses for 2018, neither of which was complete. The data for this agency were combined into a single response. Four agencies did not provide data on their Crime Severity Index (CSI).⁷ Where possible, this

⁷ The Crime Severity Index includes all violations of the Criminal Code (including traffic and drug violations as well as all Federal Statutes) and takes into account both the volume and the seriousness of crime (Statistics Canada, 2020). Offences are assigned a weight, based on the average sentence meted out by the courts. More serious offences have a larger impact on the CSI value since they carry lengthier sentences, and therefore, have more weight in the CSI calculation (Statistics Canada, 2020). A higher CSI value indicates either more crime by volume, more serious crime, or both more crime by volume and more serious crime than the lower CSI to which it is being compared. In 2018, the national average for CSI was 75.01 (Statistics Canada, 2020).

information was obtained from Statistics Canada. Also, due to the limitations of the survey tool, CSI data was rounded to the nearest whole number.

All 13 of the agencies collected use of force data; however, there was substantial variability in what was provided (variability in what data police agencies had a capacity to gather and provide would prove to be the most challenging aspect of this study). Some agencies were able to provide details on the use of intervention options, whereas others were not. Amongst the agencies that were able to provide details on intervention options, there were additional inconsistencies (e.g., some agencies were able to provide effectiveness rates for the drawing and displaying of intervention options, whereas other agencies did not collect this data and were only able to provide effectiveness rates on actual deployments of intervention options). As a result, all the agencies were not included in all components of the analysis. To provide clarity and context, many results are presented as the percentage of the total population of 2018 officers that each individual statistic or result represents. An additional consequence to the variability in data was that some of the research questions could not be examined. This will be addressed in the Results section below.

Results

Due to the large variation in agency size, and the variation in the size of populations policed, the distribution of some of the independent variables was skewed, (e.g., total officers, total population policed, total geographic area policed); however, no data transformations were completed. In the spirit of transparency (important in all research, but even more so in the case of this study given the current climate in policing), the study sought to maintain the data in the state it had been received from the agencies, to the greatest extent possible. That being said, analyses were conducted with and without outliers. Since the dependent variable (use of force rate as a

proportion of total police occurrences) violated the assumption of normality, analysis was limited primarily to non-parametric bivariate correlations and chi-square tests of independence.

Descriptive Analyses of 2018 Data

Before proceeding to the analysis of the formal research questions, a descriptive analysis of the agencies that participated in the study will be presented. This will be accompanied by a descriptive analysis of the following areas of training, overall and for each agency: Crisis Intervention and De-escalation (CID), Conducted Energy Weapon (CEW), and Extended Range Impact Weapon (ERIW). Hereinafter, all references to *data* and *participating agencies* refers to the 2018 dataset.

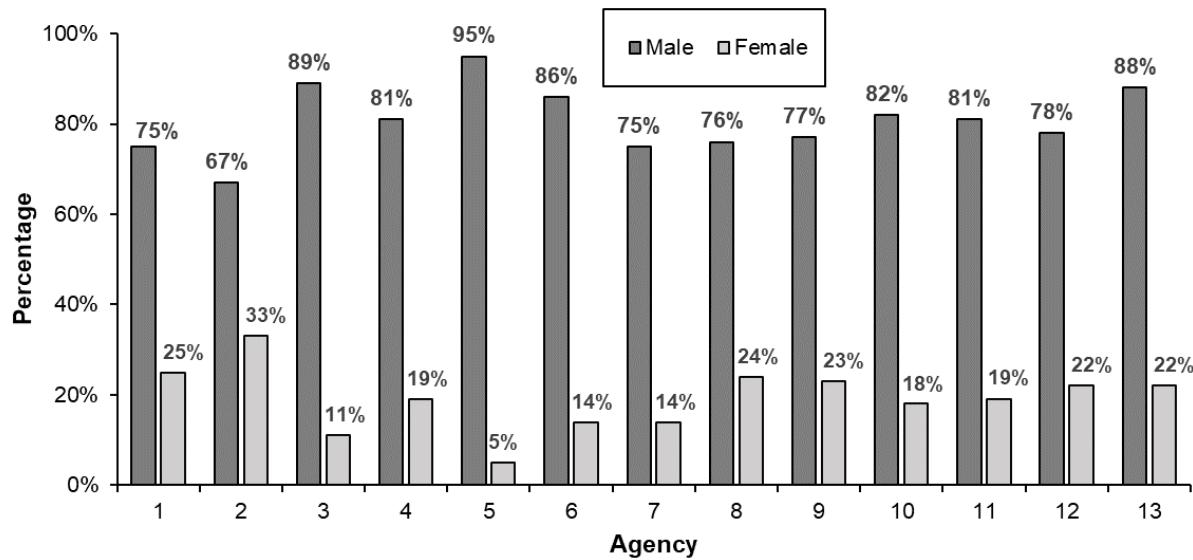
Descriptive Analysis of Demographic Data

All the participating agencies ($n = 13$) provided data on their total complement of sworn officers, which ranged from 18 to 18,905 officers ($Mdn = 1,341$, $M = 3,089$, $SD = 5,189$). The majority of agencies provided data on the gender of their officers ($n = 13$ for male and female officers and $n = 9$ provided data on non-binary officers). Male officers ranged from 16 to 14,808 within each agency ($Mdn = 1,000$, $M = 2,384$, $SD = 4,056$) and female officers ranged from 1 to 4,097 within each agency ($Mdn = 341$, $M = 704$, $SD = 1,146$). Only one agency had officers whose gender was identified as non-binary. These officers made up less than .02% of the sample.⁸ As can be seen in Figure 2, all the agencies had predominantly male officers.

⁸ Analysis was not completed using non-binary as a category of gender, due to the limited number of non-binary officers in this sample. This group of officers was removed from the analysis.

Figure 2

Percentage of Officers by Gender



Note: The 13 agencies represented above account for a total of 39,903 officers (58.2% of the total population of officers in Canada in 2018). The mean percentage of male officers was 80% ($SD = 7.1\%$), and the mean percentage of female officers was 20% ($SD = 7.1\%$). According to Statistics Canada (2020), in 2018, the national average for male and female officers was approximately 78% and 22% respectively.

Nearly all the participating agencies ($n = 12$) provided data on the population they policed. This population ranged from 10,700 to 8,055,165 people ($Mdn = 457,500$, $M = 1,380,106$, $SD = 2,301,659$). Nearly all the agencies ($n = 12$) also provided data on the total geographic area they policed (in sq. km), which ranged from 7 sq.km to 9,613,263 sq.km ($Mdn = 460$, $M = 891,117$, $SD = 2,764,112$).

A majority of the agencies ($n = 8$) provided data on the average years of service of their officers, which ranged from 13 to 16 years ($M = 14.6$, $SD = .92$), and all the agencies ($n = 13$) indicated that they had a union or association. All the participating agencies ($n = 13$) provided the total number of occurrences their officers responded to in 2018, which ranged from 3,425 to

2,919,805 occurrences ($Mdn = 262,854$, $M = 610,269$, $SD = 919,446$).⁹ In total, the participating agencies reported 8,776,235 occurrences. Data on CSI was either provided by, or obtained for, nearly all the participating agencies ($n = 12$). These values ranged from 43 to 115 ($Mdn = 72$, $M = 77$, $SD = 27$).

Descriptive Analysis of Training

Crisis Intervention and De-escalation (CID). Across the sample of agencies, 10 (77%) reported having a CID training program while three agencies reported not having a program. All these agencies ($n = 10$) reported on the number of their officers that had been trained in the use of CID techniques. The percentage of each agency's officers trained in CID ranged from 8.43% to 100% ($Mdn = 99.4$, $M = 87$, $SD = 28.5$). Most agencies ($n = 9$) provided the length of their CID training program, which ranged from 2 to 120 hours ($Mdn = 12$, $M = 24.6$, $SD = 37.6$). All the agencies with a CID program reported the modality of training they utilized (*online, in-person, or both online and in-person*). The majority of agencies ($n = 5$) indicated *in-person* training, while some ($n = 3$) indicated *both online and in-person*, and the minority ($n = 2$) reported *online* training. Many of the agencies ($n = 7$) indicated they had recertification training in CID. The length of recertification training ranged from 4 to 24 hours ($Mdn = 4$, $M = 9$, $SD = 7.77$), with most agencies ($n = 4$) reporting that their recertification was conducted annually while the remaining agencies ($n = 3$) reported their recertification training took place triennially. Most agencies with recertification training ($n = 4$) indicated this training was *in-person*, while 2 agencies indicated *online* and 1 agency reported that CID recertification training was *both online and in-person*.

⁹ Occurrences are defined as a recorded call for service or an officer reported incident.

Conducted Energy Weapon (CEW). All the agencies ($n = 13$) indicated they had a CEW training program and nearly all ($n = 12$) reported on the number of their officers that had been trained to use the CEW. The percentage of officers trained to use the CEW ranged from 4.8% to 100% ($Mdn = 68.3$, $M = 61.4$, $SD = 35.7$). Nearly all agencies ($n = 11$) provided the length of their CEW training program, which ranged from 7 to 24 hours ($Mdn = 12$, $M = 13.3$, $SD = 5.80$). Nearly all the agencies ($n = 12$) indicated they had recertification training on the CEW. Most agencies ($n = 11$) reported the length of recertification training, which ranged from 4 to 8 hours ($M = 4.91$, $SD = 1.38$). Nearly all agencies ($n = 12$) reported the frequency of their CEW recertification training. The majority of agencies ($n = 11$) indicated this training was conducted annually while the remaining agency ($n = 1$) reported this training took place triennially.

Extended Range Impact Weapon (ERIW). Across the sample, 11 agencies reported having an ERIW training program, while two agencies reported not having a program. Most agencies ($n = 9$) reported the number of their officers trained to use the ERIW. The percentage of officers trained to use the ERIW ranged from .25% to 44.4% ($Mdn = 8.85$, $M = 11.9$, $SD = 13.4$). Many of the agencies ($n = 9$) provided the length of their ERIW training program, which ranged from 2 to 40 hours ($Mdn = 15$, $M = 15.2$, $SD = 11.8$). Nearly all the agencies ($n = 9$) indicated they had recertification training on the ERIW. Most agencies ($n = 9$) reported the length of recertification training, which ranged from 1 to 8 hours ($Mdn = 4$, $M = 4$, $SD = 2.29$). Nearly all agencies ($n = 9$) reported the frequency of their ERIW recertification training. The majority of agencies ($n = 8$) indicated this training was conducted annually while the remaining agency ($n = 1$) reported this training took place bi-annually.

A descriptive overview of each type of training, by agency, is included in Appendix B.

Use of Force Rates

For this study, a *use of force* occurrence was defined as the application of an intervention above physical control soft (i.e., physical control hard, OC spray, baton, CEW, ERIW, or firearm) regardless of whether the intervention was used on its own or with another intervention. Occurrences where an intervention option was drawn and displayed (*draw and display*) to a subject (in an effort to gain voluntary compliance) were not included.¹⁰

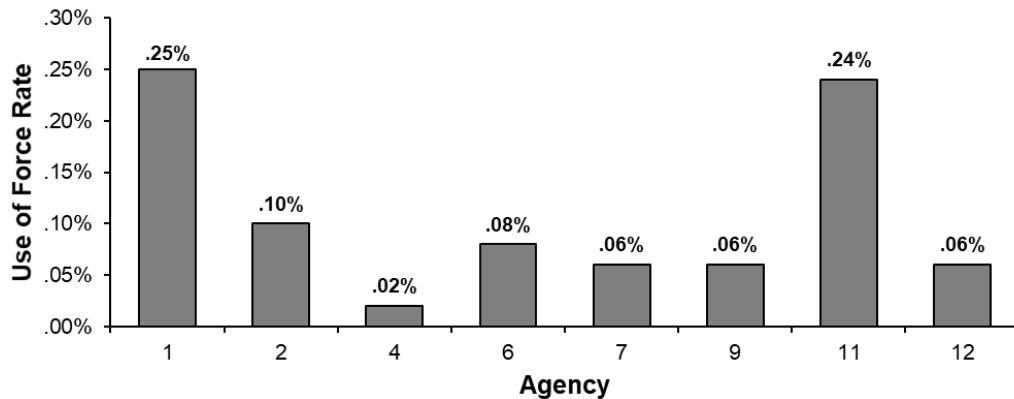
A majority of the agencies ($n = 8$), provided information on both total occurrences as well as total *use of force* occurrences where force meeting the aforementioned definition was reported; this allowed use of force rates, as a percentage of total police occurrences, to be calculated. As anticipated, the results indicated the sample of agencies tended to use force sparingly with rates of use of force ranging from .02 to .25% ($M = .11$, $SD = .09$).¹¹ Use of force rates by agency can be seen in Figure 3.

¹⁰ While some agencies capture data on *draw and display* to measure the effectiveness of this technique in gaining compliance, and to demonstrate their efforts to gain compliance before physically applying force to a subject, capturing this data is not yet wide spread in the industry (as demonstrated by the sample data). *Draw and display* also brings up questions regarding whether displaying an intervention option to a subject as a visual warning is in fact a *use of force*. A consensus has yet to be reached among researchers (Klahm & Tillyer, 2010). Answering this question goes well beyond the scope of this paper and would require the input of numerous subject matter experts.

¹¹ One agency captured only those occurrences of physical control hard that resulted in injury and one agency does not track ERIW deployments; therefore, this estimate is to be considered conservative.

Figure 3

Use of Force Rates by Agency.



Note. Use of force rates as a percentage of total police occurrences.

Given the vast size differences among the agencies that provided data whereby a use of force rate could be calculated (total officers ranged from 95 to 18,905), a weighted average was also used to establish the average use of force rate across the sample. The weighted average was determined by first calculating the proportion of the total number of officers an agency contributed to the sample of officers in this statistic (e.g., 1900 officers / 37,961 officers = .05). Second, this figure was multiplied by the agency's use of force rate to determine its adjusted use of force rate (e.g., .05 x .15 = .0075). Finally, the adjusted use of force rates were totalled resulting in a weighted average. The weighted average for the sample was calculated to be .08%. This equates to an average of 1 use of force encounter for every 1250 occurrences, or 80 use of force encounters for every 100,000 occurrences. Of note, these 8 agencies accounted for a total of 37,961 officers, which in 2018, was 55.4% of the total population of officers in Canada.

Seven of the agencies provided data that allowed the number of use of force incidents per 10,000 people to be calculated. In this case, the number of use of force incidents ranged from 1.53 to 9.90 incidents per 10,000 people ($M = 4.64$, $SD = 3.07$). As done previously, a weighted

average was calculated. The result was 2.09 use of force encounters (annually) per 10,000 people. These 7 agencies accounted for a total of 32,022 officers, which in 2018, was 46.7% of the total population of officers in Canada.

Mean use of force rates by jurisdiction (municipal and provincial) can be seen in Table 2. A chi-square test for association was conducted between jurisdiction type and use of force rate (force applied at an occurrence, *Yes* or *No*). All expected cell frequencies were greater than five. There was a statistically significant association between jurisdiction type and whether force was applied, $\chi^2(1) = 95.105, p < .001$; however, the strength of the association was nearly zero, $\phi = 0.004, p < .001$. Based on the virtually non-existent strength of the association, there is likely to be little practical value in the association that was found between jurisdiction type and use of force rate.

Table 2*Mean Use of Force Rates by Jurisdiction Type*

Variable	Use of force rate:			
	Municipal (N=6)	SD	Provincial (N=2)	SD
Proportion of total occurrences	.12%	.097%	.06%	.007%
Per 10,000 people	5.02	3.173	2.35 ^a	--

Note: N = total agencies included in the sample. Total municipal officers = 13,110. Total provincial officers = 24,851.

^a One provincial agency did not provide data for total population policed; therefore, that agency was not included in this statistic.

Relationship Between Demographic Factors and Use of Force

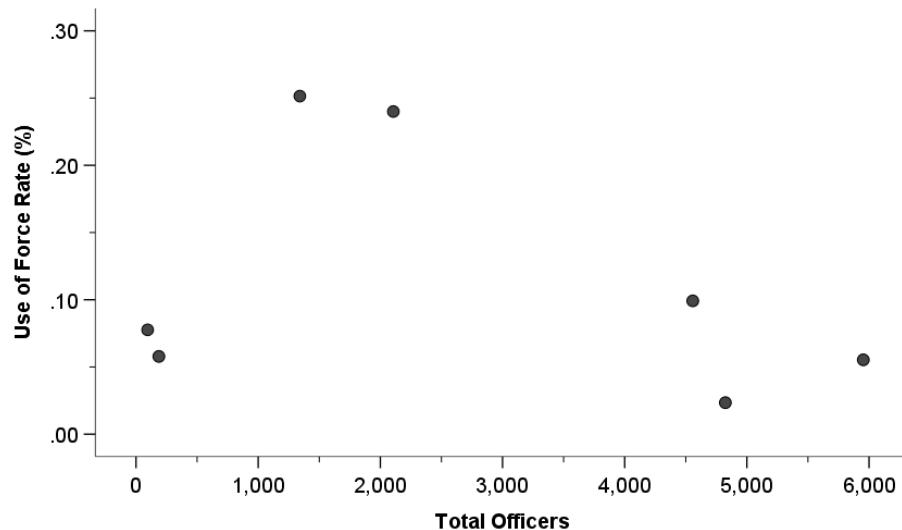
Total Officers. The first set of analyses to address research question 1 involved examining the relationship between total officers (in an agency) and use of force rate. A scatterplot of total officers by use of force rate was created, but there was an obvious outlier (one agency had 18,905 officers).¹² The original scatterplot can be seen in Appendix C. The outlier was removed from the data (see Figure 4). The resulting scatterplot suggested a negative association, but the Spearman's rank order correlation was not significant, $r_s(5) = -.429$, $p = .337$ (the analysis including the outlier also resulted in a non-significant correlation).¹³

¹² Q3 + 1.5IQR = 13,463 officers.

¹³ The 7 agencies represented in this analysis account for a total of 19,056 officers (27.8% of the total population of officers in Canada in 2018).

Figure 4

Scatterplot of Total Officers by Use of Force Rate – Outlier removed



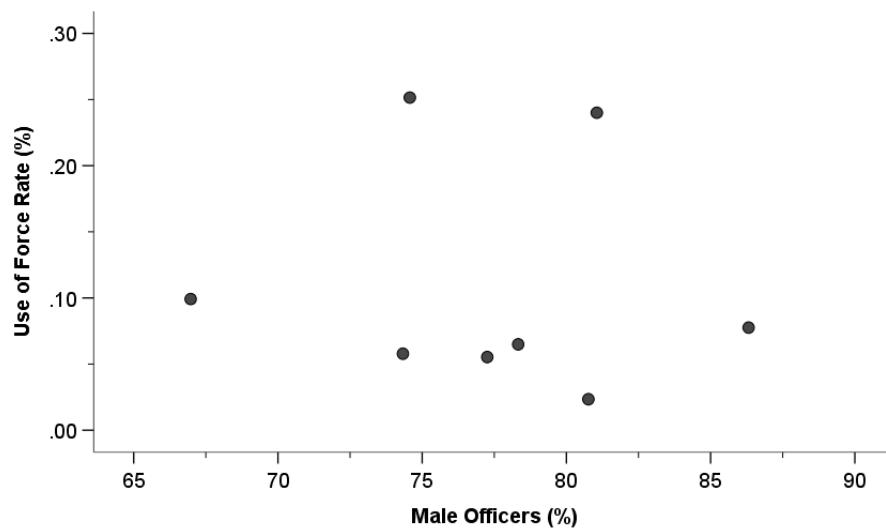
Note. Use of force rate, as a percentage of total police occurrences.

Officer Gender. The next set of analyses to address research question 1 involved examining the relationship between an agency's gender demographics (i.e., the percentage of male and female officers in the agency) and use of force rate. A scatterplot of the percentage of male officers by use of force rate was visually inspected. There appeared to be no relationship between these two variables (see Figure 5). A Spearman's rank order correlation was run to confirm this observation.¹⁴ There was no meaningful correlation between the percentage of male officers in an agency and use of force rate, $r_s(6) = -.071, p = .805$.

¹⁴ The 8 agencies represented in this analysis account for a total of 37,961 officers (55.4% of the total population of officers in Canada in 2018).

Figure 5

Scatterplot of Percentage of Male Officers by Use of Force Rate



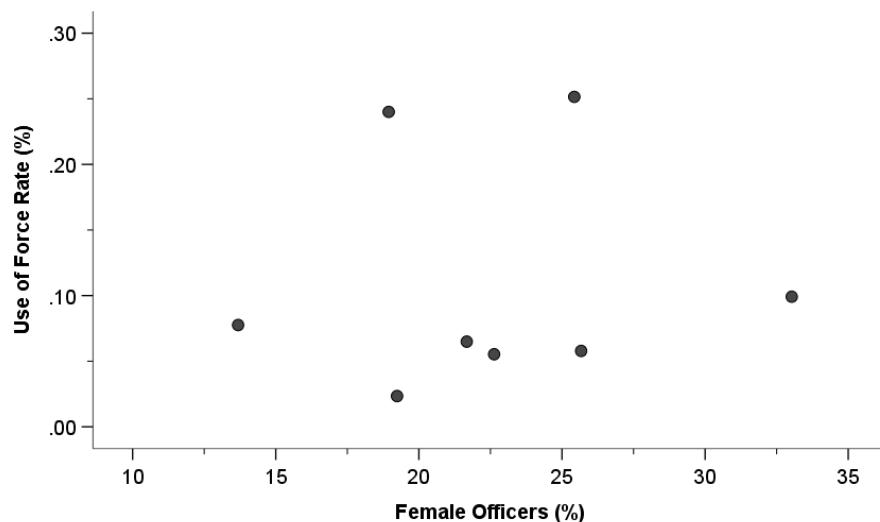
Note. Use of force rates, as a percentage of total police occurrences.

A scatterplot of the percentage of female officers by use of force rate was visually inspected. As with the percentage of male officers, the scatterplot suggested that there is no relationship between the percentage of female officers in an agency and its use of force rate (see Figure 6). A Spearman's rank order correlation confirmed this, $r_s(6) = .071, p = .867$.¹⁵

¹⁵ The 8 agencies represented in this analysis account for a total of 37,961 officers (55.4% of the total population of officers in Canada in 2018).

Figure 6

Scatterplot of Percentage of Female Officers by Use of Force Rate



Note. Use of force rates, as a percentage of total police occurrences

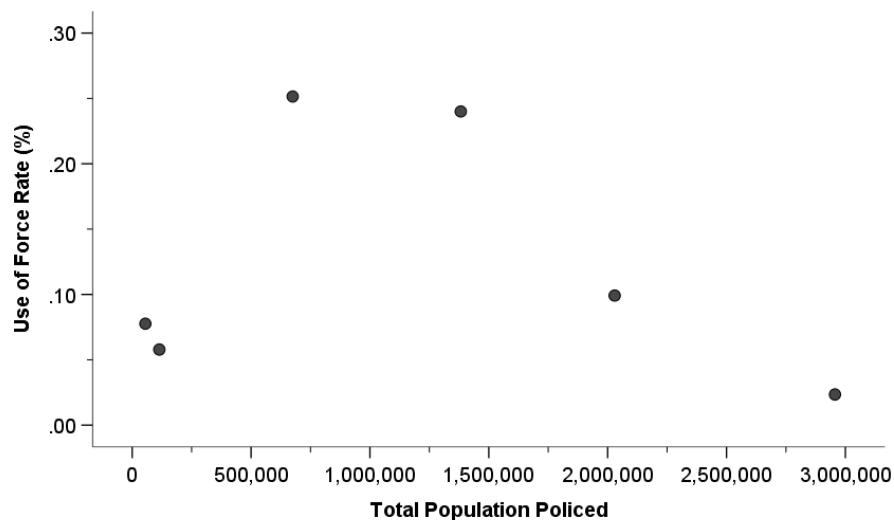
Total Population Policed. A scatterplot of total population policed by use of force rate was examined and an obvious outlier was identified (one agency policed a population of 8,055,165 people).¹⁶ The original scatterplot can be seen in Appendix D. The outlier was removed from the data and another scatterplot was created (see Figure 7).¹⁷ With the outlier removed, the correlation was non-significant, $r_s(4) = -.143, p = .787$ (the analysis including the outlier also resulted in a non-significant correlation).

¹⁶ Q3 + 1.5IQR = 7,218,838 people.

¹⁷ The 6 agencies represented in this analysis account for a total of 13,117 officers (19.1% of the total population of officers in Canada in 2018).

Figure 7

Scatterplot of Total Population Policed by Use of Force Rate – Outlier Removed



Note. Use of force rates, as a percentage of total police occurrences.

Total Geographic Area Policed. A scatterplot of the total geographic area policed (in sq.km) and use of force rate was examined. Due to the scale required to accommodate the vast difference in geographic area policed by the sample agencies (300 sq. km to 9,616,263 sq. km), it was difficult to interpret the scatterplot given the influence of two obvious outliers. One agency policed a 1,076,000 sq. km area and another policed a 9,613,263 sq. km area.¹⁸ The original scatterplot can be seen in Appendix E. The removal of two outliers greatly increased the interpretability of the scatterplot and suggested that there was no association between the total geographic area policed by an agency and the use of force rate (see Figure 8).¹⁹

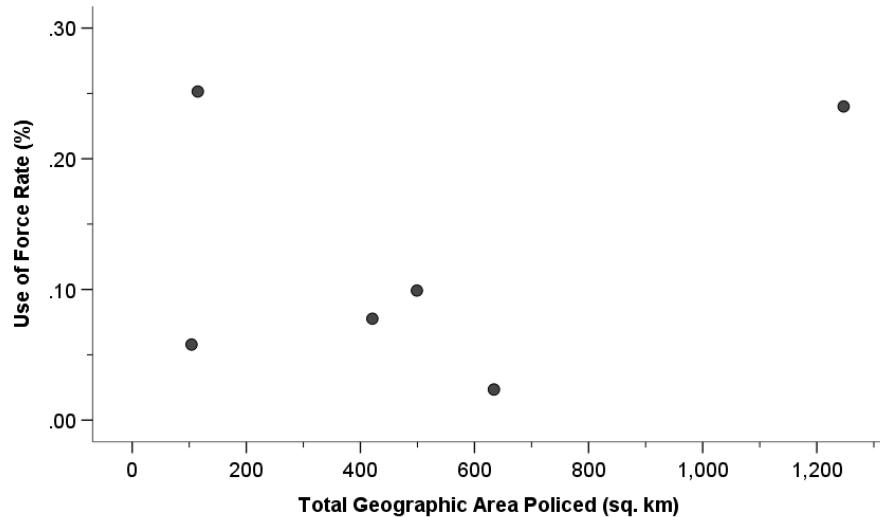
¹⁸ With all agencies included, initial Q3 +1.5IQR = 2,017,991.7 sq. km, which only identified one outlier (9,613,263 sq. km); however, the remaining extreme value of 1,076,000 sq. km was so far beyond the remaining data points, Q3 + 1.5IQR = 2945 sq. km, that both extreme values (1,076,000 sq. km area and 9,613,263 sq. km) were removed.

¹⁹ The 6 agencies represented in this analysis account for a total of 13,117 officers (19.1% of the total population of officers in Canada in 2018).

This was confirmed by Spearman's rank order correlation, $r_s(4) = .029, p = .957$ (the analysis including the outliers also resulted in a non-significant correlation).

Figure 8

Scatterplot of Total Geographic Area Policed by Use of Force Rate – Outliers Removed



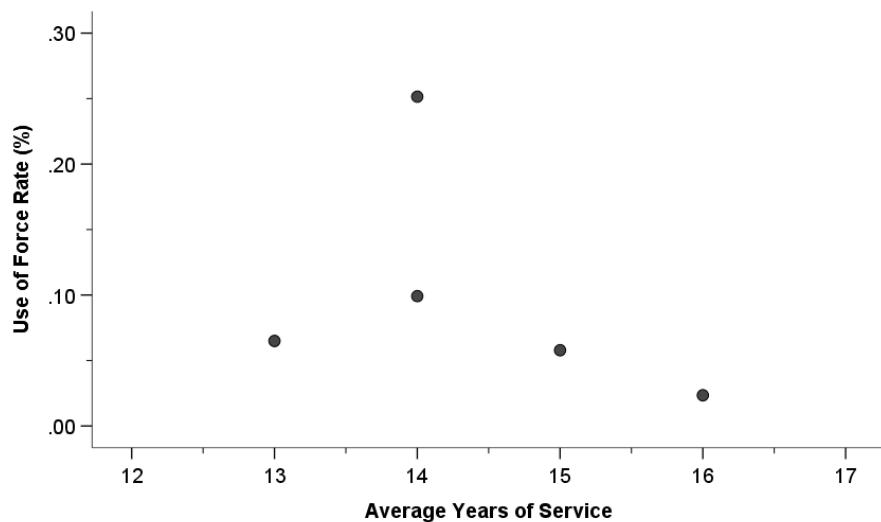
Note. Use of force rates, as a percentage of total police occurrences.

Average Years of Service. A scatterplot of the average years of service of an agency's members and use of force rate was examined. The scatterplot suggested that a negative relationship may exist between these variables (see Figure 9), but the Spearman's rank order correlation between the two variables was not significant, $r_s(3) = -.667, p = .219$.²⁰

²⁰ The 5 agencies represented in this analysis account for a total of 29,814 officers (43.5% of the total population of officers in Canada in 2018).

Figure 9

Scatterplot of Average Years of Service by Use of Force Rate



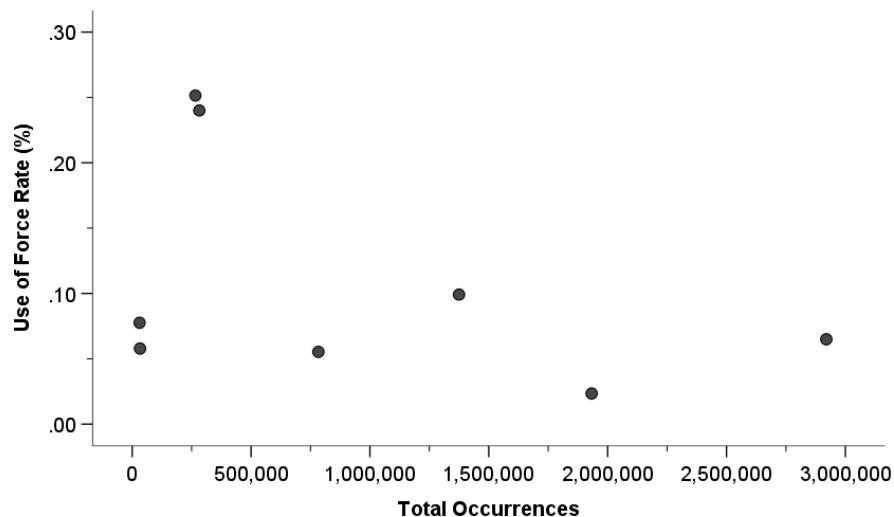
Note. Use of force rates, as a percentage of total police occurrences.

Total Occurrences. A scatterplot of total occurrences and use of force rate was examined. The scatterplot suggested that a negative relationship may exist between these two variables (see Figure 10), but the Spearman's rank order correlation was not significant, $r_s(6) = -.333, p = .420$.²¹

²¹ The 8 agencies represented in this analysis account for a total of 37,961 officers (55.4% of the total population of officers in Canada in 2018).

Figure 10

Scatterplot of Total Occurrences by Use of Force Rate



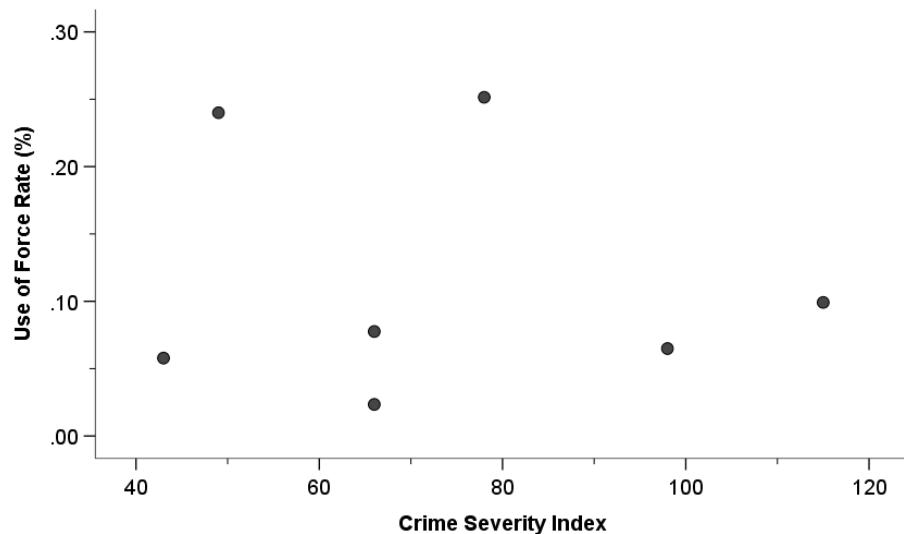
Note. Use of force rates, as a percentage of total police occurrences.

Crime Severity Index. A scatterplot of crime severity index and use of force rate was examined (see Figure 11). A Spearman's rank order correlation revealed a non-significant association between these variables, $r_s(5) = .270, p = .558$.²²

²² The 7 agencies represented in this analysis account for a total of 32,015 officers (46.7% of the total population of officers in Canada in 2018).

Figure 11

Scatterplot of Crime Severity Index by Use of Force Rate



Note. Use of force rates, as a percentage of total police occurrences.

Relationship Between Training and Use of Force

CID Training. The first set of analyses for research question 2 involved an examination of the relationship between CID training and use of force rate.

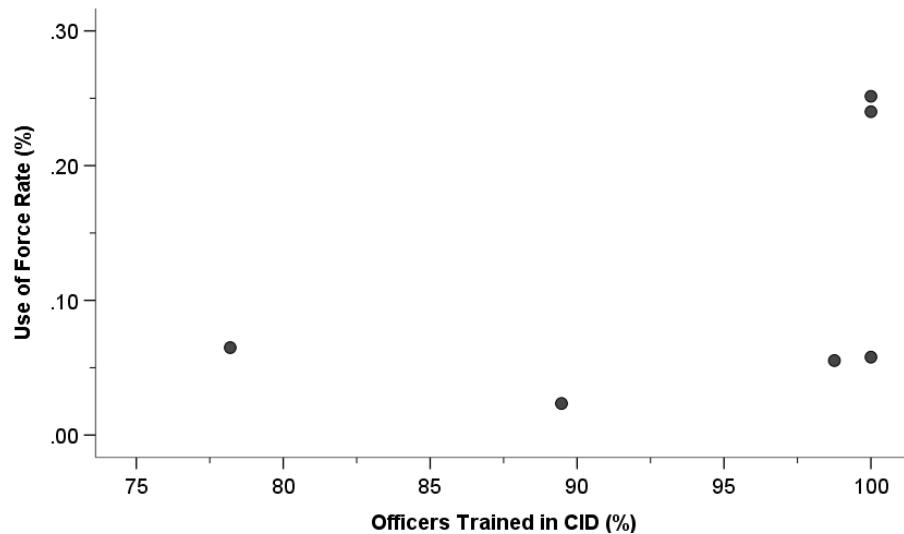
Percentage of Officers Trained in CID. A scatterplot of the percentage of officers in an agency trained in CID and use of force rate was examined, but an obvious outlier was identified (one police agency only trained 8.43% of officers).²³ The original scatterplot can be seen in Appendix F. This outlier was removed and a new scatterplot was created (see Figure 12). A Spearman's rank order correlation was run on this data, and was found to be non-significant, $r_s(4) = .516$, $p = .295$ (the analysis including the outlier also resulted in a non-significant correlation).²⁴

²³ Q1 – 1.5IQR = 45.5% officers trained.

²⁴ The 6 agencies represented in this analysis account for a total of 33,323 officers (48.6% of the total population of officers in Canada in 2018).

Figure 12

Scatterplot of Percentage of Officers Trained in CID by Use of Force Rate – Outlier Removed



Note. Use of force rates, as a percentage of total police occurrences.

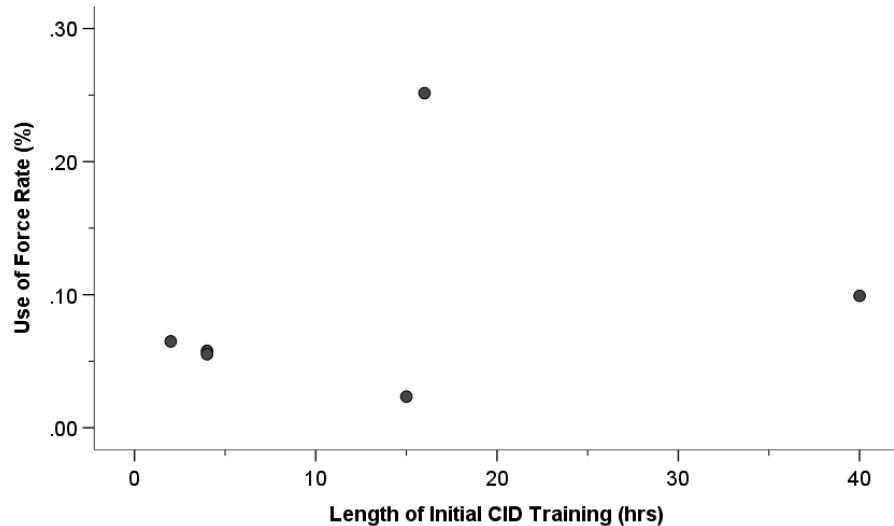
Length of Initial CID Training. A scatterplot of the length of initial CID training and use of force rate was examined. Again, an outlier was observed (the length of training in one police agency was 120 hours).²⁵ The original scatterplot can be seen in Appendix G. A new scatterplot was constructed without the outlier (see Figure 13) and Spearman's rank order correlation was calculated.²⁶ That correlation was non-significant, $r_s(4) = .406$, $p = .425$ (the analysis including the outlier also resulted in a non-significant correlation).

²⁵ Q3 + 1.5IQR = 94 hours.

²⁶ The 6 agencies represented in this analysis account for a total of 35,760 officers (52.2% of the total population of officers in Canada in 2018).

Figure 13

Scatterplot of Length of Initial CID Training by Use of Force Rate – Outlier Removed



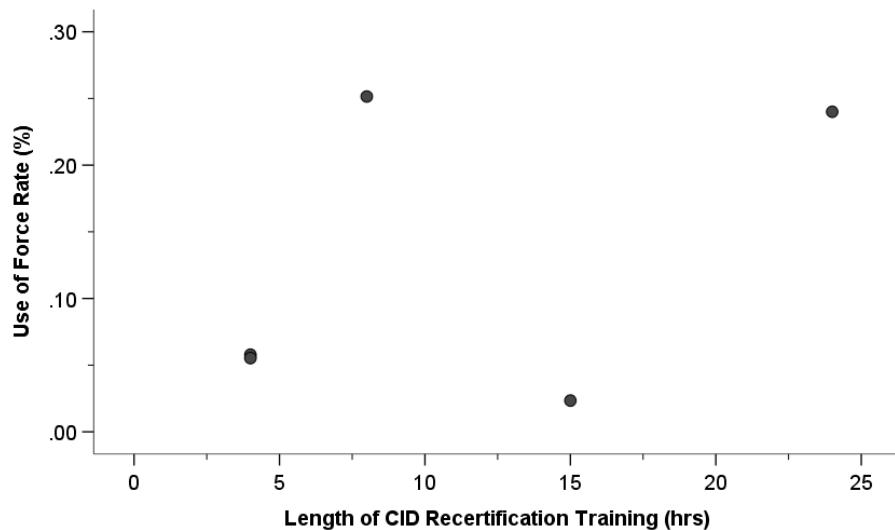
Note. Use of force rates, as a percentage of total police occurrences.

Length of CID Recertification Training. A scatter plot of the length of CID recertification and use of force rate was examined. The scatterplot suggested that a relationship does not exist between these two variables (see Figure 14), which was confirmed by a Spearman's rank order correlation, $r_s(3) = .105$, $p = .805$.²⁷

²⁷ The 5 agencies represented in this analysis account for a total of 14,404 officers (21% of the total population of officers in Canada in 2018).

Figure 14

Scatterplot of Length of CID Recertification Training by Use of Force Rate



Note. Use of force rates, as a percentage of total police occurrences.

Type of Initial CID Training. As seen in Table 3, a 2 x 3 cross-tabulation was structured using the three categories of initial training type (*both online and in-person, in-person, or online*) and two categories for use of force (*Yes or No*, referring to whether force had been applied during the occurrence). Expected cell frequencies were greater than five. Based on this data, a chi-square test for independence was conducted between the initial type of CID training and whether force had been used at a recorded occurrence. There was a statistically significant association between the type of initial CID training an agency's officers receive and whether force had been used during a police occurrence, $\chi^2(2) = 1135.43, p < .001$. However, the strength of association was negligible, Cramer's V = .012 $p < .001$.

Table 3*Cross-tabulation of Initial CID Training Type and Application of Force*

Force applied	Type of initial CID training		
	Both	In-Person	Online
Yes	678 (33.7)	2917 (-6.7)	1914 (-6.3)
No	281,818 (-33.7)	4,353,340 (6.7)	2,950,746 (6.3)

Note. Adjusted residuals appear in parenthesis below observed frequencies.

Type of CID Recertification Training. As seen in Table 4, a 2 x 2 cross-tabulation was structured using the two categories of recertification type (*In-person* or *Online*) and two categories for use of force (*Yes* or *No*, referring to whether force had been applied during the recorded police occurrence). Expected cell frequencies were greater than five. A chi-square test for association was conducted between type of CID recertification training and use of force.²⁸ There was a statistically significant association between the type of CID recertification training an agency's officers received and whether force had been used during a police occurrence, $\chi^2(1) = 1260.34$, $p < .001$. However, the strength of association was very weak association, $\phi = -.020$, $p < .001$.

²⁸ The 5 agencies represented in this analysis account for a total of 14,404 officers (21% of the total population of officers in Canada in 2018).

Table 4

Cross-tabulation of CID Recertification Training Type and Application of Force

Force applied	Type of CID recertification training	
	In-Person	Online
Yes	1564 (-35.5)	687 (35.5)
No	2,996,667 (35.5)	297,821 (-35.5)

Note. Adjusted residuals appear in parenthesis below observed frequencies.

Frequency of CID Recertification Training. The cross-tabulation for the frequency of CID recertification training and use of force rate was identical to the one created for recertification type by use of force rate because those agencies who provide their recertification in-person and those who provide it online, do so annually and triennially respectively. The chi-square test of association was also the same (a very weak, but statistically significant association).

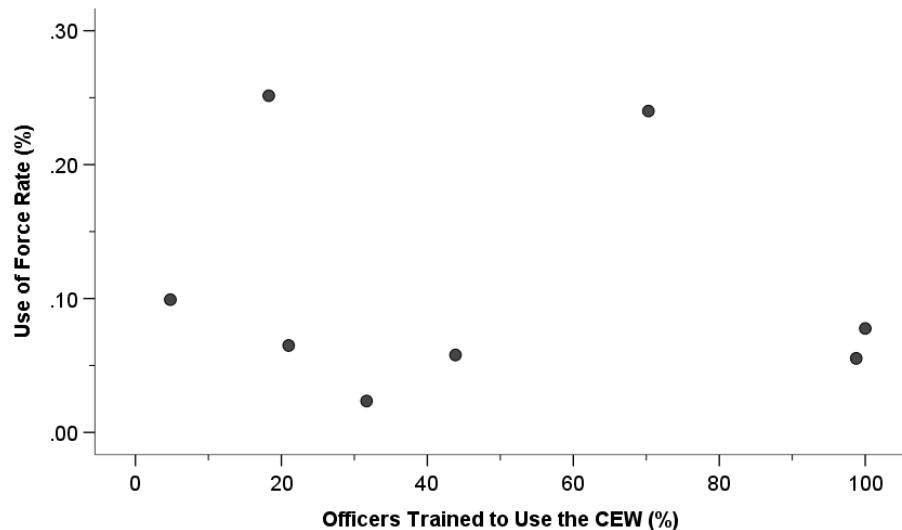
CEW Training and Frequency of Force. The next set of analyses for research question 2 involved examining the relationship between CEW training and how frequently an agency's officers use force.

Percentage of Officers Trained to Use the CEW. A scatterplot of the percentage of officers in an agency trained to use the CEW and use of force rate was examined. The scatterplot suggested that a relationship does not exist between these two variables (see Figure 15). This was confirmed by a non-significant Spearman's rank order correlation, $r_s(6) = -.310$, $p = .456$.²⁹

²⁹ The 8 agencies represented in this analysis account for a total of 37,961 officers (55.4% of the total population of officers in Canada in 2018).

Figure 15

Scatterplot of Percentage of Officers Trained to Use the CEW by Use of Force Rate



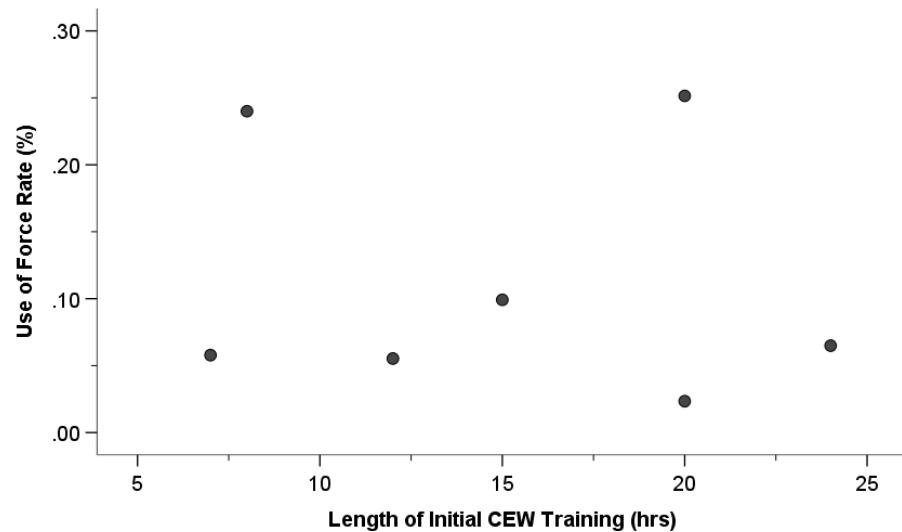
Note. Use of force rates, as a percentage of total police occurrences.

Length of Initial CEW Training. The relationship between the length of the initial training an agency's officers received on the CEW and the agency's use of force rate was also examined. A scatterplot of the length of initial CEW training received by an agency's officers and the agency's use of force rate suggested that a relationship does not exist between these two variables (see Figure 16). This was confirmed by a non-significant Spearman's rank order correlation, $r_s(6) = .036$, $p = .938$.³⁰

³⁰ The 7 agencies represented in this analysis account for a total of 37,866 officers (55.2% of the total population of officers in Canada in 2018).

Figure 16

Scatterplot of Length of Initial CEW Training by Use of Force Rate



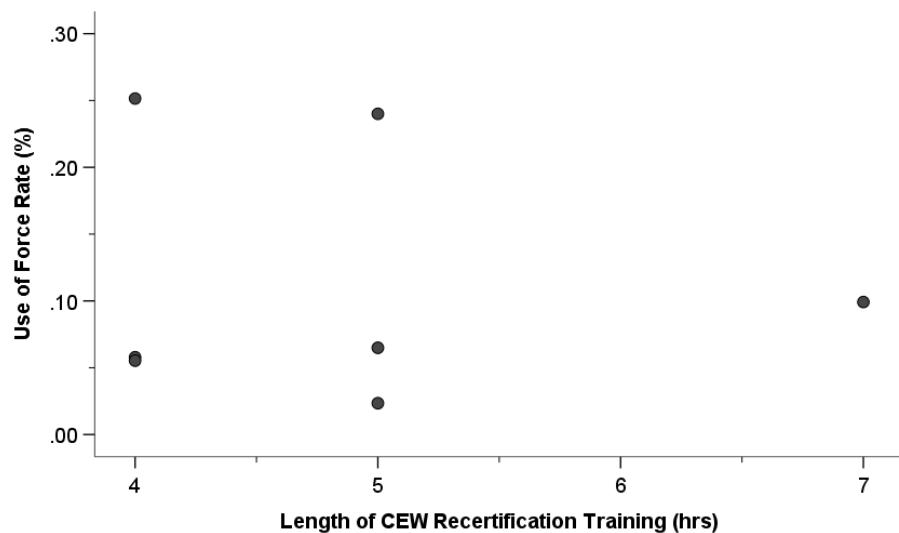
Note. Use of force rates, as a percentage of total police occurrences.

Length of CEW Recertification Training. A scatterplot of the length of CEW recertification training received by an agency's officers and the agency's use of force rate was examined. The scatterplot hinted at a possible relationship between these two variables (see Figure 17), but the Spearman's rank order correlation between these variables was not significant, $r_s(6) = .077$, $p = .869$.³¹

³¹ The 7 agencies represented in this analysis account for a total of 37,866 officers (55.2% of the total population of officers in Canada in 2018).

Figure 17

Scatterplot of Length of CEW Recertification Training by Use of Force Rate



Note. Use of force rates, as a percentage of total police occurrences.

Frequency of CEW Recertification. Correlation analysis was not possible for this variable as each of the agency's that reported on their CEW recertification program and provided data to allow the calculation of their use of force rate, had an annual recertification cycle for the CEW.

CEW Training and CEW Effectiveness. Further analysis was conducted on the relationship between CEW training and the effectiveness of the CEW in each of its deployment modes (*draw and display, probe mode, and drive stun*).³² These relationships were examined separately, rather than from the perspective of overall CEW effectiveness due to the differences in the number of agencies that provided data on each of the deployment modes. Overall rates of effectiveness for the CEW can be seen in Table 5.

³² *Probe mode* is when the probes are fired into a subject allowing electrical current to be transferred from the CEW into the subject. *Drive stun*, also known as push stun or contact mode, is when an activated CEW is pressed or pushed into a subject with or without the cartridge. *Draw and Display* is when the CEW is displayed to a subject to try to gain voluntary compliance.

Table 5*CEW Rates of Effectiveness by Deployment Mode*

Deployment mode	<i>n</i>	Percent of occurrences reported effective:				
		<i>Mdn</i>	<i>M</i>	<i>SD</i>	<i>Minimum</i>	<i>Maximum</i>
Draw and display	1746 ^a	85.8	71.1	40.3	0.00	100.0
Probe	1131 ^b	75.3	71.8	10.4	50.0	80.1
Drive stun ^d	300 ^c	82.3	82.0	13.8	66.7	100.0

Note: *n* = total number of deployments of the CEW in the referenced mode. Effectiveness defined as the subject became compliant, was incapacitated, and/or the intervention resulted in a desired outcome (e.g., subject dropped the weapon).

^a The 5 agencies represented in this statistic account for a total of 31,968 officers (46.6% of the total population of officers in Canada in 2018).

^b The 7 agencies represented in this statistic account for a total of 37,866 officers (55.2% of the total population of officers in Canada in 2018).

^c The 6 agencies represented in this statistic account for a total of 37,679 officers (55% of the total population of officers in Canada in 2018).

^d *Drive stun* is different than *probe mode* in several ways but most notably, it is the effects of the two deployment types where there is the most difference. While the outcome, or effect, of *probe mode* is anticipated to be neuro-muscular incapacitation (the subject locks-up due to electrical stimulation), *drive stun* simply causes pain, through which the officers seeks to gain compliance (pain compliance). *Drive stun* offers no control of the subject.

As a supplementary analysis, scatterplots were created for each of the CEW deployment types modes (*draw and display*, *probe mode*, and *drive stun*) by length of training (*initial and recertification*). These scatterplots can be seen in Appendix H. Spearman's rank order correlations were then completed for each of the aforementioned variable pairings. As can be seen in Table 6, a significant positive association between the length of CEW recertification training and the effectiveness of the CEW when drawn and displayed to a subject was confirmed, $r_s(3) = .866, p = .029$.

Table 6

Spearman's Rank Order Correlations – CEW Deployment Mode by Length of Training

Deployment Mode	Length of training			
	Initial		Recertification	
	r_s	p	r_s	p
Draw and display	.300	.624 ^a	.866	.029 ^a
Probe	-.406	.425 ^{b,c}	.577	.308 ^{d,e}
Drive stun	-.368	.237 ^f	.148	.767 ^{g,h}

Note: Correlation analysis of the relationship between the effectiveness of the CEW and the frequency of CEW recertification training could not be conducted since each of the agency's that reported on their CEW recertification program, and provided data to allow the calculation of the rate of effectiveness for the CEW, had an annual recertification cycle for the CEW.

^a The 5 agencies represented in this analysis account for a total of 31,968 officers (46.6% of the total population of officers in Canada in 2018).

^b One agency had an effectiveness rate of 50%. Q1-1.5IQR = 50.81, so this agency was removed as an outlier (the analysis including the outlier also resulted in a non-significant correlation).

^c The 6 agencies represented in this analysis account for a total of 37,680 officers (55% of the total population of officers in Canada in 2018).

^d One agency had an effectiveness rate of 50%. Q1-1.5IQR = 50.81, so this agency was removed as an outlier.

Another agency had a recertification length of seven hours. Q3+1.5IQR = 6 hours, so this agency was also removed as an outlier (the analysis including the outliers also resulted in a non-significant correlation).

^e The 5 agencies represented in this analysis account for a total of 33,122 officers (48.3% of the total population of officers in Canada in 2018).

^f The 6 agencies represented in this analysis account for a total of 37,679 officers (55% of the total population of officers in Canada in 2018).

^g One agency had a recertification length of seven hours. Q3+1.5IQR = 6 hours, so this agency was removed as an outlier (the analysis including the outlier also resulted in a non-significant correlation).

^h The 5 agencies represented in this analysis account for a total of 33,122 officers (48.3% of the total population of officers in Canada in 2018).

ERIW Training and Frequency of Force. The final set of analyses for research question 2 involved examining the relationship between ERIW training and how frequently an agency's officers use force.

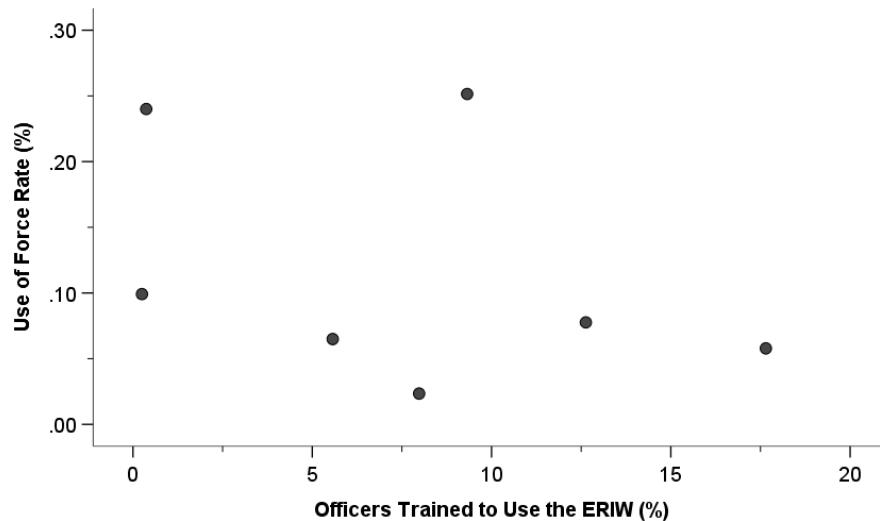
Percentage of Officers Trained to Use the ERIW. A scatterplot of the percentage of officers in an agency trained to use the ERIW and use of force rate was examined. The scatterplot suggested that a relationship does not exist between these two variables (see Figure

18). This was confirmed by a non-significant Spearman's rank order correlation, $r_s(5) = -.321$, $p = .482$.³³

³³ The 7 agencies represented in this analysis account for a total of 32,015 officers (46.7% of the total population of officers in Canada in 2018).

Figure 18

Scatterplot of Percentage of Officers Trained to Use the ERIW by Use of Force Rate



Note. Use of force rates, as a percentage of total police occurrences.

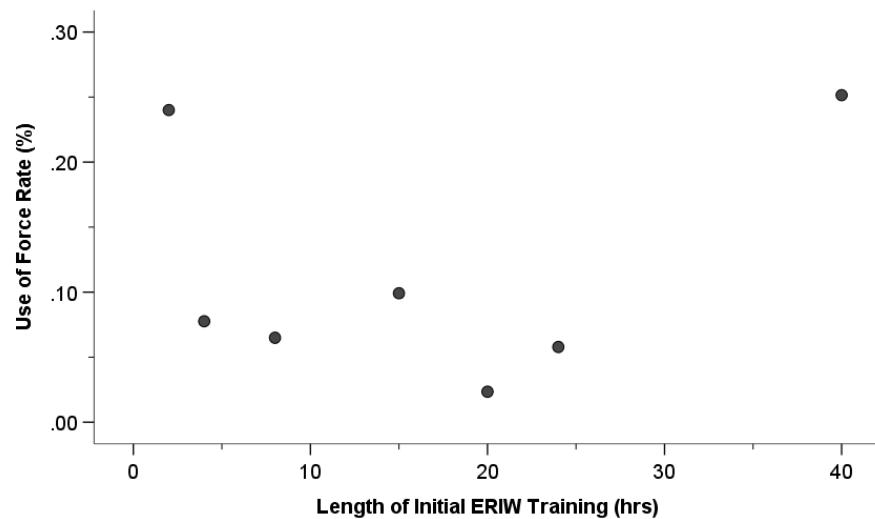
Length of Initial ERIW Training. The relationship between the length of the initial training an agency's officers received on the ERIW and the agency's use of force rate was also examined. A scatterplot of these two variables was visually inspected. The scatterplot suggested that a relationship does not exist and can be seen in Figure 19. This lack of association was confirmed by a non-significant Spearman's rank order correlation, $r_s(5) = -.107$, $p = .819$.^{34, 35}

³⁴ The 7 agencies represented in this analysis account for a total of 32,015 officers (46.7% of the total population of officers in Canada in 2018).

³⁵ Although visually, the data point in the upper right-hand corner of Figure 19 appears to be an outlier, it is not.

Figure 19

Scatterplot of Length of Initial ERIW Training by Use of Force Rate



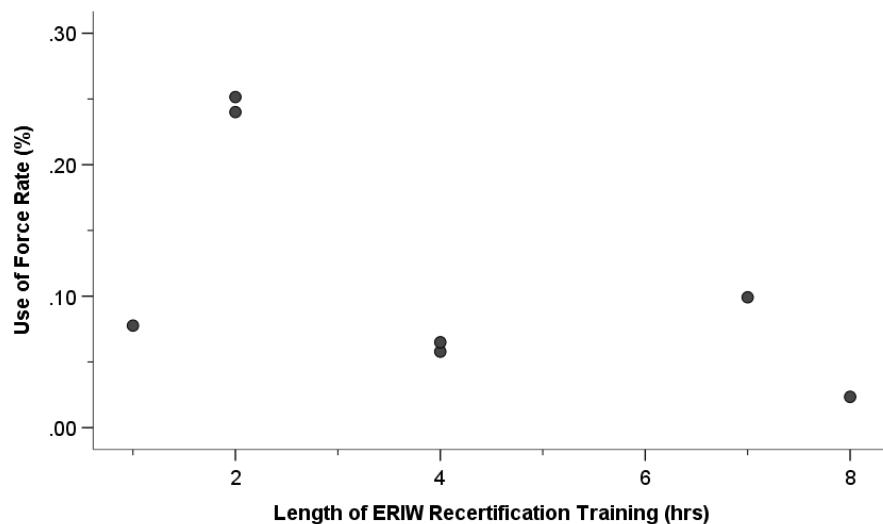
Note. Use of force rates, as a percentage of total police occurrences.

Length of ERIW Recertification Training. The relationship between the length of the ERIW recertification training and use of force rate was examined. The scatterplot suggested a negative relationship may exist between these variables (see Figure 20), but the Spearman's rank order correlation between these variables was not significant, $r_s(5) = -.582$, $p = .170$.³⁶

³⁶ The 7 agencies represented in this analysis account for a total of 32,015 officers (46.7% of the total population of officers in Canada in 2018).

Figure 20

Scatterplot of Length of ERIW Recertification Training by Use of Force Rate



Note. Use of force rates, as a percentage of total police occurrences.

Frequency of ERIW Recertification. Correlation analysis of the relationship between the frequency of ERIW recertification and use of force rate was not undertaken because only one of the agencies that provided data on use of force rate and ERIW recertification, had a non-annual recertification cycle.

ERIW Training and ERIW Effectiveness. Further analysis was conducted on the relationship between ERIW training and the effectiveness of the ERIW in its two deployments modes (*projectile fired*, and, *draw and display*).³⁷ These relationships were examined separately, rather than from the perspective of overall ERIW effectiveness due to the differences in the number of agencies that provided data on each of the deployment modes of the ERIW. Table 7 shows the rates effectiveness for the ERIW.

³⁷ *Projectile fired* is when the less lethal projectile (e.g., sponge round, bean bag round, etc.) is fired at a subject. *Draw and Display* is when the ERIW is displayed to a subject to try to gain voluntary compliance.

Table 7*ERIW Rates of Effectiveness by Deployment Mode*

Deployment mode	<i>n</i>	Percent of occurrences reported effective:				
		<i>Mdn</i>	<i>M</i>	<i>SD</i>	<i>Minimum</i>	<i>Maximum</i>
Projectile fired	42 ^a	66.66	61.25	17.1	42.1	75.0
Draw and display	166 ^b	88.54	88.9	9.80	78.6	100.0

Note: *n* = total number of deployments of the ERIW in the referenced mode. Effectiveness defined as the subject became compliant, was incapacitated, and/or the intervention resulted in a desired outcome (e.g., subject dropped the weapon).

^a The 3 agencies represented in this statistic account for a total of 28,826 officers (41.3% of the total population of officers in Canada in 2018).

^b The 4 agencies represented in this statistic account for a total of 25,257 officers (36.8% of the total population of officers in Canada in 2018).

Here, the percentage of occurrences where the ERIW was determined to be effective are presented. A comparison can be made between the effectiveness of the ERIW when physically deployed on a subject and when it is drawn and displayed. It is seen that the ERIW is highly effective in gaining subject compliance when displayed to a subject.

As a supplementary analysis, scatterplots were created for the two types of ERIW deployment (*draw and display* and *projectile fired*) by length of training (*initial* and *recertification*). These scatterplots can be seen in Appendix I. Spearman's rank order correlations were then calculated for each of these variable pairings and are presented in Table 8. As can be seen in Table 8, the results indicate a perfectly positive association between the length of ERIW training (*initial* and *recertification*) and the effectiveness of the ERIW when it is deployed on a subject. However, due to the extremely small sample size, these findings must be interpreted with caution.

Table 8

Spearman's Rank Order Correlations – ERIW Deployment Mode by Length of Training

Deployment Mode	Length of training			
	Initial		Recertification	
	r_s	p	r_s	p
Draw and display	0	.1 ^a	-.316	.684 ^a
Projectile fired	1	.001 ^b	1	.001 ^b

Note: Correlation analysis of the relationship between the effectiveness of the ERIW and the frequency of ERIW recertification training could not be conducted since each of the agency's that reported on their ERIW recertification program, and provided data to allow the calculation of the rate of effectiveness for the ERIW, had an annual recertification cycle for the ERIW.

^a The 4 agencies represented in this analysis account for a total of 25,257 officers (36.8% of the total population of officers in Canada in 2018).

^b The 3 agencies represented in this analysis account for a total of 28,286 officers (41.3% of the total population of officers in Canada in 2018).

Relationship Between Officer Gender and Use of Force

No analysis on research question 3 was undertaken beyond that which took place as part of research question 1 (as part of the analysis on agency demographics and use of force rate). As aforementioned, since the dependent variable (use of force rate) had violated the assumption of normality, and I wanted to maintain that data as it had been received from the participating agencies, I did not complete any data transformations which may have allowed further statistical analysis.

Relationship Between Intervention Options and Effectiveness

Analysis for research question 4 began with a descriptive examination of the rates of effectiveness for each of the intervention options. Most of the time, all the intervention options were reported as being effective although some were reported as being effective more often than others. The intervention option most frequently reported as being effective was physical control hard ($M = 78\%$, of use of force occurrences where it was applied). Of note, physical control hard

made up nearly half of all use of force encounters (44.9%). The intervention least often reported as being effective was the ERIW ($M = 61.3\%$, of use of force occurrences where it was deployed), with one agency indicating that it had been effective in only 42.1% of the occurrences in which it had been deployed (8 out of 19 deployments). The intervention option with the least variability in effectiveness was OC spray ($SD = 8.12$), whereas the most variability was observed in the effectiveness of the firearm ($SD = 18.4$). Table 9 provides an overview of reported effectiveness when each of the intervention options are physically deployed (applied to a subject).

Table 9*Rates of Effectiveness by Intervention Type*

Intervention type	<i>n</i>	Percent of use of force occurrences where reported effective:				
		<i>Mdn</i>	<i>M</i>	<i>SD</i>	<i>Minimum</i>	<i>Maximum</i>
Physical control hard	2077	80.2	78	10	66.02	90.5
OC Spray	792	78.8	76.6	8.12	66.7	85.4
Baton	231	73.5	71.6	11.9	50	85
CEW	1431	74	72	10.8	50	80.9
ERIW	42	66.7	61.3	17.1	42.1	75
Firearm	53	75	77.2	18.4	60	96.6

Note: *n* = total number of physical deployments of the intervention option; circumstances of draw and display are not included due to agency variation in tracking draw and display. The 8 agencies represented in this table account for a total of 37,961 officers (55.4% of the total population of officers in Canada in 2018).

As seen in Table 10, a 2 x 6 crosstabulation was structured using the six categories of intervention type and two categories for effectiveness (*Yes* or *No*, referring to whether the intervention was effective when it was deployed). Expected cell frequencies were greater than five. A chi-square test for independence was conducted between intervention type and effectiveness. There was a statistically significant association between the type of intervention and effectiveness, $\chi^2(5) = 52.182$, $p < .001$. The association, however, was small, Cramer's V = .106.

Table 10*Crosstabulation of Intervention Type and Effectiveness*

Effectiveness	Physical control hard	Intervention type				
		OC	Baton	CEW	ERIW	Firearm
Yes	1739	654	167	1101	24	43
	(4.9)	(1.6)	(-2.9)	(-3.3)	(-3.9)	(.1)
No	338	138	64	330	18	10
	(-4.9)	(-1.6)	(2.9)	(3.3)	(3.9)	(-.1)

Note. Adjusted residuals appear in parenthesis below observed frequencies.

To clarify what this test shows, odds ratios were calculated to compare the odds of effectiveness for each of the intervention options (see Table 11). The results show that physical control hard has the greatest odds of being effective over all other intervention options. The ERIW on the other hand, has the least odds of being effective compared to all other intervention options. For example, the odds of physical control hard being effective are 97% greater than the odds of the baton and 54% greater than the odds of the CEW; however, in the case of the ERIW, the odds of it being effective are 49% less than the baton and 60% less than the CEW.

Table 11*Odds Ratios – Intervention Effectiveness*

Intervention option	Odds effective compared to:											
	Physical control hard		OC		Baton		CEW		ERIW		Firearm	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Physical control hard	1.00	-	1.09	[.87, 1.35]	1.97**	[1.45, 2.69]	1.54**	[1.30, 1.83]	3.86**	[2.07, 7.19]	1.20	[.60, 2.41]
OC	.92	[.74, 1.15]	1.00	-	1.82**	[1.29, 2.56]	1.42**	[1.14, 1.77]	3.55**	[1.88, 6.73]	1.10	[.54, 2.25]
Baton	.51**	[.37, .69]	.55**	[.39, .77]	1.00	-	.78	[.57, 1.07]	1.96	[1.00, 3.85]	.61	[.29, 1.28]
CEW	.65**	[.55, .77]	.70**	[.56, .89]	1.28	[.94, 1.75]	1.00	-	2.50**	[1.34, 4.67]	.78	[.39, 1.56]
ERIW	.26**	[.14, .48]	.28**	[.15, .53]	.51	[.26, 1.00]	.40**	[.21, .75]	1.00	-	.31*	[.12, .78]
Firearm	.84	[.42, 1.68]	.91	[.45, 1.85]	1.65	[.78, 3.47]	1.29	[.64, 2.59]	3.23*	[1.28, 8.08]	1.00	-

Note: OR = odds ratio; CI = confidence interval. It is important to note that these odds ratios compare odds of effectiveness in separate situations where the individual intervention options are used, it is not a comparison of likelihood of effectiveness of each of the intervention options in the same situation. For example, in situations where OC is deemed to be the appropriate intervention option, the odds of it being effective are 82% greater than the odds of the baton being effective, in situations where the baton is deemed to be the appropriate response. This does not mean that in situations where the baton is deemed to be the appropriate response, that OC spray should be used (since it has higher odds of effectiveness). This table also does not control for various situational factors (e.g., weapons, intoxication, etc.) that may impact intervention effectiveness.

* $p < .05$. ** $p < .01$.

Relationship Between Intervention Option and Injury (Subject and Officer)

Unfortunately, no analysis was completed on research questions 5 and 6. The data on injuries was too limited to allow for an analysis that could be generalized to agencies across the country.

Discussion

The purpose of this study was to gain a better understanding of police use of force in Canada. A series of research questions were asked to estimate how often force is used by police officers in Canada and to determine if relationships exist between the use of force and (a) agency demographics (e.g., average years of service of officers, total population policed, etc.), (b) officer training (e.g., length and frequency), and (c) officer gender. The study also sought to examine the relationship between intervention options and (a) effectiveness, (b) subject injury, and (c) officer injury. Although this study was hindered by variability in the amount of data provided by the responding agencies, there are key findings that can be used by future researchers to further refine research designs on police use of force, and by police organizations to challenge assumptions regarding police training and guide discussions about data collection at the national level.

Use of Force Rates

With respect to use of force rates, the results indicate that the number of incidents where police in Canada report using force, as a proportion of total police occurrences, is very small (.08%). This relative infrequency is further demonstrated when put in the context of use of force encounters per 10,000 people; the present study found this value to be 2.09 use of force occurrences per 10,000 people annually. Additionally, no practical association was found between jurisdiction type and use of force rate, suggesting that municipal and provincial officers use force with similar frequency. From the perspective of accountability, this finding suggests that use of force is unaffected by whether the agency is managed at the local level or from authorities who are geographically distanced from where the policing is physically occurring.

This rarity was anticipated, given that previous research has consistently found that the use of force by police is not common (Baldwin et al., 2016; Bureau of Justice Statistics, 1996; Croft, 1985; Hickman et al., 2008). However, building upon the work of Hall and Votova (2013), heretofore the largest multi-jurisdictional Canadian study that calculated a use of force rate, these findings also demonstrate that this relative rarity is consistent across Canadian policing jurisdictions; the results for this study are drawn from a sample of 8 agencies, inclusive of police officers from every province and territory, and account for just over half of the police officers in Canada in 2018 (55.4%).

The Relationship Between Use of Force and Agency Demographics

Total Officers. There was a non-significant negative relationship between the number of officers in an agency and its reported use of force rate. To the writer's knowledge, this is the first Canadian study to explore this relationship, but this result is consistent with previous research conducted elsewhere. For example, the most comprehensive study to date that commented on this relationship, Garner et al.'s (2018) study of 337,590 use of force incidents occurring in American law enforcement jurisdictions in 2012, found that the number of use of force incidents in an agency was not associated with the number of officers in the agency. The present findings are also consistent with Pate et al.'s (1993) study, which found that, other than police shootings, the rates at which other types of intervention options were used did not vary consistently across large and small police departments. However, these findings are not completely consistent with previous research. For instance, in Terrill et al.'s (2008) study examining the use of force by officers in a small American police agency, officers were found to apply physical force (above handcuffing) with greater regularity than many of their counterparts in bigger agencies, suggesting a relationship between number of officers and frequency of force. The fact that I

found no significant relationship between total officers and use of force suggests that some other factor likely explains the few occasions (two agencies) where force was notably higher (rates of .24% and .25%).

Officer Gender. Results indicated that a negligible, non-significant positive relationship exists between the proportion of female officers in an agency and the use of force rate. To some extent this was surprising given that some previous research on the subject has supported that female officers tend to use less force, and use force less frequently (Bazley et al., 2007; Carmichael & Kent, 2015; Garner et al., 2002; McElvain, & Kposowa, 2008; Schuck & Rabe-Hemp, 2005). In fact, Lonsway et al. (2002) suggested that the key to reducing the overall use of force by a police agency is to hire more female officers. Importantly, the current results also do not provide statistically meaningful support to previous research, which suggests that a higher proportion of female officers might be associated with higher levels of force (e.g., Smith [2003], who found that in cities with a population of over 100,000, a higher proportion of female officers was related to greater numbers of police-caused homicide). In Canada at least, the results reported in this thesis suggest that thoughtfulness must still be exercised by police managers who may be seeking to reduce their agency's use of force rate only through hiring more female officers and that it would be erroneous to assume that female officers will automatically apply less force in a combative situation.

Total Population Policed. Results suggested a non-significant negative association between the total population being policed and an agency's use of force rate. This makes sense given the non-significant findings on total officers and use of force rate, since the number of officers in an agency tends to be reflective of the total population being policed. Although multi-jurisdictional studies on police use of force exist (Boivin & Lagace, 2016; Engel et al., 2000;

Garner et al., 2002), and previous studies have reported *rates of force* based on population size (Alpert & McDonald, 2001; Garner et al., 2018), little is known about the relationship between these two variables. But, the current findings appear to be consistent with what we do know. For example, Fyfe (1988) suggests that there is unlikely to be an association between use of force rates and population size, describing the relationship between police-caused homicides and the size of population being policed as, “far from linear” (p. 178). Blair et al. (2011) too suggests there is unlikely to be an association, observing that for nearly 40-years justifiable homicides by police in the U.S. have remained in the range of 300 to 450 despite large increases in the American population. Certainly some studies have demonstrated that the *characteristics* of the neighborhood or population policed may have an effect on the use of force by police (Garner et al., 2002; Lersch et al., 2008; Terrill & Mastrofski, 2002; Terrill & Reisig, 2003), but given the dearth of research in this area, and the limited data available in Canada, it is difficult at the moment to comment on how the present study aligns with this body of research.

Total Geographic Area Policed. Results also suggest that there is no association between the total geographic area an agency polices and its use of force rate. Although I had no expectations regarding the direction of association, I did anticipate there might be a relationship. Although not based on empirical research, within the policing industry, two schools of thought exist on this relationship. One side argues that since a back-up officer may not be as readily available in a larger geographic area, the responding officer will go to greater lengths to use verbal intervention to gain voluntary compliance from a subject. The other side argues that for those very same reasons (delayed back-up), the responding officer may more quickly take

physical control of a subject, recognizing that delay could lead to an escalation in the situation.³⁸

Were there an association, either of the aforementioned would be a plausible explanation. A possible explanation for the findings of the present study is that organizational policies that have been put in place to mitigate some of the inherent risks to officer safety resulting from large geographic areas (risks such as poor/slower radio communications, and increased response times from back-up officers), have had their intended effect. That is, these policies have in fact mitigated (but not eliminated) some of these risks. Therefore, geographic area itself has no correlation with the frequency with which force is applied.

Average Years of Service. The present study found a non-significant negative correlation between the average years of service (of officers) in an agency and use of force rate; however, the correlation was still quite strong ($r_s = -.667$). While it would be inappropriate to put too much weight on this finding given that it is not significant, the strong negative correlation is consistent with previous literature that has suggested that more experienced officers tend to use less force or force less frequently than their less experienced co-workers (Brandl et al., 2001; Paoline & Terrill, 2007; Terrill & Mastrofski, 2002). To the extent that this finding can be replicated with a large sample, this is promising. Across all vocations, there is an expectation that practitioners will become better at their craft with experience, and it is fair to say that an officer becoming increasingly able to avoid using force with experience would be viewed by the public as an officer becoming better at their job.³⁹ The question becomes, what enables experienced

³⁸ The writer concedes that referring to the existence of “schools of thought” within an industry, without substantive source material, is not a widely accepted practice academically; nor should it be perhaps. However, he can attest to the existence of these general opinions, having engaged in debate over the same with numerous officers on numerous occasions. It was the existence of these opinions, which were based only on anecdote and individual experience, which generated the writer’s interest in measuring this association.

³⁹ An important caveat exists with this statement; it refers only to situations where avoiding force does not place the public or the officer at increased risk.

officers to use force less frequently?

Boivin and Lagace (2016) have suggested that experienced officers may be more adept at using environmental and situational factors to inform their decisions compared to their less experienced counterparts. Thus, a possible explanation for why experienced officers might use force less frequently is that, through experience, they gain an understanding of how to maneuver themselves into positions of tactical advantage (e.g., utilizing cover, maintaining appropriate time and distance).⁴⁰ This, in turn, might reduce the subject's advantage and encourage the subject to comply. It is also plausible that, through experience, officers learn to recognize cues from the subject that indicate that an escalation in the conflict is imminent, and by recognizing these cues, the officer is able to employ strategies to reduce the tension in the situation.

Total Occurrences. There was also a non-significant negative correlation between total occurrences and use of force rate. This was somewhat surprising; it was anticipated that there may be a positive relationship between these two variables, for it seems reasonable to expect that as the number of recorded interactions between the public and the police increase, the more likely it is that the police would be required to use force. However, this finding suggests that the factors which contribute to the use of force by police do not grow in direct proportion to the number of times police respond to an event. From a public policy (i.e., accountability) perspective, this is a good thing. If an oversight body were to inquire with an agency as to why its use of force rate is higher than its peers, the agency would not be able to rely on call volume as justification for its use of force rate.

⁴⁰ Cover refers to an object/equipment that protects the officer from the threat/weapon with which the officer is faced. Appropriate time and distance, refers to the presence of sufficient space between the officer and subject, to allow the officer to react appropriately to the subject's behaviour (Walton, 2007).

Crime Severity Index. Finally, there was a non-significant positive correlation between the Crime Severity Index and the use of force rate. This non-significant finding is inconsistent with Alpert and MacDonald's (2001) work that found a significant correlation between the violent crime rate and the use of force rate, as well as Lersch et al.'s (2008) findings that violent and property crime rates were significant predictors of force. In the present study, had a more precise metric of crime been used, such as the violent crime rate, a significant correlation may have been found.

Summary. In summary, there were no statistically significant associations between any of the demographic variables measured and the use of force rate; nonetheless, these findings are of value when considered in the larger policing context. Regardless of the circumstances examined (e.g., small agency or large agency, fewer or greater numbers of female officers, etc.), there did not seem to be any significant variation in use of force rates. This held true whether the policing occurred in a higher crime or a lower crime jurisdiction (CSI values ranged from 43 to 115). This suggests that officers across these broad circumstances are doing well (in terms of the frequency with which force is applied), and that it is the individual incidents that are likely the primary factor in whether force is applied during the encounter. Importantly, this is as it should be.

The Relationship Between Use of Force and Training

Crisis Intervention and De-escalation. Although not statistically significant, this study found a strong positive correlation between the percentage of officers in an agency trained in utilizing CID techniques and use of force rate ($r_s = .516$). If this result were found to be significant when drawing on a larger sample, it would be counter-intuitive. One might expect (or at least hope) that the relationship would be negative between these two variables. That being

said, the literature is somewhat unclear as to whether one would find this relationship empirically.

There are numerous studies on Crisis Intervention Teams (CIT) and CIT programs (Compton et al., 2008; Hails & Borum, 2003; Taheri, 2016), and a cornerstone of these programs is training officers to use Crisis Intervention and De-escalation (CID) techniques (Pelfrey & Young, 2019).⁴¹ Interestingly, while past research has shown that officers perceive an improvement in their effectiveness (or their agencies' effectiveness) when dealing with persons in crisis when the agency adopts a specialized CIT program (Borum et al., 1998), the literature has been less clear about the extent to which CIT programs or CID techniques reduce use of force rates or other measurable outcomes such as officer or subject injury rates (Dayley 2016; Taheri, 2016). In fact, Taheri (2016) points out that behavioural outcomes, like use of force, are not always in the expected direction after CIT implementation.

Interestingly, this study also found a non-significant correlation between the length of initial CID training and use of force rate and a non-significant correlation between the amount of refresher training and use of force rate. Again, these results are counter-intuitive. While I could not locate research specific to CID training, research from other contexts suggests that the time dedicated to training should have an impact on outcomes. For example, Andresen et al. (2008) found that learners who had received seven hours of cardiopulmonary resuscitation (CPR) and automated external defibrillator (AED) training performed better on some tests than learners who

⁴¹ The development of the Crisis Intervention Team model is credited to a partnership between the Memphis Police Department, the Memphis chapter of the Alliance for the Mentally Ill, the University of Memphis, and the University of Tennessee. After the police shooting incident of a mentally ill man in 1987, these groups created a program to provide specialized training to officers to assist them in responding to "mental disturbance" calls (Steadman et al., 2000). Crisis Intervention and De-escalation techniques, those communication skills designed to de-escalate/reduce the tension in a crisis, are taught on their own or as part of a CIT training program.

had only received four or two hours of training. Similarly, Lee et al. (2016) found that learners who had received 180 minutes of CPR training had better quality results than learners who had received less training (40 minutes, 80 minutes, and 120 minutes). With reference to skill retention, research has also shown that skills can fade over time (Ansquer et al., 2019; Arthur et al., 1998; Ginzburg & Dar-EI, 2000), but that retention can be improved with refresher training (Oermann et al., 2011, Wells & Hagman, 1989).

Given these findings, the results of the present study are even more curious, and one might question if CID training is being conducted in the most effective manner. Clearly more research needs to be done in this area, especially given that other results related to CID training were significant (the association between the type and frequency of CID training and use of force). From a policy and training perspective, prudent police managers may want to consider such an examination sooner rather than later. CID training for police officers is mandatory in some Canadian policing jurisdictions (e.g., British Columbia, RCMP jurisdictions).⁴² It is entirely possible that the results of mandated CID training will not meet the expectations of the respective governing bodies and should this occur, answers will be sought from relevant police managers.

Conducted Energy Weapon. The results of the present study indicate there is a non-significant negative association between the percentage of officers trained to use the CEW and the agency's use of force rate. Despite this correlation being non-significant, the negative association is consistent with the work of Lin and Jones (2010) who, in a single agency study, found that the CEW tended to replace other types of force and tended to resolve incidents with

⁴² In Ontario, a portion of basic recruit training is devoted to communication and CID (Dubé, 2016).

fewer forms of force being used. A plausible explanation for this is that the CEW's ability to cause neuro-muscular incapacitation reduces the need for additional interventions or reduces the need for additional officers to apply force when attempting to gain control of a violent subject. While the CEW is delivering electrical current, officers may be able to take control of the subject while the subject is unable to move.⁴³ This may reduce the need for additional force, and is indeed, the preferred outcome. Gaining control while the subject is under current is of primary importance because when the five second cycle is over, the subject's full strength and mobility will return (Braidwood, 2009).

Another possible explanation for the negative association between the percentage of officers trained to use the CEW and use of force rates is that subjects simply become compliant after a single application of the CEW, which again, reduces the need for additional force. In addition to neuro-muscular incapacitation, the CEW causes pain (Dawes & Kroll, 2009); thus, after feeling its effects, some subjects may choose to comply. It is also possible that this association results from the CEW simply acting as a visual deterrent in potentially violent situations. Some officers have reported that the presence of the yellow handle of the CEW seems to have a calming effect during violent or potentially violent situations (Western Australia Police., 2010).

Of note, there was a non-significant association between the percentage of members trained in an agency to use the CEW and the agency's use of force rate, and there was no meaningful association between the length of CEW training or the length of CEW recertification training and use of force rate. This may suggest that the pervasiveness of CEW training, and the

⁴³ After the trigger is pulled, the CEW delivers electrical current for a five second cycle.

time devoted to the CEW in training, neither encourages nor discourages the police to apply force through the use of the CEW. It may also mean that the circumstances surrounding particular incidents are the stronger driving force behind CEW use than the pervasiveness of length of training officers receive.

The supplemental analysis on the CEW revealed a significant association between the length of CEW recertification training and self-reported effectiveness when the device is drawn and displayed to a subject. This is consistent with research on refresher training (Oermann et al., 2011, Wells & Hagman, 1989) and suggests that longer refresher training provides officers the skills necessary to use the CEW as a deterrent in a more effective manner.

Extended Range Impact Weapon. Like findings with the CEW, the present study found a non-significant negative association between the percentage of members trained in an agency to use the ERIW and the agency's use of force rate, again suggesting that ERIW use is driven by situational demands, not by the pervasiveness of training. I also found no statistically significant results when examining the length of initial ERIW training and use of force rate, and the length of ERIW recertification training and use of force rate.

Interestingly, the only other statistically significant correlations in this thesis emerged when examining the length of ERIW training (initial and recertification) and self-reported effectiveness of the ERIW. In both cases, strong, statistically significant positive associations between training and effectiveness were found. This is consistent with research on both initial training and refresher training (Andresen et al., 2008; Lee et al., 2016; Oermann et al., 2011, Wells & Hagman, 1989), and suggests that training allows officers to deploy projectiles in a more effective manner.

Summary. The present study produced some surprising results regarding the relationship between training and use of force. The only significant correlations I found, were when I examined CEW and ERIW training, and self-reported effectiveness of using those two intervention options. While the results reflect positively on training for these two devices, the findings are based on a limited sample and therefore they must be interpreted with caution. Considered collectively, the results in this section of the thesis highlight the need for police agencies and trainers to evaluate the outcomes of their training programs on an ongoing basis.

The Relationship Between Intervention Option and Effectiveness

The current study found that most of the time, intervention options were reported as being effective. This was anticipated. One would expect that if an intervention option were to be ineffective more often than effective, an agency would abandon its use all together. Nonetheless, from a public and police safety perspective, this is a reassuring finding; police officers are being equipped with intervention tools that are effective (from their perspective) in most encounters in which the tools are being deployed. In addition, building upon the work of Baldwin et al. (2017) who, in a single agency study, found that physical control hard was reported as being more effective than OC spray, the baton, and the CEW, the present study determined that physical control hard was reported as being effective more often than all other intervention options.

Notably, the present study also found that there was variability in effectiveness amongst the different intervention options; a pattern of results that is consistent with previous research on this topic (Brandl & Stroshine, 2017; Lin & Jones, 2010, Mesloh et al., 2008), and one which speaks to the situational nature of police use of force encounters. For example, Adang et al. (2006), found that the effectiveness of OC spray can be impacted by a number of factors including, but not limited to, the use of drugs by a suspect, an officer's level of experience, and

the subject's level of violence. If each situation were not unique, we might expect that all intervention options would work all the time.

Each intervention option brings with it several benefits and limitations that must be assessed against the totality of the circumstances in which their use is being considered. For example, a benefit of the CEW is that an effective probe deployment will nearly incapacitate a subject; however, the CEW can only be used on a limited number of suspects at a time.⁴⁴ OC spray on the other hand, offers no physical control; however, it can be deployed on multiple subjects (Brandl & Stroshine, 2017). Officers must evaluate these benefits and limitations during their assessment of the totality of the circumstances which determines their ultimate response. Officers will also need to take into account the safety associated with each intervention option (i.e., the likelihood of the option being associated with subject and officer injury). Unfortunately, despite my intention to look at this issue, the data provided by the participating agencies did not allow safety to be examined in the current study. This must be a priority for future research.

Limitations

There are at least three potential limitations associated with this study. The most obvious limitation concerns the small sample size. While the number of officers represented in the sample is large (representing 55.4% of the population of police officers in Canada), the number of agencies represented in the sample is small (representing approximately 4.42% of the population of police agencies in Canada).⁴⁵ This may reduce the generalizability of the findings

⁴⁴ CEWs with dual shot capabilities exist (Axon, 2020), therefore, it is possible to use the device on two subjects at a time; however, it is left to the discretion of individual agencies to determine if they are going to use the CEW in this way.

⁴⁵ According to Conor et al. (2019), there were approximately 181 police agencies in Canada in 2018.

across Canadian police agencies. A future study would no doubt benefit from the participation of a larger number of police agencies.

A second limitation is that the study relied on self report data on two separate levels; that is, the study relied on self report data from the participating agencies, and the participating agencies were relying on the self report data of their officers. This is not to bring into question the integrity of any of the participating agencies, nor is it intended to bring into question the integrity of their officers. However, an inherent shortcoming of the results stemming from self report data is that they are only as accurate as the data provided. Use of force self reports are subject to the perceptions and accuracy of the submitting officer and it is reasonable to anticipate that there may be some unintentional inaccuracies in the data (e.g., the stress associated with a use of force event is likely to impact an officer's recall of that event; Artwohl 2002; Hope et al., 2016; Lewinski et al., 2016). Given the operational challenges involved, it is difficult to think of alternative ways to capture the sorts of data analyzed in the current thesis. In the future it may be possible, at least in some jurisdictions, to cross-reference use of force reports prepared by officers with other sources of data, such as footage from body worn cameras (Makin et al., 2018; Makin et al., 2020; Willits & Makin, 2018).

A third limitation is that the data provided only allowed for a limited statistical analysis. Although some agencies provided data that allowed for more detailed analyses, focusing on that data would have reduced the overall sample size and thus, the generalizability of the study. A balance had to be struck between statistical heft, and meeting the overarching goal of the study, which was to obtain data from the greatest number of police officers/agencies possible to determine if the use of force by police was generally consistent across Canada, and whether there was an association with a range of variables. Therefore, the analysis focused on aggregate-level

data that allowed for the greatest number of officers/agencies to be represented in the sample. In the future, a larger sample of data should be collected, and more detailed analyses of data from specific agencies should be examined. It may be that this agency-specific analysis reveals relationships that remain hidden when applying fairly simple, aggregate-level analyses.

Conclusion

The findings reported in this thesis, and the existing body of research conducted in the Canadian context, allow us to draw an important inference - the frequency with which the police across Canada use force is consistently rare, and indeed guided by the lawful authorities found in the Criminal Code; if each agency were not being guided by, and adhering to the same *rules*, we would expect significant inconsistency, which we do not find. Moreover, the lack of significant associations between the demographic and training factors examined and use of force suggests that force is applied in any given situation based on the totality of the circumstances in which police are engaged at the time, rather than as a function of any other variable.

That is not to say that agencies should become complacent. For example, despite what these results might indicate, there is still the need to further explore the validity of CID training and techniques; police training comes at public expense and if training that is designed and expected to reduce the overall use of force by police is not associated with that result, agencies should be made aware of this and should be examining how they are delivering this training. However, this study's overall general indication, that the use of force by police is driven by the circumstances of individual occurrences, and not significantly associated with agency or training factors, brings with it a sense of reassurance. Canadian citizens can expect that they are no more likely to be the subject of the use of force by police from one city or region to another, or by one type of officer or another.

Having said that, much work remains. As alluded to earlier, it is impossible to separate the completion of this study from current events, for in terms of policing, these times are unprecedented. The actions of police are being condemned based on what are perceived to be acts motivated by race or bias, rather than an examination of the acts themselves via due process (Collinson, 2020; Nickel, 2020). These condemnations, in the absence of due process, are in turn driving policy discussions on defunding the police (Riebe, 2020). The Commissioner of the RCMP, after two day's hesitation, agreed with the suggestion that systemic racism exists within Canada's national police force (Slaughter, 2020). Moreover, after the peaceful apprehension of an armed intruder at the Prime Minister's residence by police, the leader of one of Canada's major political parties implied that had the intruder not been Caucasian, he would have been shot (Rabson, 2020). The chasm between the public and the police has grown so wide, one wonders how the present study can have a positive impact and perhaps shine a light on the way forward.

Although I am loathe to use the term "both sides," as this draws connotations of an "us vs. them" mentality, and indeed runs counter to the principles of Sir Robert Peel (Peel, 1829) and ignores the paradoxical nature of policing (officers are citizens and are therefore their own clients), I will use the term for simplicity sake. Completing this study has led to some insights into use of force data collection by police at the national level. I offer these insights in the hopes that they may encourage both sides (the public and the police) to come to the table in the spirit of cooperation to make positive change.

First, the literature consistently demonstrates that use of force by police is rare and the present study makes clear that this is the case across Canada. This needs to be acknowledged - in terms of the application of force, it appears the police are good at what they do. The public side

of the table needs to acknowledge that, in Canada, we are policed by professionals who are trained in the appropriate use of force and are accountable for their actions.

Second, the police need to shift their gaze from one which focuses on statistics, to one that focuses on the human element of use of force encounters. Adopting a statistical view, by its very nature, offers a measure of distance and shrouds oneself in impartiality. To be sure, 80 use of force occurrences out of 100,000 police-public encounters is arguably something to be proud of, especially when compared to other countries such as the US; however, this fails to recognize that each of those 80 encounters involves people – members of the public and police officers – that may be significantly harmed by the interaction, both physically and psychologically. Recognizing that each of these encounters will likely impact on human lives can provide motivation to reduce the use of force even further.

Third, the policing industry should start collecting a basic set of data that is standardized for national reporting. This may be challenging, but it can be done (the NUFF itself demonstrates that police experts across Canada can come together and work toward a common goal). The issue is less about the disagreement on what constitutes a use of force, and more the disagreement on what data agencies should be tracking. For example, presently, some agencies are not routinely collecting data on physical control soft techniques, limiting the collection of this data to occurrences where the intervention results in an injury. This practice needs to be re-examined. Tracking of use of force should not be based on outcome (i.e., whether an injury occurs). From an accountability perspective, minor uses of force need to be tracked to the same extent as higher-level occurrences. While higher-level occurrences are not likely to go unnoticed or unreported as they tend to end up in the media, an overly forceful wrist lock will not be tracked unless it results in injury.

Finally, police agencies should be meeting with stakeholders to determine what questions, related to the use of force, stakeholders want answered. This may lead to further data collection efforts (as is currently happening in some jurisdictions around race-based data; Tunney, 2020), or it may lead the stakeholders to reprioritize what data needs to be captured. Officers who are required to fill out additional data fields on use of force reports are not on the road responding to calls for service; therefore, the police and their stakeholders need to determine which data are the priority.

The use of force by police is not choreographed or precise, it can be unsettling and unsightly to civil society; it brings with it risk of injury to the parties involved and the risk of irreparably damaging the relationship between the public and the police. If the police do not exercise this authority responsibly, or if society no longer grants police this authority, the outcomes could be long lasting, and devastating; thus, it is my hope that my recommendations will be implemented, or, at the very least, considered, as following through on these recommendations holds benefits for both the public and the police.

For the public, not only do these recommendations enhance their ability to hold the police accountable, these recommendations will ultimately increase public safety; data on use of force encounters can provide an evidence-base that can then be used to inform improvements in police training. For the police, enhanced data collection, and working with stakeholders to determine what refinements to current data collection need to be made, offers an opportunity to repair and strengthen, the presently damaged relationship between the police and the citizens they serve.

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Appendix A**Data Related Survey Questions**

1. What year will you be providing data from?
2. How many officers does your agency have in total (actual strength)?
3. How many male officers does your agency have in total?
4. How many female officers does your agency have in total?
5. How many non-binary officers does your agency have in total?
6. What is the total population that your agency polices?
7. What is the total geographic area that your agency polices (in sq. km.)?
8. What is the total rural geographic area that your agency polices (in sq. km.)?
9. What is the total urban geographic area that your agency polices (in sq. km.)?
10. What is the average years of service of your officers (force-wide)?
11. Does your agency have a union or association?
12. What is your agency's total number of occurrences/calls for service for the year indicated?
13. What is your agency's crime severity rating?
14. Does your agency have formalized CID training?
15. How many officers have been trained in CID (in total)?
16. What is the length of your agency's initial CID certification/qualification training (in hours)?
17. What is the training delivery type for your agency's initial CID certification/qualification?
18. What is the length of your agency's CID recertification/requalification training (in hours)?
19. What is the frequency of your agency's CID recertification/requalification training?
20. What is the training delivery type of your agency's CID recertification/requalification?
21. Does your agency have CEW training?

22. How many officers have been trained on the CEW (in total)?
23. What is the length of your agency's initial CEW certification/qualification training (in hours)?
24. What is the length of your agency's CEW recertification/requalification training (in hours)?
25. What is the frequency of your agency's CEW recertification/requalification training?
26. Does your agency have ERIW training?
27. How many officers have been trained on the ERIW (in total)?
28. What is the length of your agency's initial ERIW certification/qualification training (in hours)?
29. What is the length of your agency's ERIW recertification/requalification training (in hours)?
30. What is the frequency of your agency's ERIW recertification/requalification training?
31. Are your UoF encounters tracked?
32. What is your agency's method of tracking your UoF encounters?
33. What is your agency's total number of occurrences/calls for service involving UoF?
34. What is your agency's total number of UoF occurrences where the subject was perceived to be suffering a mental health crisis / emotional disturbance?
35. What is your agency's total number of UoF occurrences where the subject was perceived to be under the influence of drugs or alcohol?
36. What is your agency's total number of UoF occurrences where the subject was perceived to be suffering a mental health crisis / emotional disturbance AND where the subject was perceived to be under the influence of drugs or alcohol?
37. What is your agency's total number of UoF occurrences where a subject was perceived or believed to be in possession of weapon?
38. What is your agency's total number of incidents where an officer discharged their firearm at a subject?
39. What is your agency's total number of incidents where an officer discharged their firearm at a subject and the subject was injured (excluding self-inflicted)?

40. What is your agency's total number of incidents where an officer discharged their firearm at a subject and the subject died (excluding self-inflicted)?
41. What is your agency's total number of incidents where an officer discharged their firearm at a subject and the officer was injured?
42. What is your agency's total number of incidents where an officer discharged their firearm at a subject and the officer died?
43. What is your agency's total number of incidents where an officer discharged their firearm at a subject in a vehicle and the subject was injured (excluding self-inflicted)?
44. What is your agency's total number of incidents where an officer discharged their firearm at a subject in a vehicle and the subject died (excluding self-inflicted)?
45. What is your agency's total number of incidents where an officer discharged their firearm at a subject in a vehicle and the officer was injured?
46. What is your agency's total number of incidents where an officer discharged their firearm at a subject in a vehicle and the officer died?
47. What is your agency's total number of UoF occurrences with a single officer?
48. What is your agency's total number of UoF occurrences with two officers present?
49. What is your agency's total number of UoF occurrences with more than two officers present?
50. What is your agency's total number of UoF occurrences with a male subject?
51. What is your agency's total number of UoF occurrences with a female subject?
52. What is your agency's total number of UoF occurrences with a non-binary subject?
53. What is your agency's average age of subject(s) involved in UoF occurrences?
54. Interventions [Physical Control (soft and hard), OC Spray, Baton, CEW (Probe mode, Contact Mode/Drive Stun), ERIW, K-9, Firearm]⁴⁶
 - Number Effective
 - Number Ineffective

⁴⁶ Questions 54 through 64 completed for *Draw and Display* and *Deployed*, where applicable to the intervention type.

- Total
55. Lethal Force Overwatch Present (Total Number) - Yes
 56. Lethal Force Overwatch Present (Total Number) - No
 57. Subject Injury Proximal to This Intervention Type Only (Total Number - Excluding Self-Inflicted) - Yes
 58. Subject Injury Proximal to This Intervention Type Only (Total Number - Excluding Self-Inflicted)- No
 59. Subject Fatality Proximal to This Intervention Type Only (Total Number - Excluding Self-Inflicted) – Yes
 60. Subject Fatality Proximal to This Intervention Type Only (Total Number - Excluding Self-Inflicted) – No
 61. Officer Injury Proximal to This Intervention Type Only (Total Number - Excluding Self-Inflicted) – Yes
 62. Officer Injury Proximal to This Intervention Type Only (Total Number - Excluding Self-Inflicted) – No
 63. Officer Fatality Proximal to This Intervention Type Only (Total Number) - Yes
 64. Officer Fatality Proximal to This Intervention Type Only (Total Number) - No

Appendix B

Descriptive Overview of Training Type by Agency

Table B1

Descriptive Overview of CID Training – Agencies 1 to 6

Variable	Agency					
	1	2	3	4	5	6
CID Training	Yes	Yes	Yes	Yes	Yes	No
Percent officers trained	100	8.43	100	89.47	95	--
Length of training	16	40	8	15	12	--
Modality of training	In-person	In-person	Both	In-person	In-person	--
Recertification training	Yes	--	Yes	Yes	Yes	--
Length of recertification	8	--	4	15	4	--
Frequency of recertification	Triennially	--	Triennially	Annually	Annually	--
Modality of recertification	Online	--	Both	In-person	In-person	--

Note: Length of training and length of recertification training are in hours. Both = both online and in-person.

Table B2*Descriptive Overview of CID Training – Agencies 7 to 13*

Variable	Agency						
	7	8	9	10	11	12	13
CID Training	Yes	No	Yes	No	Yes	Yes	Yes
Percent officers trained	100	--	98.76	--	100	78.20	100
Length of training	4	--	4	--	120	2	--
Modality of training	Online	--	In-person	--	Both	Online	Both
Recertification training	Yes	--	Yes	--	Yes	No	--
Length of recertification	4	--	4	--	24	--	--
Frequency of recertification	Triennially	--	Annually	--	Annually	--	--
Modality of recertification	Online	--	In-person	--	In-person	--	--

Note: Length of training and length of recertification training are in hours. Both = both online and in-person.

Table B3*Descriptive Overview of CEW Training – Agencies 1 to 6*

Variable	Agency					
	1	2	3	4	5	6
CEW Training	Yes	Yes	Yes	Yes	Yes	Yes
Percent officers trained	18.27	4.79	66.67	31.67	95	100
Length of training	20	15	8	20	12	--
Recertification training	Yes	Yes	Yes	Yes	Yes	Yes
Length of recertification	4	7	4	5	4	--
Frequency of recertification	Annually	Annually	Triennially	Annually	Annually	Annually

Note: Length of training and length of recertification training are in hours.

Table B4*Descriptive Overview of CEW training – Agencies 7 to 13*

Variable	Agency						
	7	8	9	10	11	12	13
CEW Training	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Percent officers trained	43.85	94.12	98.76	92.04	70.29	20.99	--
Length of training	7	12	12	8	8	24	--
Recertification training	Yes	Yes	Yes	Yes	Yes	Yes	--
Length of recertification	4	8	4	4	5	5*	--
Frequency of recertification	Annually	Annually	Annually	Annually	Annually	Annually	--

Note: Length of training and length of recertification training are in hours. *Although Agency 12 follows an annual recertification cycle, the training alternates between two modalities on a yearly basis, in-person for eight hours one year, online for two hours the following year and vice versa. The data collection tool did not capture such specific recertification data; therefore, the average of these two recertification lengths was used.

Table B5*Descriptive Overview of ERIW Training – Agencies 1 to 6*

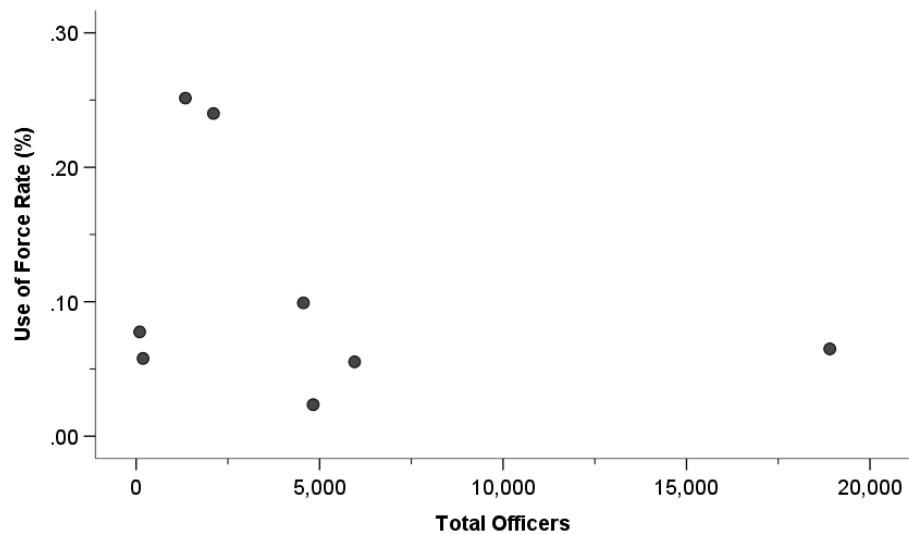
Variable	Agency					
	1	2	3	4	5	6
ERIW Training	Yes	Yes	Yes	Yes	No	Yes
Percent officers trained	9.32	.25	44.44	7.98	--	12.63
Length of training	40	15	8	20	--	4
Recertification training	Yes	Yes	Yes	Yes	--	Yes
Length of recertification	2	7	4	8	--	1
Frequency of recertification	Annually	Annually	Annually	Annually	--	Annually

Note: Length of training and length of recertification training are in hours.

Table B6*Descriptive Overview of ERIW Training – Agencies 7 to 13*

Variable	Agency						
	7	8	9	10	11	12	13
ERIW Training	Yes	No	Yes	Yes	Yes	Yes	Yes
Percent officers trained	17.65	--	--	8.85	.37	--	--
Length of training	24	--	--	16	2	8	--
Recertification training	Yes	--	--	Yes	Yes	Yes	--
Length of recertification	4	--	--	4	2	4	--
Frequency of recertification	Bi-annually	--	--	Annually	Annually	Annually	--

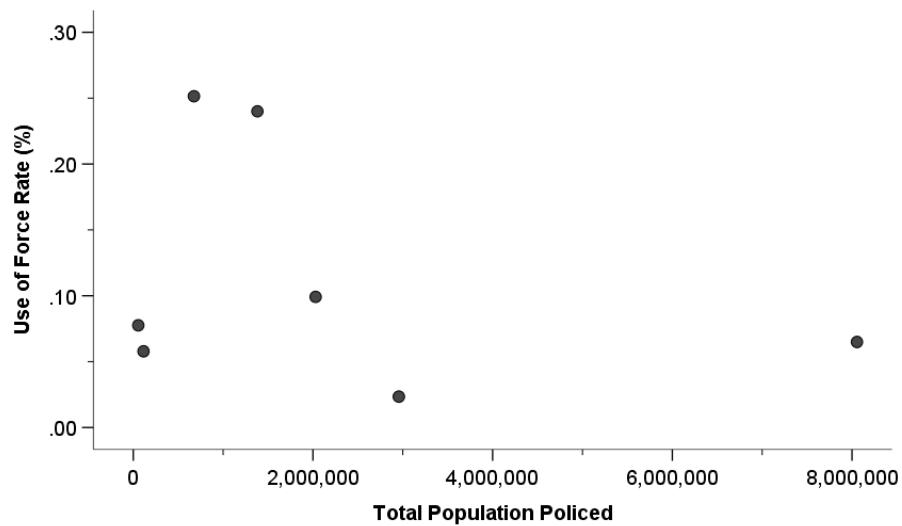
Note: Length of training and length of recertification training are in hours.

Appendix C**Scatterplot of Total Officers by Use of Force Rate – Outlier Included**

Note. Use of force rate, as a percentage of total police occurrences.

Appendix D

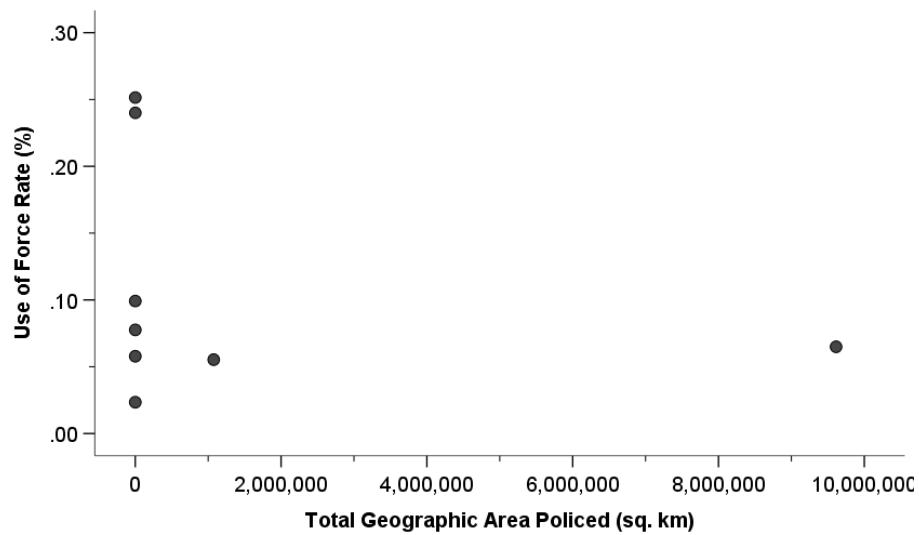
Scatterplot of Total Population Policed by Use of Force Rate – Outlier Included



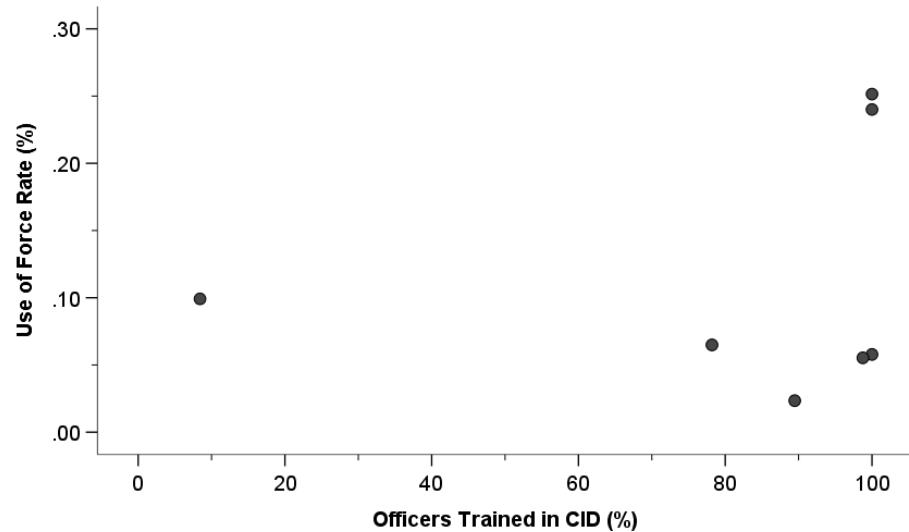
Note. Use of force rates, as a percentage of total police occurrences.

Appendix E

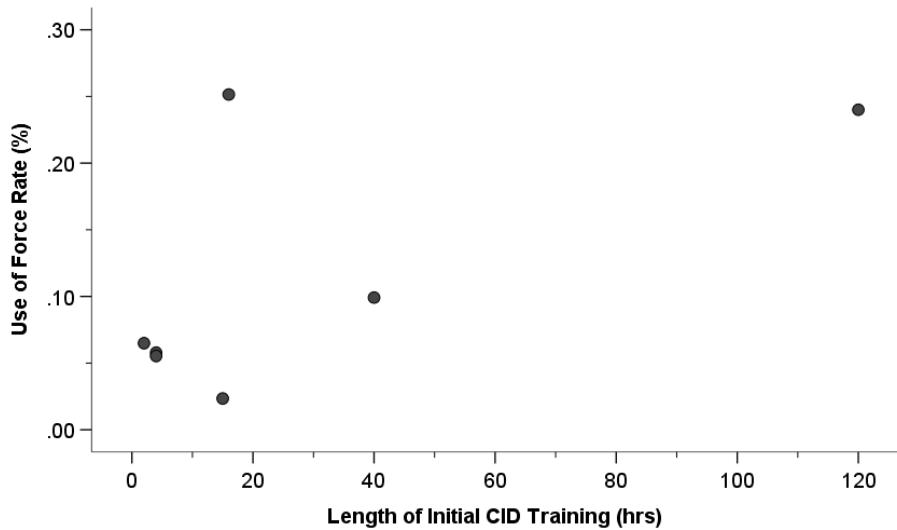
Scatterplot of Total Geographic Area Policed by Use of Force Rate – Outliers Included



Note. Use of force rates, as a percentage of total police occurrences.

Appendix F**Scatterplot of Percentage of Officers Trained in CID by Use of Force Rate – Outlier Included**

Note. Use of force rates, as a percentage of total police occurrences.

Appendix G**Scatterplot of Length of Initial CID Training by Use of Force Rate – Outlier Included**

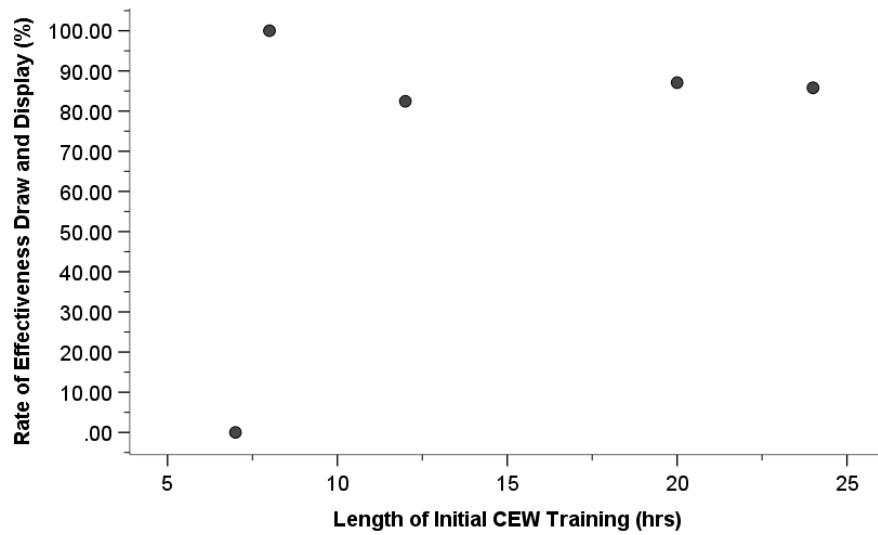
Note. Use of force rates, as a percentage of total police occurrences.

Appendix H

Scatterplots - Length of CEW Training by CEW Effectiveness (all Deployment Types)

Figure H1

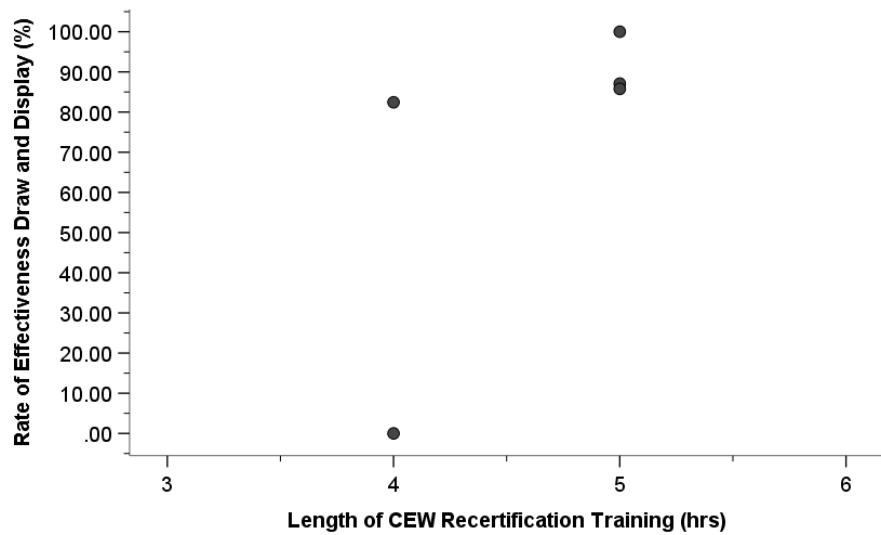
Scatterplot of Length of Initial CEW Training by Draw and Display Rate of Effectiveness



Note. Rate of effectiveness for *draw and display*, as a percentage of total of uses of the CEW in *draw and display*.

Figure H2

Scatterplot of Length of CEW Recertification Training by Draw and Display Rate of Effectiveness

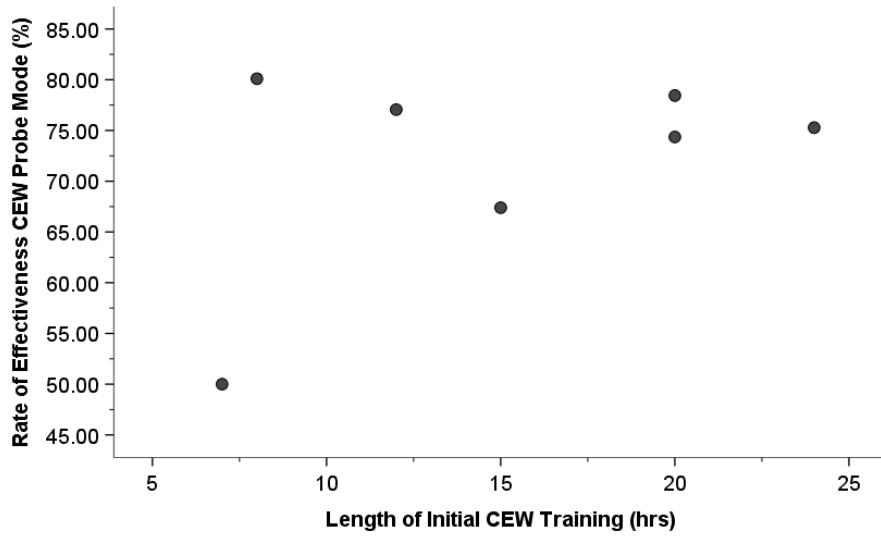


Note. Rate of effectiveness for *draw and display*, as a percentage of total of uses of the CEW in *draw and display*.

Figure H3

Scatterplot of Length of Initial CEW Training by Probe Mode Rate of Effectiveness – Outlier

Included

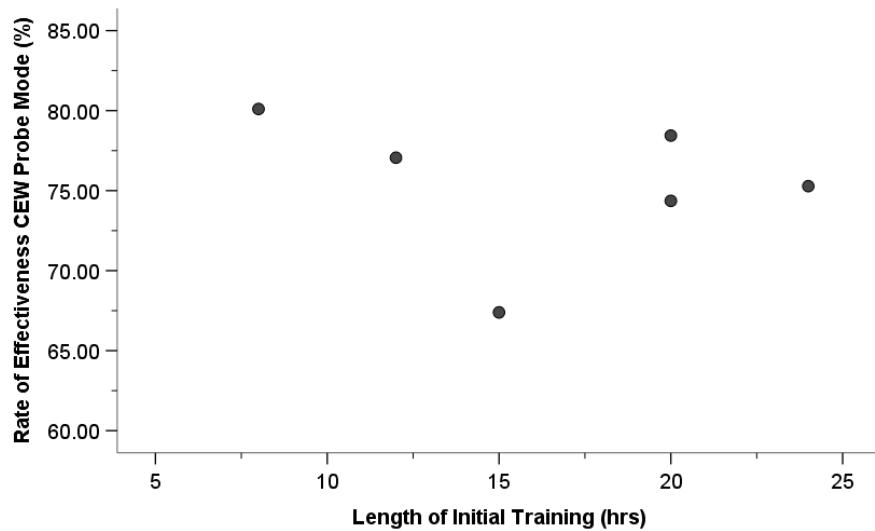


Note. Rate of effectiveness for *probe mode*, as a percentage of total of uses of the CEW in *probe mode*.

Figure H4

Scatterplot of Length of Initial CEW Training by Probe Mode Rate of Effectiveness – Outlier

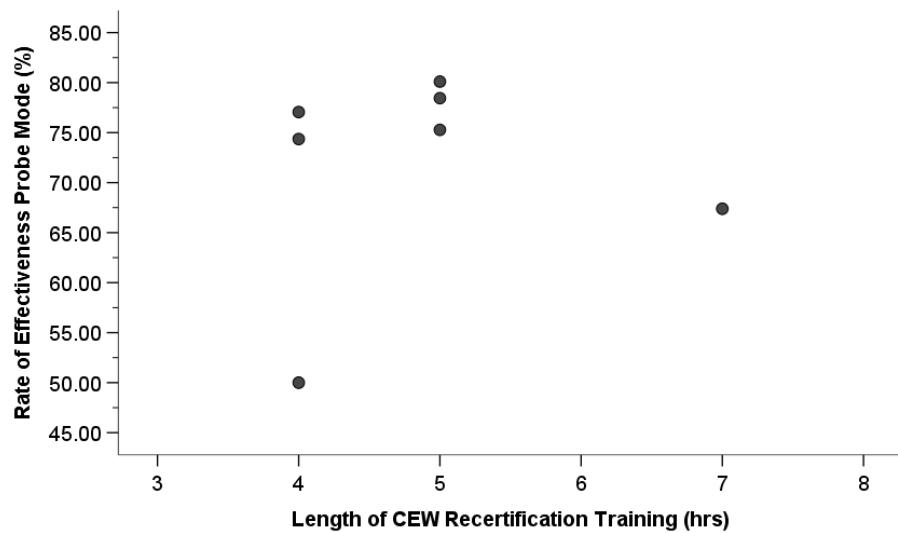
Removed



Note. Rate of effectiveness for *probe mode*, as a percentage of total of uses of the CEW in *probe mode*.

Figure H5

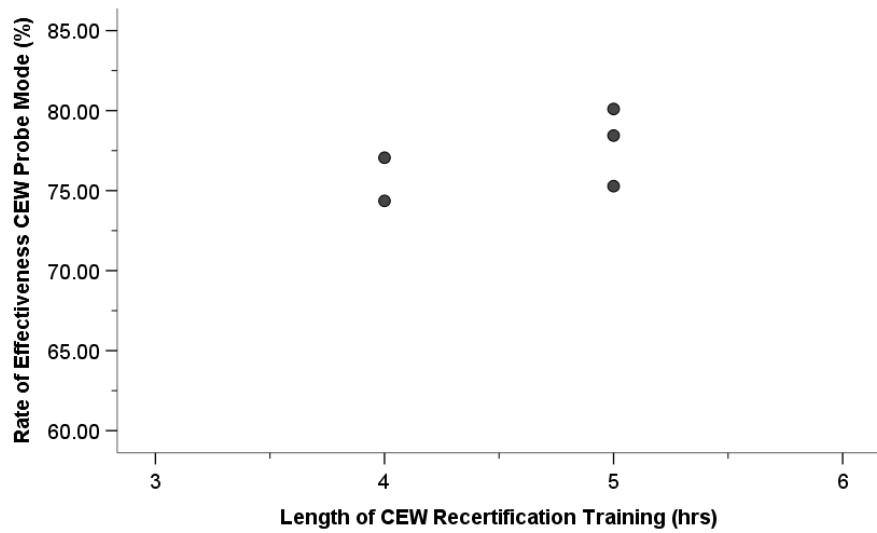
Scatterplot of Length of CEW Recertification Training by Probe Mode Rate of Effectiveness – Outliers Included



Note. Rate of effectiveness for *probe mode*, as a percentage of total of uses of the CEW in *probe mode*.

Figure H6

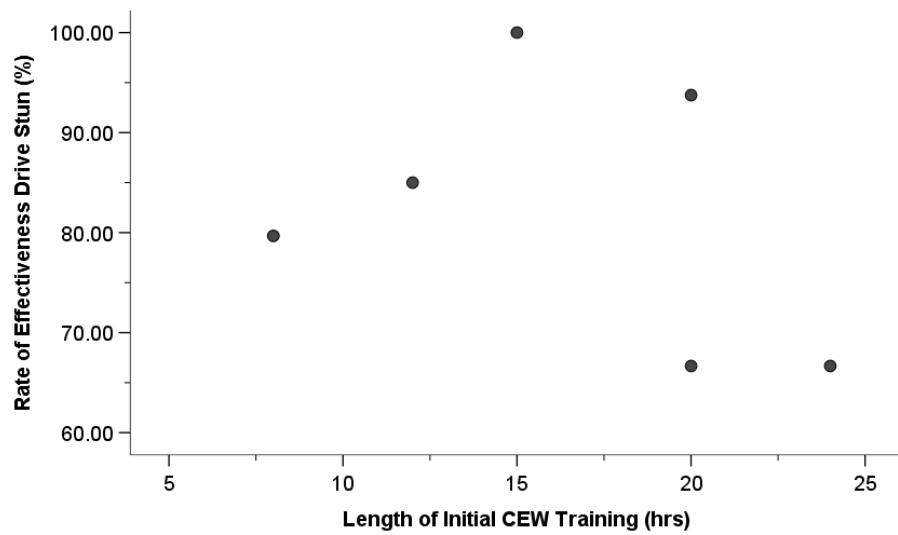
Scatterplot of Length of CEW Recertification Training by Probe Mode Rate of Effectiveness – Outliers Removed



Note. Rate of effectiveness for *probe mode*, as a percentage of total of uses of the CEW in *probe mode*.

Figure H7

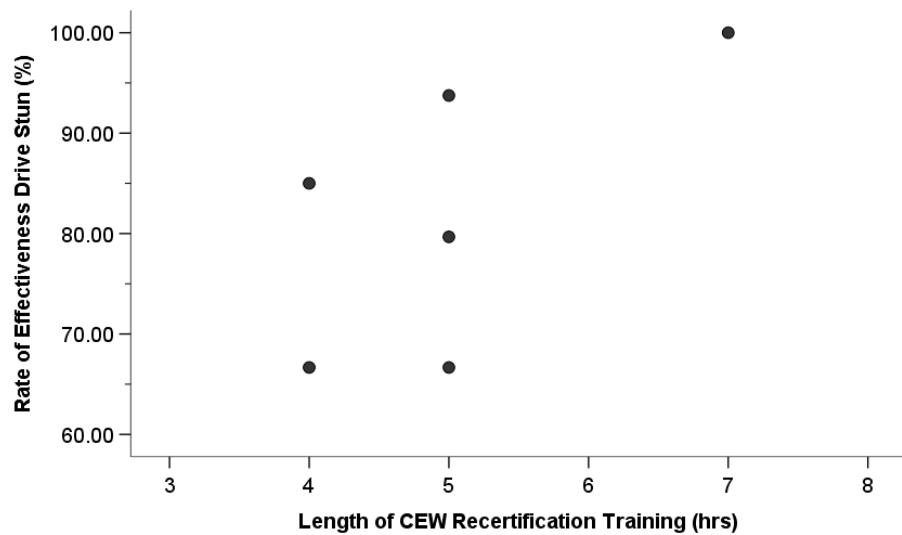
Scatterplot of Length of Initial CEW Training by Drive Stun Rate of Effectiveness



Note. Rate of effectiveness for *drive stun*, as a percentage of total of uses of the CEW in *drive stun*.

Figure H8

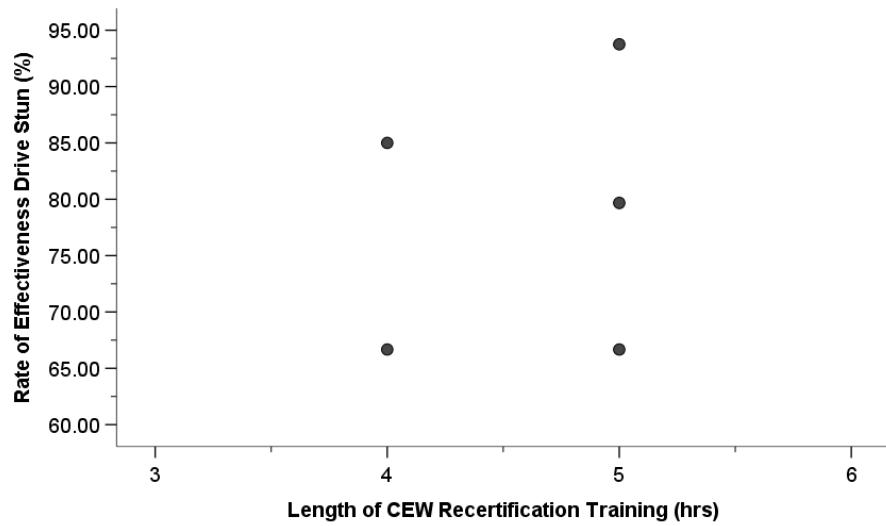
Scatterplot of Length of CEW Recertification Training by Drive Stun Rate of Effectiveness – Outlier Included



Note. Rate of effectiveness for *drive stun*, as a percentage of total of uses of the CEW in *drive stun*.

Figure H9

Scatterplot of Length of CEW Recertification Training by Drive Stun Rate of Effectiveness – Outlier Removed



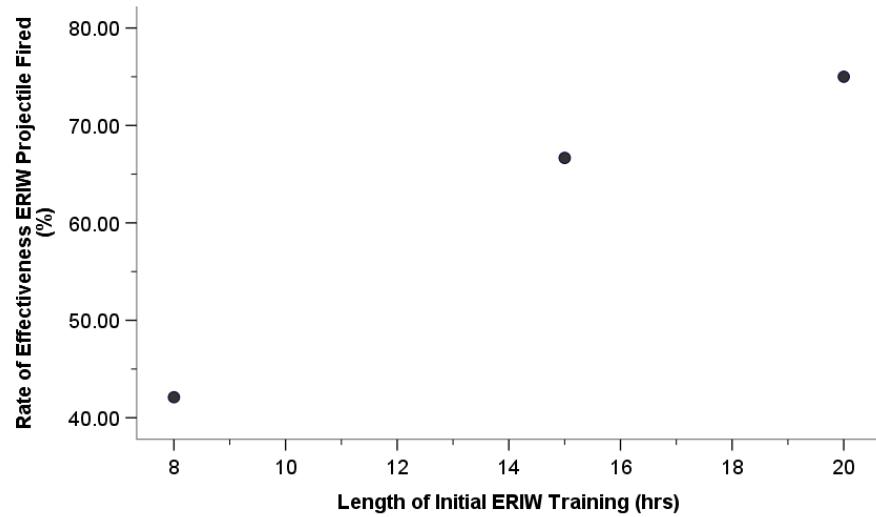
Note. Rate of effectiveness for drive stun, as a percentage of total of uses of the CEW in drive stun.

Appendix I

Scatterplots - Length of ERIW Training by ERIW Effectiveness (all Deployment Types)

Figure I1

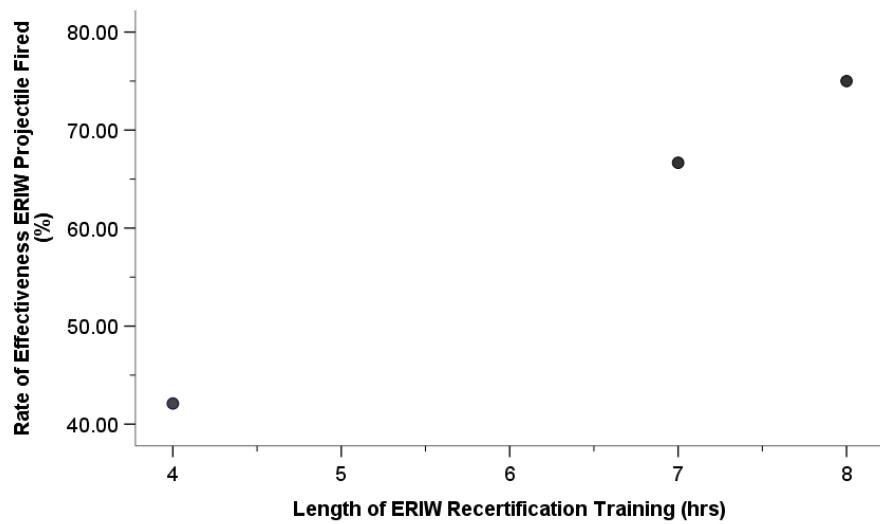
Scatterplot of Length of Initial ERIW Training by Projectile Fired Rate of Effectiveness



Note. Rate of effectiveness for *projectile fired*, as a percentage of total of uses of the ERIW where a projectile was fired at the subject.

Figure I2

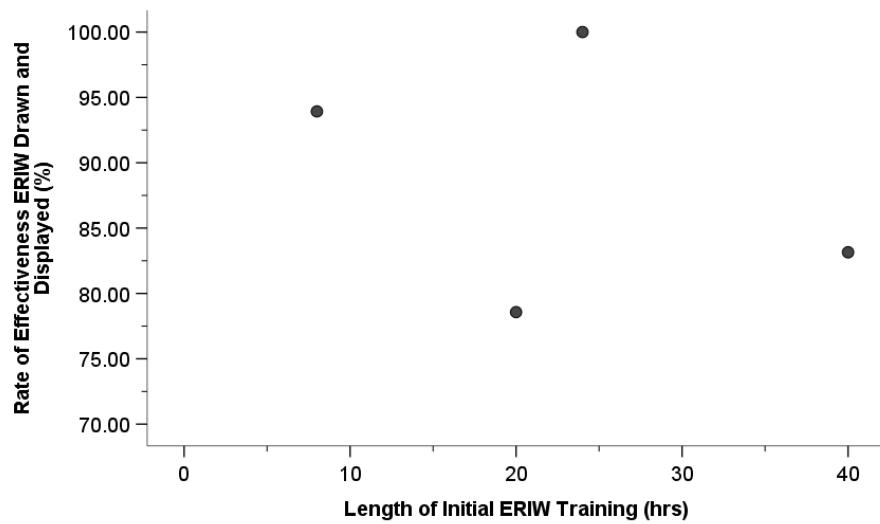
Scatterplot of Length of ERIW Recertification Training by Projectile Fired Rate of Effectiveness



Note. Rate of effectiveness for *projectile fired*, as a percentage of total of uses of the ERIW where a projectile was fired at the subject.

Figure I3

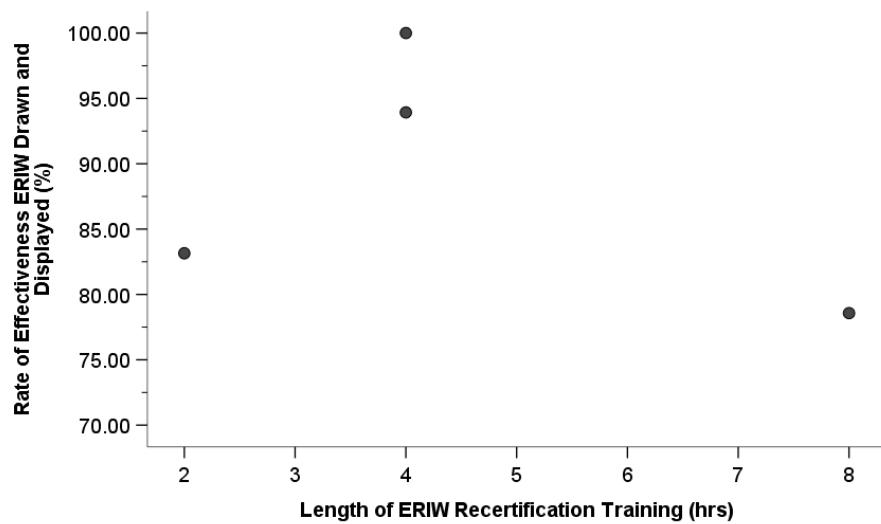
Scatterplot of Length of Initial ERIW Training by Rate of Effectiveness When Drawn and Displayed



Note. Rate of effectiveness for *drawn and displayed*, as a percentage of total of uses of the ERIW where it was reported as being *drawn and displayed*.

Figure I4

Scatterplot of Length of ERIW Recertification Training by Rate of Effectiveness When Drawn and Displayed



Note. Rate of effectiveness for *drawn and displayed*, as a percentage of total uses where the ERIW was *drawn and displayed* to a subject.