EXPOSING POLICE TO PEPPER SPRAY IN TRAINING: INCITING INJURY OR ENHANCING OFFICER SAFETY?

by

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ABSTRACT

Occupational health and safety regulations in British Columbia prohibit the practice of exposing police to pepper spray in training. Previous research indicates that pepper spray exposure does not cause serious health problems; that traditional training methods are inadequate; and that exposing police to pepper spray in training enhances officer safety in the field. This study explored how exposure to pepper spray in training affects officer safety. To accomplish this, patrol and traffic personnel from independent municipal police forces in British Columbia were surveyed and interviewed. Quantitative and qualitative analyses revealed that exposure to pepper spray in training enhances the physical performance, decision making, confidence, and knowledge of police when they are exposed in the field; enhances officer safety during non-sanctioned exposures; and does not cause serious health problems. These findings suggest that police training should feature exposure to a variety of less-lethal weapons.

Keywords: Oleoresin capsicum; Pepper spray; Performance; Police; Safety; Training.

Subject Terms: Learning strategies; Performance standards; Police professionalization; Police training; Safety measures; Training.
DEDICATION

This research is dedicated to my parents,

for supporting me in my educational endeavors.
QUOTATION

"Only through proper training can we provide the necessary safeguards to protect both the lives of our police officers and the citizens of each community that they serve."

ACKNOWLEDGEMENTS

First, I would like to extend my appreciation to the police community for dedicating their time and energy to this research. Without their cooperation and exceptional participation, this study would not have been possible.

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Finally, I would like to thank my Uncle Dale, for telling me to “be tough...eat dirt...get it done...” when the going was tough.
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LIST OF ACRONYMS

GVTAPS: Greater Vancouver Transportation Authority Police Services.

JIBC: Justice Institute of British Columbia.

RCMP: Royal Canadian Mounted Police.

WCBC: Worker’s Compensation Board of British Columbia.
LIST OF DEFINITIONS

Cognitive capacity: A person’s ability to acquire, organize, and apply knowledge (Kraiger, Ford, and Salas, 1993).

Effectiveness of pepper spray: The spray’s ability to ease arrests, reduce aggression in subjects, and render subjects incapacitated (Adang et al., 2006).

Intermediate weapon: Any weapon on the cusp of lethal force.

Large sized department: A department with more than 1000 sworn members.

Less-lethal weapon: A weapon that seldom has lethal effects.

Medium sized department: A department with more than 50 sworn members but less than 1000.

Minor injuries: Cuts, bruises, pain, and discomfort (Brown, 1994).

Motivation to train: A person’s willingness to participate in and desire to continue training (Quinones, 1995).

Safety: Physical performance, decision making ability, confidence, knowledge, and injuries sustained.

Self-efficacy: A person’s self-perceived competence to perform a task (Mathieu, Martineau, and Tannenbaum, 1993).

Serious injuries: Fractures, lacerations, concussions, and trauma (Brown, 1994).

Small sized department: A department with less than 50 sworn members.

Training: The acquisition of job related skills and knowledge (Baldwin and Ford, 1998).

Training attitude: A person’s belief that training is able to improve performance and provide future opportunities (Cannon-Bowers, Salas, Tannenbaum, and Mathieu, 1995).
CHAPTER 1: INTRODUCTION

Background

Pepper spray is a less-lethal tool consisting of an inflammatory resin that causes mucous membranes to inflame and swell. Pepper spray was first issued to officers serving independent municipal police departments in British Columbia in 1991. Training was initially conducted by private instructors who were employed by pepper spray manufacturing companies located in the United States (B.C. Police Commission, 1991). This rudimentary training involved a classroom component and a practical component. In the classroom component, officers were provided with information on the product and were given instructions on deploying it. In the practical component, officers were directly exposed to the spray and then immediately decontaminated. Pepper spray training evolved and became more professional once the spray’s value was fully realized by the police community. Training was then conducted by use of force instructors rather than product manufacturers and involved role-playing scenarios (Brady, 2006). Instructors believe that the practical component of this training enhances officer safety during real exposures. In 1993, however, the Worker’s Compensation Board of British Columbia used pre-existing occupational health and safety regulations to prohibit trainees from being exposed. This decision was intended to promote officer safety in training by

1 Similarly, the North Carolina Department of Crime Control and Public Safety recommended the discontinuation of this training due to health and legal concerns (Stopford, 1996).
preventing injuries resulting from exposure. JIBC trainers adhered to the WCBC decision and no longer expose trainees to pepper spray.

Problem

Pepper spray exposure poses a genuine threat to police safety in the field. In Canada, pepper spray can be legally purchased by anyone. Canisters available to the public are often larger and contain a much higher concentration of capsaicin (the active ingredient in pepper spray) than the canisters police are equipped with. In addition to the threat posed by suspects wielding pepper spray, police often face the threat of cross-contamination. Cross-contamination occurs in the following circumstances: when pepper spray is deployed in a confined area; when it is deployed at a range of less than 2 feet; when it is deployed into the wind; when it is deployed around assisting officers; and when seeking to gain control of a contaminated suspect too quickly (Friend, 1996; Orrick, 2004). Furthermore, police are exposed to pepper spray in the field quite frequently. The Queensland Police Service in Australia found that roughly half of all incidents involving pepper spray resulted in some degree of exposure for police officers. Twenty-one percent of these exposures had a substantial impact on the officer’s performance at the scene (Crime and Misconduct Commission, 1995).

Exposure to pepper spray in the field seriously threatens officer safety, since policing is a high-risk occupation for injury (Castillo and Jenkins, 1994). A study conducted in Britain found that 60 percent of patrol officers had been physically

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2 This is because they are intended for larger mammals, such as bears.
3 In fact, police are twice as likely to encounter violence in the workplace as workers in all other occupations in British Columbia combined and are at greater risk than all other professions to take time off work as a result of violence (Boyd, 1995).
assaulted while on duty. Ten percent of these injuries were considered serious (Brown, 1994). Incidents involving pepper spray are particularly dangerous, since pepper spray is primarily deployed during violent altercations (Edwards et al., 1997). This raises concern for officer safety, since most injuries sustained by police occur during violent situations (Ellis et al., 1993; Brandl, 1996).

The potential for injury is magnified when police are exposed to pepper spray in the field, whether the response is complete debilitation or momentary distraction (Johnston, 2007). Friend (1996), and Edwards et al. (1997), provided a bleak outlook for police who are incapacitated after being exposed to pepper spray in the field, when they reported that a high percentage of officers who are incapacitated or have their guns taken away from them are later shot with their own firearms.\(^4\) Public safety is also threatened when police are exposed to pepper spray in the field, since police are unable to protect the public from harm if they are incapacitated.

**Purpose**

Training can be used to enhance officer safety in the field. When police receive training that properly prepares them for an assault, their risk of injury decreases significantly (Ellis, Choi, and Blaus, 1993). In fact, improved self-defense and officer survival training have contributed to a decrease in homicide and a reduction in errors made by police (Boylen and Little, 1990; Brown and Langan, 2001). These findings are supported by literature on pepper spray exposure in training, which suggests that this

\(^4\) This is why police are justified in using deadly force against assailants wielding pepper spray (Thompham, 2001).
training enhances an officer’s safety when they are exposed to pepper spray in the field (these findings will be discussed in the literature review).

Conversely, without proper training police are inadvertently placed at risk. Injuries that are incurred as a result of inadequate training involve significant costs in the form of medical treatment and work time lost. Kaminski and Martin (2000) analyzed police officer satisfaction with defense and control tactics. They found that 60 percent of police who were assaulted on duty failed to receive training that would have adequately prepared them for the attack that led to their injuries.

The threat of pepper spray exposure in the field warrants the best training available. To determine whether police are in fact receiving the best possible training, the effectiveness of pepper spray training methods will be explored, with the following research questions in mind:

1) How does exposure to pepper spray in training affect an officer’s safety when they are exposed to pepper spray in the field?

2) How does removing exposure from training affect an officer’s safety during non-sanctioned exposures?

3) How do current pepper spray training methods affect an officer’s safety when they are exposed to pepper spray in the field?5

4) How does exposure to pepper spray in training affect an officer’s health?

This study will also serve to fill the gap in research on police training. Furthermore, this study will provide impartial findings in an area where researchers have traditionally had difficulty breaking through barriers.

5 Defensive tactics trainers in British Columbia still conduct simulation exercises. However, they are limited to using an inert spray containing water and a carrier. The effects of pepper spray are learned using traditional classroom methods such as videos and lectures (McEwen and Leahy, 1994).
CHAPTER 2: METHODOLOGY

Population

The population consists of 1,162 police officers who are active in patrol and traffic operations and serve independent municipal police forces in British Columbia. These include: Abbotsford, Central Saanich, Delta, Greater Vancouver Transportation Authority Police Service (GVTAPS), Nelson, Oak Bay, Port Moody, Saanich, Vancouver, Victoria, and West Vancouver.

Police were selected for the study’s population because their extensive experience with pepper spray enables them to form an expert opinion on topics considered relevant to this study. Police are not the only professionals armed with pepper spray. However, the number of patrol and traffic personnel was determined by contacting the human resources division of each independent municipal police force in British Columbia.

Royal Canadian Mounted Police (RCMP) municipal forces were excluded from this study because they train their recruits at the RCMP academy in Regina. On the other hand, independent municipal forces train their recruits at the JIBC police academy in New Westminster. Training related variables such as an academy’s training philosophy, policies, course content, and environment all have an important influence on the quality and effectiveness of training (Quinones, 1995). These variables could affect an officer’s performance in the field and opinions on training. This is important to note, since this study compares the experiences and opinions of officers who were exposed to pepper spray in training with the experiences and opinions of officers who were not. Variation between participants cannot be explained by extraneous variables in this study, since participants were all trained under the same circumstances. If RCMP officers were included in the population then variation between participants could potentially be linked to the presence of extraneous variables, since RCMP officers train under entirely different circumstances. The distinction between these groups would thus make it difficult to conclude whether a relationship really exists between exposure to pepper spray in training and an officer’s safety in the field. This is not to say that RCMP officers could not be studied, but that they should be studied in isolation from officers serving independent municipal forces. The Stl’atl’imx Tribal Police Department, with 10 members, was also excluded from this study due to their unique mandate. This mandate is not shared among other independent municipal police forces in British Columbia and could thus have a distinct impact on an officer’s experiences with pepper spray.

See Appendix C, Figure 1 for an account of each department’s human resources.

Pepper spray is used by officers belonging to Canada Border Services Agency and Correctional Service Canada, as well as by postal workers for protection against animals.
no other profession is able to match police expertise on this subject matter. This is because police encounter a variety of dangerous situations on a daily basis and work in an unfamiliar environment. In contrast, other professionals who are armed with pepper spray are concerned with a specific mandate and work in a secure and controlled environment. As a result, police deploy pepper spray more often and in higher-risk situations when compared to other professionals.

This study specifically sampled police officers who are active in patrol and traffic operations. These officers were selected because they have direct contact with people on a daily basis and they are armed with pepper spray while performing their regular duties. Administrative personnel and officers who are involved in support services such as investigations, community relations, and victim services are seldom armed with pepper spray and are rarely involved in situations where pepper spray is deployed. However, they were allowed to participate in this study because officers belonging to these units have past experience in patrol or traffic operations. Their experiences involving pepper spray are simply less recent than the experiences of officers who are currently active in patrol and traffic activities. Another reason why these officers were permitted to participate is because smaller departments do not have special units. Instead, their personnel serve multiple roles and each member is involved in patrol or traffic activities.  

Similarly, Smith and Petrocelli (2002) only invited patrol and traffic personnel to participate in their study on the effectiveness of force used by police making arrests, since the majority of arrests and use of force encounters involve these officers. In the largest department (Vancouver) and in medium sized departments (such as Delta), officers involved in patrol or traffic operations represent roughly half the number of sworn members in the entire force. In smaller departments (such as Port Moody), 70 to 90 percent of sworn members perform patrol or traffic duties to some extent.
Sample

The sample population consists of 499 police officers serving Abbotsford, Central Saanich, Delta, GVTAPS, Oak Bay, Port Moody, Saanich, Vancouver, Victoria, and West Vancouver. This sample represents roughly 43 percent of police officers who are active in patrol and traffic operations and serve with independent municipal police forces in British Columbia.

The vast majority of these officers are specifically involved in patrol and traffic operations. The number of officers included in this sample who are not specifically involved in patrol or traffic activities represents a very small percentage of the overall sample. It is estimated that less than 5 percent of participants from smaller departments (such as Port Moody) and the largest department (Vancouver) are not involved in patrol or traffic activities, while less than 10 percent of participants from medium sized departments (such as Delta) are not involved in patrol or traffic activities.

The average response rate from each department was 37 percent. When considered as a whole, no department deviated too far from this average in either direction, with the exception of Abbotsford which had a response rate of 66 percent and Nelson which had a response rate of 0. Differences between response rates are likely due to data collection procedures rather than actual differences between departments (this will be discussed in the section on data collection procedures).

This sample is approximately 80 percent male and 20 percent female. A larger proportion of male to female participants does not suggest that an error was made in

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12 See Appendix C, Figure 2 for a distribution of each department's sample size.
13 Departments with less than 50 members were considered small in size.
14 Vancouver was considered the only department that is large in size (with more than 1000 members).
15 Departments with more than 50 members but less than 1000 members were considered medium in size.
16 See Appendix C, Figure 1 for an account of each department's response rate.
sampling, since policing is currently a male dominated profession (despite the best efforts of police recruiters who actively seek to hire females and the implementation of policies that strive for equity and diversity).

The average age of this sample is approximately 36 years. A frequency distribution for age revealed that a greater percentage of officers are between 20 and 40 years of age, while a smaller percentage are between 35 and 60 years of age.\(^{17}\) This is typical of the police profession, which attracts younger recruits, but generally seeks to enlist candidates who are under the age of 40.

The average participant had 9 years of policing experience.\(^{18}\) A frequency distribution for policing experience revealed some variation between participants.\(^{19}\) The vast majority of participants had less than 10 years of policing experience, while some officers had as many as 40 years. This sample reflects the current experience demographic in the police community. Police forces are currently replacing the baby boomer generation (which is retiring en masse) with as many qualified people as they can, resulting in a huge influx of new recruits and thus accounting for the significant number of officers with less than 10 years of policing experience.\(^{20}\)

The ratio of constables to sergeants (or watch commanders) was an even 90 percent to 10 percent. This does not suggest that 10 percent of the sample is not involved in patrol or traffic operations, as sergeants still fulfill these duties to varying degrees

\(^{17}\) See Appendix C, Figure 3 for a distribution of this sample’s age.
\(^{18}\) Some individuals noted previous experience in other law enforcement agencies, such as BC Sheriffs. This was not credited as policing experience, even though they may have had significant experience with pepper spray exposure during that time.
\(^{19}\) See Appendix C, Figure 4 for a distribution of this sample’s policing experience.
\(^{20}\) While attending one briefing in particular, it was revealed that more than half of the officers on duty had less than 3 years of experience.
(albeit not in the same capacity as a constable), depending on the size of the department and the sergeants leadership style.

The characteristics of interview participants roughly resemble those of participants who were sampled using the questionnaire. To begin with, all 12 participants were involved in patrol or traffic operations. Participants were interviewed from Abbotsford, Delta, GVTAPS, New Westminster, Port Moody, and Vancouver. The absence of interviewees from Vancouver Island demonstrates the importance of physically attending the department at shift briefing in order to enhance participation. Finally, the ratio of males to females and constables to sergeants, as well as the average age and experience of interview participants are all consistent with the overall population sample.

Variables

The independent variable is: "whether an officer was exposed to pepper spray in training." This variable was measured as "yes" or "no," with the question: "Have you ever been exposed to pepper spray in a training facility?"

The dependent variable is: "an officer’s safety when they are exposed to pepper spray in the field." This variable is conceptualized in terms of the officer’s physical performance, decision making ability, confidence, and knowledge, which all have an impact on officer safety (this relationship will be explained in the discussion section). This variable is also conceptualized in terms of the officer’s injuries (this relationship is more apparent). Variables used to measure these constructs were conceived from

\[2^1\] In smaller departments, each member is involved in patrol or traffic activities.

\[2^2\] Sergeants are often labeled as either administrative or field supervisors.
literature on defensive tactics training, simulation training, stress inoculation training, and interviews with defensive tactics trainers.23

Physical performance is defined as an officer’s ability to defend, communicate, and maintain control of a situation. Questions 1-5, 8, 9, 29, and 31-36 were used to measure this construct.24 Decision making ability is defined as an officer’s ability to make appropriate decisions. This construct was measured using questions 6, 7, 14, and 15. Confidence is defined as an officer’s willingness to deploy pepper spray and experience its effects. Questions 10 and 11 were used to measure this construct. Knowledge is defined as an officer’s understanding of pepper spray and proper procedures. This construct was measured using questions 12 and 13. Injuries are defined by the seriousness of the injury, as well as by the amount of work that was missed and the degree of medical treatment that was required as a direct result of the injury. Questions 31-33 were used to measure this construct.

Also of importance to this study was an officer’s safety during non-sanctioned exposures (which was measured using questions 26-28); the effectiveness of current training methods (which was measured using questions 19-21); and the health risks involved in exposing trainees (which was measured using questions 23-25).

Demographic variables, including the officer’s age, sex, rank, policing experience, and department25 were controlled to ensure that variation between responses could not be explained by any of these variables. The officer’s sex was considered because their genetic disposition could have an impact on their experiences involving

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23 See Appendix G for transcripts from these interviews.
24 See Appendix B to refer to each question.
25 The questionnaire does not require that participants indicate the municipality they serve. However, questionnaires from each department were kept separate and each participant’s department was recorded during data analysis.
pepper spray. The officer’s age was considered because officers who were not exposed to pepper spray in training are relatively newer to the profession, while officers who were exposed to pepper spray in training are relatively more experienced. In addition, older officers are more likely to be dissatisfied with defensive tactics taught in training than younger officers (Kaminski and Martin, 2000). The officer’s department was considered because smaller departments (such as Port Moody) have less crime than medium sized departments (such as Delta) and certainly less crime than the largest department (Vancouver). The volume of calls and variety of situations each department deals with as a result of this difference could have an impact on an officer’s experiences involving pepper spray. This is important, since the transfer of skills from training to the job is improved when trainees are provided with an opportunity to use skills that were acquired in training in the actual work environment (Baldwin and Ford, 1998). The officer’s rank was considered because sergeants do not participate in patrol and traffic activities in the same capacity as constables and because lower ranking officers are more likely to be dissatisfied with defensive tactics taught in training than higher ranking officers (Kaminski and Martin, 2000). The officer’s policing experience was considered because officers with more policing experience have likely received more training and experienced more incidents involving pepper spray than officers with less policing experience. In addition, Williams (1994) found that officers with ten years of service or less are three times more likely to deploy pepper spray than senior personnel. Finally, the researcher considered the officer’s involvement in defensive tactics training while off duty because their level of training could impact their experiences involving pepper spray.

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26 This can be attributed to the roles senior personnel have, which seldom involve patrol or traffic duties.
spray, as well as and their opinions on pepper spray exposure in training (Cronbach and Snow, 1977).

Personality variables related to the acquisition and retention of training were also controlled. The participant’s self-efficacy, attitude toward training, and motivation to train were measured using questions 16-18. These variables were controlled because trainees acquire and retain skills better when they perceive that they can perform the required tasks, when training is valued, and when they are motivated to learn (Cannon-Bowers, Salas, Tannenbaum, and Mathieu, 1995). These personality variables could be used to explain the dependent variable. It would thus be difficult to make any conclusions about the relationship between the independent variable and dependent variable unless these personality variables were controlled.

It would be impossible to control all of the training related variables that impact the effectiveness of training. Such variables include the academy’s training philosophy, policies, course content, and environment, as well as the instructor’s abilities, and the delivery method of the training. However, these variables have a limited affect on variation between participants, since all officers serving independent municipal forces in British Columbia are trained at the JIBC, where police trainers hold their positions for extensive periods of time.

27 Another variable that impacts the effectiveness of training is a trainee’s cognitive capacity (Warr and Bunce, 1995). This variable was not considered in this study because participants all meet a basic standard in the ability to acquire, organize, and apply knowledge. This standard is tested during the police application process and throughout training. In addition, time elapsed since an officer was exposed to pepper spray in training could affect the dependent variable, as police who were exposed more recently may be more capable of recalling skills and information. This variable was not considered in this study, since research has demonstrated that time has little affect on memory if the event is significant in a person’s life (Flin et al., 1992) and exposure to pepper spray can be classified as a novel event.
Questionnaire

Most studies concerned with the effectiveness of training programs use questionnaires to measure skill transfer (Cannon-Bowers and Salas, 2001). Questionnaires can be completed quickly and do not require the researcher’s presence. This makes them less imposing on a department’s operations than other methods and thereby enhances cooperation from the police community. They are also simple to complete and provide a high degree of anonymity. This makes them more appealing to participants and thereby enhances the response rate. For these reasons, the questionnaire was the primary method of data collection used in this study.²⁸

Kirkpatrick (1959; 1976; 1994) designed a model to evaluate the effectiveness of training programs. This model is the most popular framework used to evaluate training programs (Cannon-Bowers and Salas, 2001: 487). Kirkpatrick’s model is based on the principle that learning is multidimensional—that skill and knowledge acquisition are evident when there are changes in attitudinal, cognitive, motor, and organizational capacities (Kraiger, Ford, and Salas, 1993). This model involves measuring the impact that training has on reaction, learning, behaviour, and results criteria. Reaction criteria measure attitudinal responses; learning criteria measure memory retention; behaviour criteria measure job performance; and results criteria measure the overall functioning of the organization. Kirkpatrick’s model was used to construct a questionnaire that explores the merits of pepper spray exposure in training. This was accomplished by developing reaction, learning, behaviour, and results criteria that measure how exposing police to pepper spray in training affects their safety when they are exposed in the field.

²⁸ See Appendix B for the questionnaire template.
Reaction criteria measured the officer's opinions on pepper spray exposure in training, the effectiveness of current training methods, and training in general. Attitudes are important to measure, since they can predict actual behaviour or performance (Gagne, 1984). Self-report measures that operationalize attitude strength are commonly used to measure reaction criteria (Quinones, 1995). In this study, a seven-point scale was used in order to measure the strength of the officer's opinion. Opinions were measured using the following response categories: "strongly disagree;" "disagree;" "somewhat disagree;" "unsure;" "somewhat agree;" "agree;" and "strongly agree." The inclusion of a response category for officers who had no opinion enhanced the validity of the data by providing officers with an outlet when they were unsure, instead of forcing them to choose an inaccurate response.

Learning criteria measured the officer's knowledge of the effects of pepper spray as well as their knowledge of decontamination procedures. Learning criteria are traditionally measured using written tests that quantify knowledge (Kraiger, Ford, and Salas, 1993). However, police are tested frequently during pepper spray training courses. Therefore, a written test may have been perceived as patronizing and would thus discourage participation. Also, some officers may have felt threatened by having their performance on a written test evaluated (Johnston, 2006). Reaction criteria were therefore used to measure the officer's knowledge in this study.

Behaviour criteria measured how officers perform when they are exposed to pepper spray in the field. Behaviour criteria are traditionally measured using role-playing scenarios that involve an experimental group and a control group (Latham and Saari, 1979). This method was not used in this study because it would entail exposing
participants to pepper spray and Work Safe BC prohibits this act. This method would therefore be illegal and unethical. Participant observation is also commonly used to measure behaviour criteria. This method was not used in this study because police use pepper spray in less than 1 percent of incidents involving the use of force (Alpert and Dunham, 1998) and they rarely use force in the first place. This method would therefore involve investing an unreasonable amount of time. Also, many police agencies restrict civilian access to dangerous calls for safety and liability reasons (Morabito and Doerner, 1997). Another common way of testing behaviour criteria is to construct written scenarios and ask participants to indicate how they would react if they were involved in hypothetical situations (Tracey, Tannenbaum, and Kavanagh, 1995). This method was not used in this study because it would lengthen the time needed to complete the questionnaire considerably. This would reduce the response rate, since police do not respond well to lengthy questionnaires (Johnston, 2006). Furthermore, the researcher only had 5 minutes to administer the questionnaire at shift briefings. As an alternative, behaviour criteria were measured retrospectively. Participants responded to “yes” or “no” questions concerned with their performance in past experiences involving pepper spray exposure.

Results criteria measured the resources and operational capacity of independent municipal police forces in British Columbia. The impact that training has at an organizational level is traditionally understood by accessing an agency’s official records and observing quantitative figures related to the functioning of the organization. Health and safety officers were contacted and asked to provide a statistical summary of injuries sustained, work days missed, and treatment costs resulting from pepper spray exposure.
However, a correlation could not be drawn between the independent variable and the dependent variable using these statistics because they did not reveal whether pepper spray was deployed before the injury occurred. As an alternative, results criteria were measured retrospectively. This method was adopted from Bowling and Gaines (2000), who gathered retrospective data describing injuries sustained by police in order to assess the impact that pepper spray has on injuries. Participants responded to “yes” or “no” questions concerned with injuries that they received in past experiences involving pepper spray exposure. This information can be considered superior to official agency records, since official documents are self-serving and therefore biased. Also, agency records do not reflect injuries that were not reported by police (Alpert and Smith, 1991). In addition, it would be difficult to compare data between departments because agency records are not standardized, some departments keep more detailed accounts than others, and departments often file incidents differently (Brown, 1994).

A pilot test of the questionnaire was conducted on police officers and academics in order to identify potential issues that may have negatively affected the response rate. The pilot test revealed that the original questionnaire required a long time to complete. This posed a serious problem, since officers would only have 5 minutes to complete the questionnaire during shift briefings. This problem was attributed to the existence of too many questions, and too many response options. In order to correct these issues, non-essential questions were eliminated and question length was reduced by limiting repetition among questions. The questionnaire was then simplified by introducing a standard scale for responses. Introducing a scale shortened the completion time, but it

29 For instance, the phrase: “exposing an officer to pepper spray in training...” was not repeated for each question. Instead, this statement was made at the top of the questionnaire along with a note indicating that each statement would begin with this phrase.
also reduced the quality and detail of responses. This problem was mitigated by designating space after each question for written comments.

Validity also proved to be an issue with the original questionnaire. The first issue related to validity was the use of leading statements. Attitudinal measures of the dependent variable were all favourable toward pepper spray exposure in training. This could have led participants to agree with each measure. In order to reduce the influence of a measure’s presumptions on a participant’s response, attitudinal measures that are unfavourable toward pepper spray exposure in training were included in the questionnaire.

Another issue related to the validity of the questionnaire was the framing of statements. Attitudinal measures of the dependent variable were all written in a positive context. This meant that the relationship between a measure and an agreeable response would always be positive, while the relationship between a measure and a disagreeable response would always be negative. A lack of variation in this relationship could have influenced a participant’s response. In order to reduce the influence of a measure’s direction on a participant’s response, some statements were rewritten in a negative context.


30 For instance, the statement: “exposing an officer to pepper spray in training enhances their ability to defend against an assailant” is favourable toward pepper spray exposure in training, since it is described as beneficial.

31 For instance, the statement: “exposing an officer to pepper spray in training encourages them to use pepper spray prematurely” is unfavourable toward pepper spray exposure in training, since it is described as problematic.

32 For instance, the statement: “exposing an officer to pepper spray in training enhances their ability to defend against an assailant” results in a positive relationship when a participant agrees to the statement and a negative relationship when the participant disagrees because of the word “enhances,” which is positive.

33 For instance, the statement: “exposing an officer to pepper spray in training reduces their anxiety over being exposed to pepper spray” results in a negative relationship when a participant agrees to the statement and a positive relationship when the participant disagrees because of the word “reduces,” which is negative.
Interviews

Semi-structured interviews were conducted with officers involved in patrol and traffic operations. Interviews were conducted both in person and over the telephone. The inclusion of interviews enhances the validity and reliability of the study’s findings by providing a triangulation of methods. Data gathered from interviews were compared with data gathered from the questionnaire in order to complement or challenge results. In addition, interviews add a more detailed qualitative component to the study than quantitative figures or comments permit, by enabling the researcher to pick up on subtle non-verbal cues and explore key inferences.

Interview participants first indicated whether they were exposed to pepper spray in training. They were then asked to recall an incident where they were exposed to pepper spray in the field and either an injury occurred or there was potential for an injury to occur. The following questions were then asked:

1) Describe how you reacted when you were exposed to pepper spray during this incident.

2) Describe how you performed after you were exposed to pepper spray during this incident.

These questions seek to explore whether a participant’s safety was breached or threatened and whether they faced real or potential consequences as a direct result of their performance following an exposure to pepper spray in the field.

Defensive tactics trainers were originally part of the sample, but were excluded once it was determined that their opinions are inherently biased. Trainers strongly favour

34 This method was borrowed from Edwards, Granfield, and Onnen (1997), who conducted follow up interviews to validate information collected from use of force reports and to allow officers to provide additional comments, suggestions, and observations regarding specific encounters.
pepper spray exposure in training amid deeply held beliefs that police training should involve dynamic role-playing scenarios and stress inoculation. Although their opinions may be biased, trainers are able to provide a wealth of knowledge and expertise. Trainers gain their knowledge from research and certification in various weapons and tactics. They expand on this expertise from trainees, who share their real life experiences and discuss how certain training methods either helped or hindered their performance in the field. Their qualifications are recognized by the courts and police community. They testify as expert witnesses in cases where force is used and they review incidents and civilian complaints that involve the use of force.

Defensive tactics trainers were asked the following questions:

1) How does being exposed to pepper spray in training affect an officer’s performance and safety when they are exposed to pepper spray in the field?

2) How does removing exposure from training affect an officer’s performance and safety when they are exposed to pepper spray in the field?

These questions reflect the main research question explored in this study. Responses gathered from trainers were used to construct attitudinal measures and formed the basis of the questionnaire. They also provided a theoretical understanding of pepper spray exposure in training.

Ethical Considerations

Research plans for this study were submitted to the researcher’s academic supervisor, as well as the field practice coordinator and the graduate chair of the School
of Criminology at Simon Fraser University. After these plans were approved, a research ethics approval document was submitted to the field practice coordinator and the director of the School of Criminology for approval to collect data. Approval to administer questionnaires and conduct interviews was obtained from staff sergeants and watch commanders belonging to independent municipal police forces in British Columbia.

Participants were informed of their involvement in this study and were advised that their participation was voluntary. They were also informed that their identity will remain anonymous and that data collected for the purpose of this study will remain confidential. Participants were required to sign Form 2 (Informed consent by participants in a research study) from Simon Fraser University's Office of Research Ethics.

Participants were provided with the field practice coordinator's contact information in order to address potential concerns regarding data collection procedures. They were also provided with the researcher's and field supervisor's contact information in order to obtain the results of this study.

Psychological risks to participants were mitigated. Participants may have been traumatized during incidents involving exposure. Requesting that they disclose information related to these experiences may have potentially caused psychological harm in retrospect. To address this, participants were informed of the nature of this research and were provided with the opportunity to discontinue at any time. In addition, data was collected with the assistance of a police officer trained in crisis intervention. If participants appeared distressed during data collection, they would have been advised to discontinue and referred to a qualified psychologist.
Data Collection Procedure

This study benefited from a large sample size of 499 participants and a high response rate of 43 percent, which enhance the study’s power to produce valid and reliable findings. Of the 499 participants who completed the questionnaire, 70 officers or 14 percent of the sample and 6 percent of the population wrote comments in their questionnaire. In addition, 12 officers involved in patrol and traffic operations volunteered to participate in an interview, while 14 defensive tactics trainers from law enforcement academies in British Columbia, Ontario, and Saskatchewan, as well as from independent municipal police departments in British Columbia provided their expert opinion on pepper spray exposure in training. Traditionally, the response rate experienced in police related studies is relatively low. The exceptional response received in this study warrants a detailed explanation so that these methods can be duplicated in future studies and researchers can achieve similar success.

In total, 1,148 questionnaires were disseminated to 1,162 patrol and traffic personnel serving with independent municipal forces in British Columbia. Questionnaires were not distributed to 100 percent of the population because some officers were seconded to special units such as the Integrated Emergency Response Team and the Integrated Homicide Investigation Team, while others were on leave when questionnaires were administered. In order to accomplish this, the researcher first sought cooperation from staff sergeants and watch commanders serving with each department included in this study. These individuals graciously agreed to administer questionnaires on behalf of the researcher and invited the researcher to attend shift briefings. Packages

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35 Police are often reluctant to trust academics with access to information, as they seek to avoid excessive criticism brought on by controversial findings.

36 See Appendix C, Figure 1 for an account of the questionnaire’s dissemination in each department.
were then compiled for each squad involved in patrol and traffic operations. These packages consisted of a letter addressed to the sergeant or watch commander inviting them to participate in the study, enough questionnaires for every officer in the squad to complete, and envelopes addressed to the JIBC for completed questionnaires.

The researcher physically attended shift briefings in order to introduce the study, distribute questionnaires, and invite participants to partake in interviews. The size of the department dictated the number of briefings that were attended. The researcher aimed to address at least 20 percent of patrol and traffic personnel serving each department. This number was easy to obtain from smaller departments in one visit, but larger departments required multiple visits. No more than one shift briefing was attended at smaller departments (such as Port Moody), while no more than two shift briefings were attended at medium sized departments (such as Delta). The researcher attended one shift briefing at each of the four patrol districts in Vancouver, as well as one downtown beat team briefing, one traffic team briefing, and one briefing at the Vancouver jail, for a total of 7 shift briefings at Vancouver detachments.

Officers belonging to squads that were not addressed at briefing were sampled by mailing packages of questionnaires to the sergeant in command of each squad and by leaving packages of questionnaires with watch commanders after briefings were attended. In the case of Nelson and independent municipal departments on Vancouver Island, time, distance, and cost made it more feasible to courier questionnaires to the sergeant in

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37 See Appendix A for the invitation to participate in research letter template.
38 One shift briefing was attended at Abbotsford and West Vancouver, while two shift briefings were attended at Delta, GVTAPS, and New Westminster.
39 These include Central Saanich, Oak Bay, Saanich, and Victoria.
command of each squad. Participants were given approximately one month to mail back their completed questionnaires.40

Interviews were conducted with patrol and traffic personnel at the police department before the start or end of a shift. Officers who work on shifts that were not addressed at briefing were encouraged to participate in a telephone interview by the sergeant in command of their squad. Defensive tactics trainers serving with law enforcement agencies in Ontario, Saskatchewan, and British Columbia were contacted over the telephone and asked to participate in an interview.

**Response Rate**

First and foremost, the response rate obtained in this study was the result of extraordinary cooperation from the police community. In order to establish this level of cooperation, the researcher proposed the study to training officers, administrative personnel, and recruiters at the JIBC during provincial police meetings. In order to validate my position as a researcher on this topic, I discussed my own experiences involving pepper spray exposure. Finally, trust was established with the police community by revealing my occupation as a sworn peace officer.

The large sample size and response rate obtained in this study is largely attributed to the delivery of hardcopy questionnaires. In his study entitled: “Incremental Police Force Options Training Model—Peace Officer Safety Training for the Twenty First Century,” Massine (2006) warns against disseminating questionnaires electronically,

40 Several questionnaires were received from Nelson and Victoria after this deadline, during the data analysis and write up stage of the study. These responses were excluded, but only after it was determined that they would not impact the results of this study. This conclusion was based on the large sample size already obtained and the homogeneity of responses.
since some departments do not have access to the internet. Instead, they have their own internal server, which cannot access external links. Although he still managed to obtain a large enough sample size, this method limited his study by precluding Vancouver (the largest police department in British Columbia) from participating in his study, since officers could not access the link at work and were reluctant to do so at home. This shortcoming prompted the researcher to deliver hardcopy questionnaires to each department.

There were several key advantages behind delivering questionnaires in person. First, the effort required from participants was greatly reduced when hardcopies were delivered directly to them. Participants were removed from the responsibility of arranging time to complete the questionnaire and were able to avoid the trouble of accessing a computer and following a link, or taking their work home with them. Instead, they simply circled their responses and left the completed questionnaires behind for collection.

Second, it allowed the researcher to supervise the delivery and collection of questionnaires. This reduced the likelihood that questionnaires would be discarded, lost, or forgotten and thereby enhanced the completion rate of the questionnaire. Supervision also discouraged participants from skipping certain questions or entire sections of the questionnaire and thereby reduced the number of missing cases. In addition, it allowed the researcher to clarify any confusion participants had regarding instructions or specific questions and thereby enhanced the validity of responses.

Third, it allowed the researcher to introduce the study and encourage participation. Participants were interested in participating after they recognized that the
study was relevant to them and that their opinions would influence the findings. Once officers from one shift were provided with an introduction to the study and given an opportunity to complete the questionnaire, “the word was out,” and interest in the study began to snowball among officers belonging to other squads. In cases where the researcher attended the department and provided an introduction, the overall response rate averaged 47 percent and was as high as 66 percent from Abbotsford, where just one briefing was attended. During individual shift briefings, the response rate was as high as 100 percent from some departments. Conversely, when questionnaires were simply mailed with an invitation to participate in the study, the overall response rate averaged 20 percent and was as low as 0 percent from Nelson.

The researcher determined that the best time to address police officers is before the start of their shift, rather than at the end or during the middle. This is because officers are fresh and eager to participate at the start of their shift and are all together in one room for briefing. Attending a department before shift briefing enables the researcher to administer questionnaires to administrative personnel and officers who are completing the opposite shift (even if participants simply set the questionnaire aside for their next shift), before addressing officers who are starting their shift. Conversely, they are less enthusiastic at the end of a labourious 12 hour shift and they are busy attending calls during the middle of their shift.

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41 The researcher received a number of phone calls from officers who did not receive a questionnaire from their supervisor, but were very keen on participating.
42 These included Abbotsford, Delta, and New Westminster.
43 The importance of timing is apparent when comparing response rates from Abbotsford, Delta, and New Westminster, which were attended before shift briefings, to the response rates from GVTAPS and Port Moody, which were attended at the start of shift briefings.
Another important factor influencing the sample obtained in this study was the assistance of a uniformed police officer. Rick Parent, a sergeant with Delta police and a researcher at the JIBC, has established hundreds of invaluable contacts with police officers as a result of his own research on police related studies.\textsuperscript{44} Rick established cooperation with the police community by writing to staff sergeants and watch commanders. He also provided access to data by accompanying the researcher to each department. Rick vastly improved the quantity and quality of responses gathered from police officers by introducing the study and following up with telephone calls in order to encourage participation. This is because policing is a brotherhood—officers are more apt to trust other police with information and make a greater effort to assist their fellow peers. The importance of having a uniformed officer assist with the delivery of the questionnaire was apparent when this resource was unavailable. When a department was attended alone,\textsuperscript{45} the researcher was greeted with less enthusiasm, staff sergeants and watch commanders were more reluctant to allow the researcher to interact with officers or attend shift briefings, and the response rate was generally lower.

\section*{Data}

Questions with a "yes" or "no" response provided nominal level data. Nominal data were coded dichotomously as 0 and 1 because nominal level data can be treated as interval level data if it is coded as dichotomous. This is beneficial, since nominal variables can only be measured against other nominal variables, which limits the level of

\textsuperscript{44} Refer to "Victim-Precipitated Homicide: Police Use of Deadly Force in British Columbia."

\textsuperscript{45} Port Moody and West Vancouver were attended alone. GVTAPS and New Westminster were attended alone on one occasion.
statistical analysis that can be conducted. However, dichotomous variables can be compared with ordinal variables in more advanced statistical analyses than nominal level data would normally permit.

Questions measuring a participant’s attitude provided ordinal level data. Ordinal data were coded from 1 to 6, with 1 representing “strongly disagree;” 2 as “disagree;” 3 as “somewhat disagree;” 4 as “somewhat agree;” 5 as “agree;” and 6 as “strongly agree.” In the questionnaire, 4 represented “unsure.” However, “unsure” was recoded as missing because it represents the absence of an opinion (rather than a neutral stance). Response categories were then scaled back from 7 to 6. This was done because the statistical difference between “somewhat disagree” and “somewhat agree” would be different than the statistical difference between other responses if the original order was maintained. This would limit the level of statistical analysis, since a bivariate analysis cannot be conducted when the distance between points on a scale are not equal at all points along the scale (Field, 2005: 64).

Data were screened prior to analysis by creating frequency distributions for each attitudinal measure of the dependent variable and for variables measuring the effectiveness of current training methods. These distributions were visually screened prior to analysis in order to identify major outliers that could influence the shape of the distribution and to determine whether they are symmetrical. Frequencies also assisted in identifying missing data, which were analyzed using missing value pattern analysis.

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46 In hindsight, it may seem less troublesome to simply code “unsure” as 7 on the questionnaire. However, this would create issues with participants intending to agree as strongly as possible and assuming a natural correlation between the number and level of agreement.

47 See Appendix C, Figures 5-22 for these frequency distributions.

48 Missing value pattern analysis describes the pattern of missing values by identifying where they are located, how extensive they are, and whether they are randomly missing.
Measures of central tendency were compared to determine whether distributions are symmetrical. Skewness and kurtosis were observed to assist in this determination. Finally, the standard deviation of each measure was observed to determine whether the mean score of each distribution is representative of the data.

**Analysis**

Measures of central tendency were observed for each ordinal measure in order to identify how responses tend to cluster. Frequencies were observed for each ordinal measure in order to identify the percentage of participants who “agreed” or “disagreed” to some extent. Frequencies were also observed for each nominal measure in order to identify the ratio of participants who responded with “yes” or “no.”

Independent sample t-tests were conducted in order to check for variability between attitudinal measures of the dependent variable based on the independent variable.49 Variation between responses could suggest an association between the independent variable and the dependent variable.50

Spearman’s point-biserial correlation analysis was used in order to determine whether there is a relationship between the independent variable and attitudinal measures.

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49 Independent sample t-tests were conducted because officers were either exposed or not exposed to pepper spray in training and so each condition is comprised of different participants (Field, 2005: 296).  
50 Three criteria are necessary to validate an association using t-tests (Field, 2005: 287). First, data must be measured at the interval level. Attitudinal measures used in this study are categorical, but they have a range from 1 to 6. Although they are not measured at the interval level, it is common for ordinal scales with a larger range (at least 1 to 5) to be analyzed at the interval level. Second, data must be normally distributed. Frequency distributions and univariate statistics revealed that attitudinal measures used in this study are not normally distributed. However, these measures do not severely violate the rule of normality—each measure is skewed, but the mean value moderately resembles the mode for each measure, and skewness and kurtosis values rarely exceed 3, which is the value that is considered significantly different from a normal distribution. Finally, data must comprise equal sample sizes in order to ensure that the variance between two samples is homogenous. Since the two sample sizes are not equal (320 officers who were exposed to pepper spray in training compared to 173 officers who were not), equal variance was tested using Levene’s test before observing the results of the t-test.
of the dependent variable and to understand the strength and direction of the relationship when it exists. Partial correlation analysis was used in order to determine whether a relationship exists when controlling for an officer's age, sex, rank, policing experience, department, involvement in defensive tactics training, self-efficacy, attitude toward training, and motivation to train.

Cross-tabulations were used in order to describe the association between the independent variable and behavioural measures of the dependent variable in percentages. Chi-square was used in order to measure the extent of the association between the independent variable and behavioural measures of the dependent variable.

Comments included in the questionnaire were considered noteworthy if they could assist the researcher in analyzing measures of the dependent variable. More generic comments such as "this is a good idea" were left out of the appendix, since they have no explanatory power. Comments from the questionnaire were used to help explain quantitative findings. Responses from interviews with patrol and traffic personnel were considered noteworthy if they described a participant's reaction or performance when they were exposed to pepper spray in the field. Responses were compared between officers who have been exposed to pepper spray in training and officers who have not in order to identify variation that could be used to support or challenge results obtained from the questionnaire.

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51 Spearman's point-biserial correlation analysis was used because it is non-parametric and so it can be used with dichotomous data, ordinal data, and data that is not normally distributed (Field, 2005: 129, 132).
52 Chi-square does not indicate how variables are related or how strong the relationship is (SPSS, 1999: 71).
53 See Appendix E for noteworthy comments.
54 See Appendix F for transcripts from interviews with patrol and traffic personnel.
CHAPTER 3: LITERATURE REVIEW

Pepper Spray

Pepper spray is a less-lethal tool used to protect against physical harm, induce compliance, and acquire control of a subject without the risk of serious injury (Onnen, 1993). This tool is most often used when officer presence, verbal tactics, and empty hand tactics are decidedly ineffective or fail to safely resolve a situation and when the baton, electronic stun device, and firearm are not reasonably necessary to apprehend a suspect or prevent future harm (Adkins, 2003). Police are permitted to use pepper spray in the following situations: when a subject actively resists arrest; when a subject relays their intention to actively resist arrest; when a subject refuses to comply with an officer’s lawful commands, which are essential to the safety of the subject, officer, or public and other means of obtaining compliance are ineffective; when a subject is attacking or about to attack an officer or another individual; and when an officer is attacked or about to be attacked by an animal (Friend, 1996).

Pepper spray is manufactured in canisters containing oleoresin capsicum—an oily, organic, inflammatory resin derived from cayenne peppers and a byproduct of capsaicin (Friend, 1996). Canisters also contain a substance used to carry the spray, such as isopropyl alcohol, water, isobutene, carbon dioxide, nitrogen, or a refrigeration agent. This tool is available in various canister sizes and is deployed in the form of liquid
aerosol or foam (B.C. Police Commission, 1991). The concentration of pepper spray ranges from 1 to 5, but is typically 5 or 5.5 percent (McEwen and Leahy, 1994).

Pepper spray causes the mucous membranes of the eyes, nose, and throat to inflame and swell. Typical symptoms include: involuntary closure of the eyes; paralysis of the larynx; a burning sensation and inflammation on exposed areas of the skin; nasal drainage; constricted airways; shortness of breath; pain in the lungs; coughing; and gagging. Symptoms of pepper spray can be instantaneous, but may take up to a minute to surface. These symptoms are temporary and usually last from 15 to 60 minutes. Acute symptoms include: nausea; impaired thought processes and motor skills; feelings of fear or panic; and unconsciousness. Adverse symptoms have been known to last for hours or days. However, such cases are extremely rare (Friend, 1996; Edwards, Granfield, and Onnen, 1997; Smith and Stopford, 1998).

Health Consequences of Pepper Spray

Following the deaths of a number of suspects who were exposed to pepper spray, research was conducted to determine whether pepper spray is directly related to any fatalities and whether it poses any serious or long-term threat to human health. Granfield, Onnen, and Petty (1994) reviewed 22 in custody deaths involving subjects who were sprayed and concluded that pepper spray did not directly cause any of these deaths. They determined that positional asphyxia and cocaine toxicity were the direct causes of death. In a similar study, Petty (2003) reviewed 63 deaths involving pepper spray

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55 Concentration is determined by the Scoville Heat Unit Index, which rates pepper spray products from five hundred thousand to two million SHU (Jett, 1997).
56 Positional asphyxia involves being placed in a position that causes upper airway obstruction or interferes with respiratory function, such as lying prone with the wrists and ankles bound together behind the back (Bell, Rao, and Wetli, 1992).
exposure. They determined that these fatalities were the direct result of positional asphyxia, stimulant drug intoxication, and occult heart disease.

Pepper spray was dismissed as the leading cause of death in all cases. However, it was listed as a contributing factor in two cases involving acute pre-existing asthma. This tool does not necessarily induce an asthmatic reaction, as Collier and Fuller (1984) as well as Blanc et al. (1991) found no significant decrease in forced expiratory volume in asthmatic subjects who inhaled capsaicin in mild concentrations. Asthma attacks may in fact have been precipitated by factors independent of pepper spray, such as physical exertion or panic, which can be attributed to events leading up to the exposure (CMC, 2005). Therefore, pepper spray cannot be isolated as a contributing factor in any reviewed deaths.

In a controlled experiment, Chan et al. (2000) measured pulmonary function as well as oxygen and carbon dioxide levels following oleoresin capsicum inhalation. They found no evidence that oleoresin capsicum inhalation results in respiratory compromise in subjects with pulmonary abnormalities such as lung disease, asthma, and smoking. In addition, they found no evidence that pepper spray poses a significant risk of respiratory compromise or asphyxiation in either the sitting or restrained position. On the contrary, it was found that pepper spray increases ventilation by reducing carbon dioxide levels. It should be noted that oleoresin capsicum inhalation resulted in elevated blood pressure. However, this may simply reflect the discomfort and pain that follows an exposure.

The Federal Bureau of Investigation exposed officers to various concentrations of oleoresin capsicum in a controlled experiment in order to determine whether it causes undocumented or severe reactions. Subjects were sprayed from 10 to 45 second intervals
in open and closed environments, both directly and indirectly. None of these subjects experienced serious or long-term effects (Onnen, 1993).

Watson, Stremel, and Westdorp (1996) explored the health effects of pepper spray by reviewing police reports that detailed actual incidents involving exposure. They found that less than 10 percent of officers who experienced an exposure required medical attention and that none of these officers experienced any serious or long-term respiratory problems.

Stopford (1996) was concerned with training related injuries in particular. He found that only 5 percent of officers who were exposed to pepper spray in training suffered reactions severe enough to require medical attention. These symptoms were minor and persisted for as long as a week in only 9 of the 6,000 trainees who were exposed. This number is slightly higher than the 1 percent of officers who reported adverse effects after being exposed in training in Adang and Mensink's (2004) study. The most optimistic finding comes from Lawrence (2007), a defensive tactics trainer at the Ontario Police Academy, who has conducted over 10,000 exposures in the course of 14 years. Lawrence indicated that he has witnessed only 1 minor injury. This injury occurred because the subject was within two feet of the canister (which is against protocol) and so their eye was slightly injured from the velocity of the propellant. The officer reported blurred vision for a week.

Further proof that pepper spray exposure poses no serious health problems is evident in the marketed use of capsaicin. Capsaicin is used as a spice in salsa, chili, curries, hot sauces, and as a pharmacologic agent in topical anesthetic and analgesic...

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57 It is interesting to note that pepper spray training has a lower risk of injury than all other components of defensive tactics training. There are far more injuries in training due to punching, kicking, and joint locks.
creams (Smith and Stopford, 1998). Capsaicin has also been used in research on respiratory reflexes and is beginning to emerge as a drug to treat chronic pain (Barnes, 1984).

Pepper spray has led to adverse symptoms such as airway swelling, lung inflammation (Winograd, 1977), and loss of corneal sensitivity for up to one week in some cases (Stopford, 1996). Such cases evoke a great deal of concern, but should be dismissed. Although they may seem serious, these injuries are minor, as they gradually subside and do not result in any long-term health problems. In addition, such reactions involve prolonged or repeat exposure with high dose applications. Such applications are discouraged by policy and so they rarely occur in practice.

Training Literature

There is a gap in research exploring how officers can best acquire and retain defensive skills and tactics. This is characteristic of police training literature, which is seldom theoretically or empirically based (Goldstein, 1980).

There are a number of reasons that account for this. It is commonly believed that police administrators are so overwhelmed with daily tasks that they do not have time to explore new developments in training (Parsons, 1976; Dossey et al., 1997; Redenbach, 1998). A limited police budget (Zacker and Bard, 1973), lack of community concern for the development of training, and fear of criticism, which hinders police from trusting academics with access to information also inhibit training methods from being scientifically tested (Saunders, 1970).
that “police training on the use of force is based largely on anecdote, history, and police lore” (Smith and Petrocelli, 2002: 201).

Research on training in general has made progress recently, with the advent of standard measurement criteria used to evaluate the effectiveness of training programs. However, studies concerned with training effectiveness use these criteria disproportionately. In most studies, researchers evaluate the effectiveness of training programs by measuring the attitudes and opinions of trainees. However, these studies fail to consider whether training improves behavioural or cognitive performance and whether it produces its intended result (Zacker and Bard, 1973; Van Buren and Erskine, 2002). In addition, research that relates training methods to job performance and explores the effect that various training methods have on the acquisition and retention of skills remains limited (Goldstein, 1980). This makes it difficult to rely on past studies to demonstrate the importance of pepper spray exposure in training. While specific training methods remain unexplored by researchers, the validity of broader training methods such as simulation training and stress inoculation training has been demonstrated. The principles behind these training methods comprise the theoretical basis for pepper spray exposure in training.

Simulation Training

Police training is traditionally classroom based. In the classroom, training is delivered using lectures and videos, while learning is measured using written tests that
assess memory retention.\textsuperscript{62} Defensive tactics training has recently evolved into a discipline of exercise physiology and sport psychology as simulation exercises increasingly replace traditional classroom methods. This transformation is evident in research conducted by Hickman (2005), who found that 90 percent of academies currently use reality based scenarios to train recruits on a variety of weapons and defensive tactics. Simulation training involves subjecting trainees to realistic role-playing scenarios, where they are expected to perform job related tasks, exercise problem solving and decision making skills, and experience emotions and behaviours encountered in the work environment (Eagly and Chaiken, 1993; Martin, 1997; Dossey, Sommers, and Uhrig, 1997; Knowles, Holton, and Swanson, 1998; Redenbach, 1998).

Adult learning theory is the basis for simulation training. This theory proposes that experience is the source of learning for adults (Dewey, 1938; Kolb, 1984). This proposition is supported by Anderson (1982), who found that humans “learn by doing” (369) and Helsen and Pauwels (1993), who determined that cognitive knowledge is acquired by physically performing tasks.

An important principle of simulation training is that training exercises should reflect the physical and psychological realities that are present in real life situations. This can only be accomplished by replicating the exact conditions and constraints that trainees are confronted with in the real world (Proteau, 1992; Chamberlain and Coelho, 1993; Starkes and Lindley, 1994; Helsen and Starkes, 1999). Russell et al. (2003) assert that

\textsuperscript{62} Early defensive tactics training was developed without testing its effectiveness and so it was consequently flawed. This training failed to adequately prepare trainees for a variety of reasons. Demonstrations involved pain compliant subjects, occurred in an unrealistic environment, and failed to include material that would allow police to engage in critical thinking or practice decision making. Also, these systems failed to take the limits of human motor performance into consideration, as they did not address physical lag times, attention, and deterioration of motor skills under stress (Martin, 1997).
the more realistic that training is the better an officer will perform in a real life scenario. Specifically, training that is more realistic better enables police to recall information, apply skills, improvise, and solve problems in a variety of situations. These propositions are supported by several studies. Annett (1979), Arthur et al. (1998), Hogan (1978), and Lim and Johnson (2002) explored the relationship between the nature of a training task and learning. They found that trainees who participate in exercises that feature artificial tasks acquire and retain skills less effectively than trainees who participate in exercises that feature natural tasks.

The effectiveness of simulation training is verified by a number of studies. Zacker and Bard (1973) found that role-playing exercises are more effective at improving an officer’s performance in interpersonal conflicts than lectures. Helsen and Starkes (1999) determined that simulation training enhances the breadth of force options used by police to resolve confrontations. Yuille et al. (1994) documented that trainees who participate in role-playing scenarios retain more information than those who merely observe scenarios. Finally, Lonsway, Welch, and Fitzgerald (2001) reported that simulation training is more effective than classroom instruction at enhancing police empathy and improving communication skills during sexual assault investigations.

**Stress Inoculation Training**

Stress is defined as a non-specific physiological response to a stimulant. “Stimulants can be physical, including biological or chemical demands on the body, or

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63 Savery and Duffy (1996) suggested that simulation exercises that more accurately reflect field conditions enhance the trainee’s interest in training and motivation to learn, which improves their performance on the job.
psychological, including the threat of assault or death" (Kavanagh, 2005: 7). When trainees are not prepared to make decisions under stress, they oversimplify information, fail to consider the full range of options available, and ignore long-term consequences (Friedman and Mann, 1993). This is because stress slows thought processes (Idzikowski and Baddeley, 1983), reduces the quality of decisions (Keinan, 1987), and increases performance related errors (Larsen, 2001). Stress can have a serious negative affect on officer safety, as demonstrated in research conducted by Mareth and Brooker (1985), who found that stress reactions were responsible for at least 50 percent of army personnel casualties during war.

Stress inoculation training involves exposing trainees to simulated stressors while they perform a task. Stress inoculation involves the following steps: first, trainees are provided with a description of a stressor that is encountered in the work environment and are advised of its effects; behavioural and cognitive skills training is then provided to assist trainees in coping with stress; finally, skills are applied under conditions that approximate the stress environment (Johnston and Cannon-Bowers, 1996; Driskell and Johnston, 1998; Cannon-Bowers and Salas, 1998).

Stress inoculation training enhances a trainee’s performance when they are subjected to stress. This is because experiencing the physiological and psychological response of a stressor in training reduces a trainee’s feelings of uncertainty and enhances the accuracy of their expectations. This improves the trainee’s confidence and diminishes their anxiety when they are exposed to the stressor on the job. Furthermore, stress inoculation training enables trainees to adapt to stressors by providing them with an

64 Using this definition, it is reasonable to include pepper spray as a stimulant.
65 Specifically, stress encourages incomplete decisions (Glass and Singer, 1973) and discourages flexible decision making (Staw, Sandelands, and Dutton, 1981).
opportunity to adopt coping strategies and practice problem solving skills. This has the effect of moderating stress levels and reducing the intensity of their response to the stressor (Deikis, 1982; Saunders et al., 1996; Driskell and Johnston, 1998).

Research supports the value of stress inoculation training. Hytten, Jensen, and Skauli (1990) found that when trainees are inoculated against stressful stimuli in training, they receive better evaluations at the end of training and require less assistance from instructors. Yuille et al. (1994) determined that stress inoculation training improves the retention of information and skills learned in training.66 Finally, Serfarty, Entin, and Johnston (1998) documented that stress inoculation improves group functioning by enhancing communication, teamwork, and feedback between group members.

**Pepper Spray Training**

Every police department and academy establishes its own pepper spray training curriculum. However, training typically covers the following material: the nature, design, and symptoms of the spray; safe maintenance; policies warranting use; legal issues; defense against cross-contamination; decontamination procedure; medical treatment; and reporting (Friend, 1996; Thompham, 2001). Training is available to both recruits and experienced officers, who receive periodic in-service training courses for pepper spray recertification. Training typically involves a classroom and a practical component. The classroom component consists of at least three hours of initial instruction and involves videos and lectures (Friend, 1996). The practical component entails exposure to pepper spray (Kelly, 2000; Thompham, 2001).

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66 In fact, stress inoculation significantly improves job performance and reduces anxiety in as little as one session (Saunders et al., 1996).
Most police departments and academies include exposure to pepper spray in their training curriculum. However, many agencies conduct this training differently, since there is no consensus on which methods are best. Pepper spray exposure in training can be voluntary or mandatory, direct or indirect, and active or passive. The Rhode Island Department of Corrections, North Carolina Department of Corrections, North Carolina State Highway Patrol, and Federal Bureau of Investigation require that their officers are exposed to pepper spray before they are permitted to carry it (Thompham, 2001; Cohen, 1997; Bowling and Gaines, 2000; Jett, 1997), while the Schenectady County Sheriff’s Department in New York, Edmonton Police Service, Winnipeg Police Department, Ontario Police College, and Royal Canadian Mounted Police Academy provide trainees the option of being sprayed (Thompham, 2001; Hogan, 2006; Williams, 1994; Lawrence, 2007; Tan, 2007).

Direct exposure involves a direct spray to the face. Indirect exposure involves anything other than a direct spray to the face, which could include smelling pepper spray, dabbing it on the face of a trainee, or entering a room that has been contaminated (Friend, 1996). One example of indirect exposure involves placing two sided tape over a trainee’s eye and then applying pepper spray to the tape using a cotton swab (Flosi, 1995). In the Merrimack County Department of Corrections, instructors wipe small amounts of pepper spray over the closed eyes of officers using a cotton swab (Thompham, 2001).

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67 Exposure is often voluntary, since mandatory exposure raises opposition from individual officers and labour organizations (Friend, 1996).
68 In fact, everything on the cusp of lethal force is used in training and all trainees are exposed to these weapons at the RCMP academy in Depot (Tan, 2007).
69 Between 5 and 10 percent of trainees will not subject themselves to an exposure when they are given a choice.
Queensland Police in Australia are sprayed on the forehead. Water is then applied to the forehead to allow the spray to run down into the trainee’s eyes and mouth (CMC, 2005).

Passive exposure simply involves experiencing the effects of pepper spray. Exercises often entail spraying a trainee and then guiding them to a decontamination station. These exercises fail to teach trainees how to adapt to the effects of pepper spray and do not provide them with an opportunity to perform while exposed (Flosi, 1995). Active exposure involves performing one or more physical tasks after being exposed. Training tasks often reflect the tasks police perform in the field, such as making reasonable force decisions, deploying weapons, and physically manipulating or handcuffing a subject (Flosi, 1995). Officers belonging to the Queensland Police and Merrimack County Department of Corrections are exposed and then ordered to defend themselves against an assailant (CMC, 2005; Thompham, 2001). Members of the Ohio Army National Guard’s 323rd Military Police Company are required to complete a five-station circuit course following an exposure, which consists of the following steps: first, unarmed police ward off aggressors wielding padded weapons; this task is then repeated using a foam baton; the next station requires officers to deliver offensive strikes using a foam baton and subsequently gain control of an assailant; trainees finish the exercise by decontaminating themselves (Casteel, 2005).

Benefits of Pepper Spray Exposure in Training

A number of unpublished studies and police reports contend that exposing police to pepper spray in training enhances officer safety during real exposures. Thompham (2001) interviewed defensive tactics trainers employed by various correctional
institutions and documented their experiences with pepper spray exposure in training. He found that when officers are exposed to pepper spray in training they are more capable of retaining their weapons, defending against an assailant, maintaining control of a situation, and calling for help when they are exposed in the field. Officers are also more capable of deciding how much assistance they can provide and how long they can effectively operate when they are exposed (Flosi, 2005). Bingham, Farncombe, and Llego (2006) conducted interviews and administered questionnaires to officers serving independent municipal police forces in British Columbia in order to determine whether exposure benefits trainees. Eighty-three percent of participants indicated that exposure in training is a good idea, citing the following benefits: trainees experience the physical effects of pepper spray in a safe environment; trainees receive instructions that enable them to perform once exposed; and trainees understand how pepper spray affects them personally. Sergeant Hogan (2006) of the Edmonton Police Service’s Officer Safety Unit administered questionnaires to patrol officers to determine whether exposure in training benefits officer safety in the field. Ninety-five percent of participants agreed that exposure to pepper spray in training helped them maintain their composure when they were exposed in the field and felt that this training should continue. Some of the more notable responses include:

Had I not been exposed [to pepper spray] during recruit training, I probably would have panicked and would not have been able to maintain enough composure to effectively work with my partner in handcuffing a suspect without injury.

Had I not experienced [pepper spray] contamination prior to this event, my ability to immobilize the [suspect’s] knife arm, and pry the knife from the suspect’s hand would have been significantly lower. The likelihood of this male stabbing me and my partner would have been tremendously increased.
This training permits police to understand their strengths and limitations when they are exposed to pepper spray (Jett, 1997). Police are taught first hand that the debilitating effects of pepper spray are psychological in nature and that exposed persons are capable of physically performing if they are goal-oriented (Thompham, 2001). Providing police with the opportunity to experience the shortcomings of pepper spray enables them to recognize situations where its effects may be limited and encourages them to deploy it with greater caution. Providing police with the opportunity to witness the success that goal-oriented behaviour has in nullifying the effects of pepper spray encourages them to adopt a similar mentality and thereby enables them to maintain their composure when they are exposed in the field. Exposure to pepper spray in training enhances police confidence in pepper spray ( Friend, 1996; Jett, 1997; Casteel, 2005).

This enhances officer safety in the field by encouraging officers to deploy a tool which reduces the frequency and severity of injuries sustained by police (Kaminski, Edwards, and Johnson, 1999).

Another benefit that arises from this training is that police will gradually condition themselves against the effects of pepper spray and will be able to recover from its effects more quickly during subsequent exposures (Friend, 1996). Hogan (2006) supports this claim by suggesting that the absence of exposure in training severely hampers the performance of officers in the field during their first or second exposure, but not during subsequent exposures. Smith and Stopford (1998) tested this claim in a

Opponents of this training argue that by increasing officer confidence in pepper spray, police may over-rely on it, deploy it too hastily, or use it in inappropriate circumstances (Morabito and Doerner, 1997). This argument is groundless, since experiencing the pain and discomfort of an exposure enhances police empathy for suspects who are sprayed and thereby encourages reasonable decision making, appropriate use, and prompt aftercare (Friend, 1996; ACPOS, 1998; Thompham, 2001; Jett, 1997; Casteel, 2005).
controlled experiment and found that repeat exposure to capsaicin may reduce sensitivity to heat or chemically induced pain.

Finally, exposure to pepper spray in training improves an officer’s ability to articulate their decision making rationale and thereby enhances their report writing skills as well as their credibility in court (Jett, 1997). This is confirmed by Flosi (2005), who reported that officers who responded with deadly force after being exposed to pepper spray during a simulation exercise had a more difficult time articulating reasonable facts when they had not been exposed previously in training (Flosi, 2005).
CHAPTER 4: RESULTS

Missing Data

Behavioural measures of the dependent variable are all missing fewer than 5 percent of their values. Most attitudinal measures of the dependent variable used in this study are missing between 5 and 10 percent of their values. Very few attitudinal measures are missing more than 10 percent of their values. This is not a major problem with a large population sample like the one obtained in this study. This is because a small number of missing cases does not impact the analysis, due to the negligible influence they have on such a large number of cases overall (even if missing cases represent extreme values).

Missing value pattern analysis revealed that only 3 measures had a significant number of cases (more than 5 cases) that were coded as either extremely high (6) or extremely low (1) values. The relatively low number of extreme values in each of these measures means that missing values do not likely skew the results of the analysis. The exceptionally low number of missing cases in each of these measures (less than 8 percent for each measure) means that a large number of extreme cases would not likely have a major impact on the overall findings of this study.

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71 Data could be missing for several reasons. The most likely reason why values are missing is that the question was not applicable to the participant and so it was legitimately skipped. For instance, if they answered “no” to the question: “have you ever voluntarily exposed yourself to pepper spray outside of a training facility?” then they would be forced to skip the next question: “were you supervised by a certified use of force instructor?” which had 83 percent missing cases as a result. Other reasons why values could be missing include: the instructions were misread; the participant failed to recognize that the questionnaire was two sided; and the participant did not want to answer the question.
Normality of Data

A visual observation of frequency distributions identified no major outliers that could influence the shape of the distribution. Visual observation also determined that none of the distributions resemble a normal bell-shaped curve. This observation was reinforced by comparing measures of central tendency and by identifying the skewness and kurtosis of each measure.\(^{72}\)

A distribution is symmetrical if the variable’s mean, median, and mode are equal. The mean is a variable’s average score, the median is its middle score, and the mode is its most frequent score. Attitudinal measures of the dependent variable share similar values among measures of central tendency. Attitudinal measures vary between having a moderate difference (of 1) and having equal scores among measures of central tendency. This comparison demonstrates that distributions are moderately symmetrical.

A distribution is symmetrical if the variable’s skewness and kurtosis values are 0. The skewness value measures the extent that scores gravitate toward one extreme, while the kurtosis value measures the extent that scores cluster around a central point (Field, 2005: 8-9). The skewness values of attitudinal measures vary depending on the direction of the measure’s relationship with the independent variable. Attitudinal measures that are favourable toward pepper spray exposure in training\(^{73}\) have moderate (-0.9 to -1.6) negative skewness values, while attitudinal measures that are unfavourable toward pepper spray exposure in training\(^{74}\) have moderate (1.1 to 1.3) positive skewness values. This observation demonstrates that participants gravitate toward strongly agreeing with

\(^{72}\) See Appendix D, Questions 1-15 and 19-21 for univariate statistics on ordinal data.

\(^{73}\) See Appendix B, Questions 1-13 for statements that are favourable toward pepper spray exposure in training.

\(^{74}\) See Appendix B, Questions 14 and 15 for statements that are unfavourable toward pepper spray exposure in training.
statements that are in favour of pepper spray exposure in training and gravitate toward strongly disagreeing with statements that are not in favour of pepper spray exposure in training. Attitudinal measures of the dependent variable range from low (0.67) to high (3.6) positive kurtosis values. Variables that measure the effectiveness of current training methods vary from having positive to negative skewness and kurtosis values. However, there is little variability between these scores. This observation demonstrates that there is little variability between responses and further demonstrates that distributions are moderately symmetrical.

A variable’s average score accurately represents a distribution if its standard deviation is small when compared to its mean. The standard deviation of each measure is relatively moderate (1.1 to 1.5) when compared to the corresponding mean (5). This suggests that there is moderate variability in attitudes and that the mean score represents attitudinal measures fairly accurately.

**Variable Frequencies**

On average, participants “agreed” with statements that are favourable toward pepper spray exposure in training and “disagreed” with statements that are unfavourable. Frequencies also revealed that the average participant “agreed” that videos and lectures are effective in describing the effects of pepper spray; “disagreed” that using an inert spray in training prepares an officer for when they are exposed to pepper spray in the field; and “agreed” that using intermediate weapons in training enhances an officer’s performance in the field.
Between 85 and 95 percent of participants agreed to some extent with statements that are favourable toward pepper spray exposure in training and disagreed to some extent with statements that are unfavourable. Frequencies also revealed that 54 percent of participants agreed to some extent that videos and lectures are effective in describing the effects of pepper spray; 30 percent agreed to some extent that using an inert spray in training prepares an officer for when they are exposed to pepper spray in the field; and 95 percent agreed to some extent that using intermediate weapons in training enhances an officer’s performance in the field.

Frequencies revealed that of the 499 officers who participated in this study, 320 officers or 65 percent have been exposed to pepper spray in training, while 173 officers or 35 percent have not. Of the 320 officers who were exposed to pepper spray in training, 2 officers indicated that they were seriously injured, 1 officer indicated that they missed work, and 7 officers indicated that they required medical treatment as a result of an exposure in training.

Frequencies also revealed that of the 499 officers who participated in this study, 86 officers or 18 percent participated in a non-sanctioned exposure. Of the 86 officers who participated in a non-sanctioned exposure, 54 officers or 63 percent were supervised by a use of force instructor and 32 officers or 37 percent were not, while 36 officers or 42 percent had access to emergency medical services and 50 officers or 58 percent did not.

Furthermore, frequencies revealed that of the 499 officers who participated in this study, 61 officers or 13 percent were physically assaulted following an exposure to pepper spray in the field. Of the 61 officers who were physically assaulted following an exposure in the field, 2 officers indicated that they sustained a serious injury, 2 officers
indicated that they missed work, and 5 officers indicated that they required medical treatment as a result of the assault.

Finally, none of the 499 officers who participated in this study indicated that they lost control of their weapons following an exposure to pepper spray in the field. However, 14 officers lost control of a suspect and 36 officers were incapacitated following an exposure in the field.

Comparing Means

The mean values of attitudinal measures were compared between officers who were exposed to pepper spray in training and officers who were not. This observation revealed that on average, officers who were exposed in training agreed more strongly with statements that are favourable toward exposure in training than officers who were not. Also, officers who were exposed in training disagreed more strongly with statements that are unfavourable toward exposure in training than officers who were not. In addition, officers who were exposed in training agreed more strongly with the statement: “using an inert spray in training prepares an officer for when they are exposed to pepper spray in the field” than officers who were not. Furthermore, officers who were exposed in training agreed more strongly with the statement: “using intermediate weapons in training enhances an officer’s performance in the field” than officers who were not. Finally, officers who were not exposed in training agreed more strongly with the statement: “videos and lectures are effective in describing the effects of pepper spray” than officers who were.
T-tests revealed that the average difference between the two groups was significant ($p<0.05$) in 8 attitudinal measures. However, these differences are hardly genuine. This is because the effect size was very small in these cases ($0.18<r>0.12$), meaning that differences between the mean values of both groups are mostly due to natural variation.

**Correlation Analysis**

Spearman's point-biserial correlation analysis revealed a significant positive relationship between the independent variable and an officer's response in 5 attitudinal measures ($1.2<r>1.0$, $p<0.05$). Partial correlation analysis revealed a significant positive relationship between the independent variable and an officer's response in 3 of these attitudinal measures ($0.16<r>0.10$, $p<0.05$). However, exposure to pepper spray in training accounts for only 1 percent of the variability in responses, which means that 99 percent of the variability can be explained by extraneous variables.

**Cross-Tabulations**

Nominal data obtained in this study is limited because less than 10 percent of the sample falls into one of two categories in 6 behavioural measures. Nominal data cannot be used to measure an association between variables when less than 10 percent of a sample falls into one or two categories, since there is not enough information to conduct a

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75 See Appendix D, Questions 1-21 for the results of each t-test.
76 See Appendix D, Questions 9, 10, 12, 13, and 21 for the results of each Spearman point-biserial correlation analysis.
77 See Appendix D, Questions 10, 13, and 21 for the results of each partial correlation analysis.
78 See Appendix D, Questions 23-25, 31-36 for the frequencies of these variables.
more advanced statistical analysis. This restricts the level of statistical analysis to univariate functions for these 6 measures. The association between the independent variable and an officer’s involvement in non-sanctioned exposures, as well as the association between the independent variable and physical assault following an exposure were measured using cross-tabulations and chi-square because there was still a significant level of variance among these measures.\textsuperscript{79}

Cross-tabulations revealed that of the 173 officers who were not exposed to pepper spray in training, 17 officers or 10 percent participated in a non-sanctioned exposure. Conversely, 69 officers or 22 percent of the 320 officers who were exposed in training participated in a non-sanctioned exposure.

Cross-tabulations also revealed that of the 18 officers who were not exposed to pepper spray in training and participated in a non-sanctioned exposure, 4 officers or 22 percent were supervised by a use of force instructor. Conversely, 50 officers or 74 percent of the 68 officers who were exposed in training and participated in a non-sanctioned exposure were supervised by a use of force instructor.\textsuperscript{80}

Furthermore, cross-tabulations revealed that of the 18 officers who were not exposed to pepper spray in training and participated in a non-sanctioned exposure, 1 officer or 6 percent had access to emergency medical services. Conversely, 35 officers or 51 percent of the 68 officers who were exposed in training and participated in a non-sanctioned exposure had access to emergency medical services.\textsuperscript{81}

It should be noted that officers who participated in a non-sanctioned exposure represent only 18 percent of the population sample and so they may represent a sub-

\textsuperscript{79} See Appendix D, Questions 26-29 for the frequencies of these variables.
\textsuperscript{80} See Appendix C, Figure 23 for a graph of this cross-tabulation.
\textsuperscript{81} See Appendix C, Figure 24 for a graph of this cross-tabulation.
population within the sample, with unique qualities that account for their behaviour. As such, it cannot be stated with absolute conviction that there is an association between the independent variable and involvement in non-sanctioned exposures.

Finally, cross-tabulations revealed that of the 173 officers who were not exposed to pepper spray in training, 24 officers or 14 percent were physically assaulted following an exposure to pepper spray in the field. Conversely, 37 officers or 12 percent of the 320 officers who were exposed in training were physically assaulted following an exposure in the field.

Chi-Square

Chi-square revealed a significant relationship between the independent variable and participation in a non-sanctioned exposure ($X^2 = 10.41, df(1), p<0.001$), supervision by a use of force instructor during non-sanctioned exposures ($X^2 = 16.03, df(1), p<0.0005$), and access to emergency medical services during non-sanctioned exposures ($X^2 = 12.32, df(1), p<0.0005$). However, none of these relationships are significant when control variables are layered.\(^{82}\) Chi-square also revealed that there is no significant relationship between the independent variable and physical assault following an exposure in the field ($X^2 = 0.51, df(1), p>0.05$).

It should be noted that chi-square is sensitive to sample size. With a large sample size like the one obtained in this study, small differences between variables are likely to be considered significant. Therefore, caution should be used before drawing conclusions about these associations (SPSS, 1999: 71).

\(^{82}\) See Appendix D, Questions 26-29 for the results of each chi-square.
Qualitative Analysis

Interviews with patrol and traffic personnel revealed that pepper spray exposure in training affects an officer's force response. One officer was "sprayed in the face with a large dose of bear spray" by an escaped convict during a road-side stop. The suspect remained at the scene following this assault, which led the officer to believe that the suspect "was waiting for the effects of the spray to kick in so that he could finish [him] off." This officer experienced a "severely incapacitating reaction to pepper spray in training," so he was able to predict that he would soon be "incapacitated and unable to protect [his] gun." This prompted the officer to "use lethal force, and [fire] a couple of rounds into the back of the truck." This force response was necessary to prevent the officer from experiencing death or grievous bodily harm. The importance of exposure in training is evident in this case, as the officer indicated: "had I not been sprayed in training, I wouldn't have known how I was going to react, and so I wouldn't have made the appropriate decision." One officer, who was not exposed to pepper spray in training, was sprayed with an entire can of pepper spray in an alleyway. The officer "saw the shadow of a figure running towards [him]" and "didn't know if it was the guy coming back or another assailant." The officer "immediately put [his] hand on [his] gun, thinking [he] would have to shoot the suspect because he had returned to finish [him] off." The figure "was in fact an off duty fireman who was rushing over to decontaminate [him]." This officer almost responded with a force option that would have unnecessarily led to death or grievous bodily harm because he was unable to recognize that he had been exposed to pepper spray and thus had difficulty maintaining his composure. The importance of exposure in training is evident in this case, as the officer indicated: "had I
been sprayed previous to this incident, I would have been able to fight through the effects and communicate with the fireman and my partner…”

Interview participants who were exposed to pepper spray in training were more cognizant of their situation when they were exposed in the field. This is evident in one officer’s response: “I immediately recognized that I had been exposed.” This enabled the officer to “predict the ensuing reaction, maintain [his] composure and avoid panicking…” In addition, the officer “never stopped fighting.” Conversely, one interview participant who was not exposed in training did not realize that he had been exposed “until [he] succumbed to the effects.” Some participants who were not exposed in training indicated that they were able to “maintain [their] composure…” However, these participants referred to incidents where they experienced a mild cross-contamination, whereas officers who were exposed in training referred to incidents where they were assaulted with large doses of pepper spray.

Interview participants who were exposed to pepper spray in training experienced a mixed level of success when they were exposed in the field. One participant was able to “make the arrest single handedly, decontaminate the suspect, and transport him to jail,” while another participant indicated that he “chased [the suspect] for a block, but lost control of him…” However, he was still able to “radio for assistance and provide a description of the suspect as well as [his] location.”

Interviewees who were exposed to pepper spray in training were able to function so long as they remained motivated and goal-oriented, as one officer indicated: “…the symptoms I was experiencing from the spray were only a secondary thought due to my focus.” However, officers often succumbed to the effects of the spray after achieving
their objective. Interviews revealed that training does not preclude officers from experiencing adverse reactions, as one officer indicated: "I was sprayed point blank in the face with a full can of bear spray... I ended up spending two days in the hospital as a result."
CHAPTER 5: DISCUSSION

Question 1

How does exposure to pepper spray in training affect an officer’s safety when they are exposed to pepper spray in the field?

Physical Performance

The vast majority of participants agreed to some extent that exposing an officer to pepper spray in training enhances their ability to defend against an assailant, retain their weapons, control a suspect, communicate with fellow officers, and call for assistance when they are exposed in the field. The vast majority of participants also agreed to some extent that exposing an officer in training enables them to adapt to the effects of pepper spray and conditions their reaction to its effects. Opinions often translate into actual behaviour or performance. These findings therefore present substantial implications for officer safety.

Officers who are better at defending against an assailant, retaining their weapons, and controlling a suspect when they are exposed to pepper spray in the field will incur injuries less frequently and will sustain less serious injuries. Officers who are better at calling for assistance when they are exposed in the field will receive back-up and emergency medical services in a timely manner and will thereby sustain fewer and less serious injuries. Officers who are better at communicating with fellow officers when
they are exposed in the field are less likely to confuse assisting officers for assailants. This enhances officer safety by reducing the likelihood that assisting officers will be harmed by an exposed officer. It also improves coordination among officers and thereby promotes successful arrests with less potential for injury. Officers who are able to adapt to the effects of pepper spray and condition their reaction to its effects are less likely to panic or become incapacitated. This enhances the likelihood that they will be able to defend against an assailant, retain their weapons, control a suspect, call for assistance, and communicate with fellow officers when they are exposed in the field.

In the questionnaire, few participants indicated that they were physically assaulted, lost control of their weapon, lost control of a suspect, or became incapacitated following an exposure to pepper spray in the field. It seems unreasonable with a population of 499 patrol and traffic personnel (including 173 officers who experienced their very first exposure in the field) that no officers lost control of their weapon, less than 5 percent lost control of a suspect, and less than 10 percent were incapacitated following an exposure in the field—especially when one considers the prevalence of exposure in the field and the inherent dangers that police face on a daily basis. Average responses to attitudinal measures further challenge the validity of responses to behavioural measures. Most participants agreed to some extent that exposure to pepper spray in training enhances an officer’s ability to defend against an assailant, retain their weapons, control a suspect, enables them to adapt, and conditions their reaction when they are exposed in the field. Opinions are often formed from real life experiences and so it is likely that a much higher percentage of officers actually experienced an assault, lost control of their weapon, lost control of a suspect, and became incapacitated when they
were exposed in the field. The disparity between attitudinal and behavioural responses can be attributed to a number of reasons. Requesting that a participant disclose information related to personal experiences is vastly different from requesting that they disclose their opinion on relevant topics. Officers may have felt comfortable providing their opinion on abstract statements, but reluctant to provide information related to actual experiences because of the invasive nature of the questions, or because they were threatened by the notion of having their performance evaluated and criticized. Also, some officers may have behaved inappropriately during past experiences involving pepper spray. These officers may have been concerned that disclosing such information would result in reprimand if the information was leaked (despite the researcher’s insistence that their identity would remain anonymous and data would be kept confidential). Finally, officers may have misunderstood the question and provided an inaccurate response based on their experience.\textsuperscript{83} Therefore, caution should be used before relying on behavioural data to draw conclusions about the dangers that police face when they are exposed to pepper spray in the field.

Participant interviews provided rich content for this area of discussion. Officers who were exposed to pepper spray in training are more capable of choosing an appropriate force response. One officer, whom was exposed in training, responded with lethal force when he was threatened with death or grievous bodily harm following an exposure in the field. The officer attributed this response to his training. This suggests that exposure in training discourages police from responding with an insufficient level of force in potentially deadly encounters, by permitting trainees to identify whether they

\textsuperscript{83} For instance, one participant indicated that they have never lost control of a suspect after being exposed to pepper spray in the field, but this was only because "there were other members there to assist." Although the suspect was arrested, the officer in question did in fact lose control.
have a severe reaction to pepper spray beforehand. Another officer, whom was not exposed in training, was disoriented and unable to communicate following an exposure in the field. This officer almost responded with an inappropriate level of force as a result of his condition. This suggests that removing exposure from training promotes excessive force. The safety of assisting officers and members of the public is threatened in addition to the safety of suspects, if police are disoriented and unable to differentiate among these individuals.

Interviews revealed that officers experience adverse reactions to pepper spray regardless of their training. This finding actually promotes the legitimacy of pepper spray exposure in training, since it demonstrates that police are still able to function to some extent, despite experiencing acute exposures that eventually incapacitate them completely. Therefore, this finding should highlight the success of this training rather than identify it as limited or ineffective. Nevertheless, police should be cautious in assuming that this training has an unimpeded impact on physical performance.

Comments from the questionnaire provided additional insight into these findings. Some participants suggested that training has a diminished impact on an officer’s physical abilities if they are exposed to a large enough dose or concentration. Similarly, interviews revealed that police can still experience adverse reactions to pepper spray and are unable to function if they are not motivated or goal-oriented, despite their training. This suggests that exposure in training improves an officer’s psychological and physiological response to the spray, but it does not negate its effects. It also reveals the importance of providing trainees with a task when they are exposed. Simply exposing an officer to pepper spray so that they can experience its effects is not enough—trainees
must be provided with an opportunity to perform a task while exposed in order to learn the importance of remaining motivated. Furthermore, comments suggest that physical performance is only improved if exposure is combined with training in defensive tactics. This reinforces the suggestion that training tasks should reflect job related tasks. With respect to adaptation and conditioning, one officer noted that “one exposure does not condition an individual.” This suggests that officers should be exposed multiple times in training and each time they recertify.

Physical performance is not entirely dependent on training. Some officers commented that physical performance is largely influenced by the environment, situation, officer, and suspect involved. Interviews provided more insight into this, as some participants who were exposed to pepper spray in training experienced a mixed level of success when they were exposed in the field, while some officers who were not exposed in training successfully performed their duties following an exposure in the field (albeit these officers experienced a minor cross-contamination). This suggests that there are a variety of factors that influence an officer’s physical performance. However, the importance of training should not be overlooked, since officers who were exposed in training were consistently able to perform following an exposure in the field (albeit at different levels), even after they were exposed to high doses and concentrations. Conversely, officers who were not exposed in training were able to perform occasionally following an exposure in the field, but only after experiencing a mild cross-contamination. Nevertheless, police should be cautious in assuming that training has a predictable affect on physical performance in all circumstances.
Decision Making Ability

The vast majority of participants agreed to some extent that exposing an officer to pepper spray in training discourages them from using the spray when its effects may be limited, or when they are likely to expose themselves or fellow officers. Also, the vast majority of participants disagreed that this training encourages police to over-rely on pepper spray or use it prematurely.

Pepper spray is less effective on extremely agitated, motivated, mentally ill, and intoxicated persons (Truncale and Messina, 1994; Nowicki, 1995; Friend, 1996; Edwards et al., 1997). Officers who are exposed to pepper spray in training are unlikely to use it when its effects may be limited, since “being sprayed allows you to realize its limitations.” Once these limitations are recognized, “pepper spray is demystified as a miracle weapon…” This enhances officer safety, since it discourages police from using pepper spray when a different force response is necessary in order to avoid harm. This is reflected in one officer’s comment: “it teaches you that you shouldn’t bring pepper spray to a knife fight.” Exposure in training also encourages police to escalate their force response after deploying pepper spray if necessary, as one officer commented: “it makes you aware that you should always have a back up plan—you shouldn’t deploy it, and then be left guessing what to do next.”

Officers who are exposed to pepper spray in training are unlikely to expose themselves or fellow officers, since “[they] will think about using the spray a bit more before deploying it.” Reducing the incidence of cross-contamination enhances officer safety, since it reduces the likelihood that police will become incapacitated or
momentarily distracted during hostile situations and thereby reduces the potential for injury.

Some researchers speculate that police may be more likely to rely on pepper spray and less likely to resort to verbal dialogue when they are faced with dangerous situations, once they realize the spray’s effectiveness in training (Lumb and Friday, 1997). This myth was dispelled in this study, as one officer commented: “not when they realize the limitations it has.”

Removing exposure from training promotes irrational decision making. Participant interviews revealed that one officer who was not exposed to pepper spray in training made a regretful decision to “track [his partner] down in [his] patrol car, even though [he] was disoriented, confused, and in shock from being sprayed.” This officer noted that “had [he] been sprayed previous to this incident...[he] wouldn’t have operated a vehicle immediately after being exposed.”

Knowledge

The vast majority of participants agreed to some extent that exposing an officer to pepper spray in training improves their ability to learn and retain pepper spray decontamination procedures as well as their knowledge of its physical and psychological effects.

Officers who are better at learning and retaining pepper spray decontamination procedures are more likely to adhere to safe standards, as one officer commented: “it encouraged me to follow proper procedure...” This enhances officer safety by deterring police from missing a critical step during the decontamination process, which would have
the effect of aggravating an officer’s symptoms following an acute exposure. Participant interviews revealed that removing exposure from training reduces an officer’s ability to learn and retain proper decontamination procedures, as one officer who drove a vehicle after being exposed to pepper spray indicated: “I thought that the decontamination provided by the fireman was sufficient—I didn’t know that the water would only give me temporary relief.” The officer also reported that: “had [he] been sprayed previous to this incident...[he] would have known how much time was needed to properly decontaminate, that you need to decontaminate your hair and head in addition to your eyes.”

Officers who have more knowledge of the physical and psychological effects of pepper spray are better at recognizing that they have been exposed. This enables police to maintain their composure and stave off panic when they are exposed to pepper spray in the field and thereby reduces the likelihood that they will make an unsafe or inappropriate decision. It also enables them to prepare for the ensuing reaction and plan for an appropriate response.84 Officers who are not familiar with the spray's effects are likely to panic when they are exposed for the first time (CMC, 2005) and would thus be too distraught to defend themselves, fellow officers, or bystanders against an assailant (Thompham, 2001). Furthermore, officers who have more knowledge of the effects of pepper spray are dissuaded from deploying too much of it and from deploying it too closely, since they are more likely to adhere to safe procedures. This enhances officer safety by reducing the potential for injury when other officers are present.

Those who oppose pepper spray exposure in training argue that it is unnecessary to be shot with a firearm in order to understand one’s reaction to bullets and so it is

84 For instance, to radio for assistance, tactically withdraw, or respond with lethal force if necessary.
unnecessary to expose police to pepper spray in order to understand one's reaction to its effects. This argument is fruitless, since persons who are exposed to pepper spray are capable of functioning if they are sufficiently motivated and goal-oriented, while persons who are shot with a firearm are unlikely to continue functioning at all (Thompham, 2001). One defensive tactics trainer encapsulated his opinion on this argument in the following statement:

Being exposed to pepper spray is the most significant thing you can make someone struggle through—outside of being shot...this is the only thing you can do—you can't shoot trainees, and you can't baton them without equipment...pepper spray is the only thing you can do 100 percent and not hurt anyone.

Confidence

The vast majority of participants agreed to some extent that exposing an officer to pepper spray in training enhances their confidence in the effectiveness of pepper spray and reduces their anxiety linked to exposure.

Officers who are more confident in the effectiveness of pepper spray are more likely to utilize it in the field. Also, “knowing that pepper spray won’t kill them reduces an officer’s anxiety over being exposed.” Officers who are less anxious over being exposed to pepper spray are less apprehensive to deploy it in the field. These findings present major implications for officer safety, since research has found that the number of assaults against police was reduced by 15 percent following the implementation of pepper spray (Kaminski, Edwards, and Johnson, 1999), while the number of injuries sustained by police was reduced by 25 percent (Lumb and Friday, 1997). Further to this, even when injuries are sustained during incidents involving pepper spray, they are often minor and
typically involve bruises and abrasions. These injuries are generally less severe than injuries sustained during incidents involving physical restraints, batons, and firearms (Meyer, 1992; Friend, 1996; Morabito and Doerner, 1997). This is demonstrated in research conducted by Hepburn, Griffin, and Petrocelli (1997), who found that only 5 percent of officers were injured in altercations involving pepper spray, while 33 percent of officers were injured when additional tactics were used.

Removing exposure from training could have a negative impact on an officer's confidence. Frisby (1994) documented a slow diffusion of pepper spray use among patrol and traffic personnel following its introduction. Researchers attributed this to unrealistic training, which did not provide police with enough confidence to use the spray (Morabito and Doerner, 1997). Furthermore, cross-contamination is the primary reason why police are reluctant to use pepper spray (Edwards et al., 1997). This is reflected in a statement made by one officer surveyed in Scotland: "cross-contamination means we may be less able to defend ourselves" (Association of Chief Police Officers in Scotland, 1998: 21). This is detrimental to officer safety, as Clarke (2002) found that officers who are less confident using pepper spray are less likely to deploy it in the appropriate context.

Some researchers warn that police are at risk for injury if they are over-confident in the effectiveness of pepper spray and fail to take safety precautions. One officer reinforced this concern: "based on the effect it had on me, I am probably over-confident

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85 The first five months following the introduction of pepper spray involved 12 applications, but the three subsequent months involved 11, 15, and 11 applications.

86 When pepper spray was first made available, product manufacturers exaggerated its effectiveness in order to enhance sales (Brady, 2006). Also, many studies boast a high effectiveness rating. Police originally assumed that the concept "effective" meant that pepper spray totally incapacitated a subject, when it actually meant that it assisted police in making an arrest (Morabito and Doerner, 1997), or reduced a subject's level of aggression (Adang et al., 2006).
in its effectiveness.” This suggests that officers who experience adverse reactions when they are exposed in training may become over-confident in the spray’s effectiveness. Officers who are over-confident in the spray’s effectiveness may come to over-rely on it. This presents a problem, since officer safety is threatened if police over-rely on pepper spray in situations where its effects may be limited. Conversely, it is possible that officers who experience mild reactions when they are exposed in training may become less confident in the spray’s effectiveness. This also presents a problem, since officers who are not confident in the spray’s effectiveness may be apprehensive to deploy it and may come to rely on more harmful tools.

**Question 2**

How does removing exposure from training affect an officer’s safety during non-sanctioned exposures?

Some officers who want the experience, confidence, and skills gained from being exposed to pepper spray in training are participating in non-sanctioned exposures. This is evident in one officer’s comment: “I volunteered to be sprayed because I needed to know how I would handle the effects of pepper spray…I didn’t want to be in a position of the ‘unknown’ in an unsafe environment.” Officers who are exposed to pepper spray in training are more likely to be supervised by a use of force instructor and have access to emergency medical services when participating in non-sanctioned exposures, than officers who are not exposed in training.\(^{87}\) This suggests that exposure in training

\(^{87}\) It should be noted that chi-square with layered variables revealed a strong relationship between a participant’s level of training, sex, and rank, and the dependent variable, in addition to the independent variable. Therefore, readers should be cautious in attributing the independent variable entirely to the credibility and safety of non-sanctioned exposures.
enhances the credibility and safety of non-sanctioned exposures. This is explained in the following statement made by a defensive tactics trainer:

There is no credible benefit in exposing police to pepper spray if they are not monitored by defensive tactics trainers who are able to teach them how to mentally prepare for an exposure, or psychologically adapt to the effects of pepper spray and it is unlikely that they will consider vital use of force tactics such as weapons retention, escalation of force, and follow up control options on their own. Also, police are more likely to be injured when participating in non-sanctioned exposures, since they do not have access to proper decontamination facilities and do not practice safe decontamination procedures (Brady, 2006).

Another problem with non-sanctioned exposures is that they do not take place in the context of a team environment. Team training involves being aware of team members at all times, directing their activities with clear instructions, encouraging them to cooperate, providing them with feedback on their performance, and adapting to their actions (U.S. Coast Guard, 1998). Training that fosters team building is more effective than training centered on individual development. This is because peer and supervisor support encourages the acquisition and retention of skills taught in training. In addition, team training is beneficial to officer safety, since police often deploy pepper spray when other officers are present and when their safety depends on the coordinated actions of team members.

Question 3

How do current pepper spray training methods affect an officer’s safety when they are exposed to pepper spray in the field?

Participants were split between those who agreed to some extent and those who disagreed to some extent that videos and lectures are effective in describing the effects of
pepper spray. Police seem to think that videos and lectures have some value as training delivery methods, but are inadequate alone and require the integration of other methods. This is reiterated in one officer's comment: “a good method, but not effective when compared to being sprayed.” This finding reflects the research consensus on traditional training methods and has major implications for officer safety. Research has determined that both knowledge and skills acquired using traditional training methods are often abandoned by officers in field conditions (Redenbach, 1998). This is because videos and lectures are designed to disseminate information to groups and so they fail to improve individual decision making (Zacker and Bard, 1973). Also, when information is disseminated in a classroom setting, it is learned in a passive context and so it is only understood in an abstract sense. This is problematic, since police have difficulty translating information learned in a passive context to an active environment where they are required to perform physical tasks (Russell et al. 2003). Furthermore, classroom methods enhance the potential for injury when police are faced with dangerous situations, since they do not require physical practice (Zacker and Bard, 1973).

A large majority of participants disagreed to some extent that using an inert spray in training prepares an officer for when they are exposed to pepper spray in the field. Police find some merit in using an inert spray in training, but only perceive it as valuable in building basic skill sets, as one officer indicated: “inert spray helps develop skills necessary to train with and properly deploy pepper spray, but exposure to the real stuff allows them to understand what to expect, to fight through it, and to realize the limitations it may have on suspects.”
The vast majority of participants agreed that using intermediate weapons in training enhances an officer's performance in the field. This suggests that exposure in training should be permitted for a variety of intermediate weapons, such as the Taser®, Shock Knife®, CS gas, and bean bag cartridges in addition to pepper spray.

Police perceptions of current pepper spray training methods impact officer safety in two ways. First, when training methods are devalued, trainees are not motivated to learn and are less capable of acquiring and retaining the skills that are taught in training (Cannon-Bowers et al., 1995). Second, when trainees are dissatisfied with training methods, they lack self-confidence when applying skills learned in training and are thereby dissuaded from using them in a job setting (Clarke, 2002).

Current pepper spray training in British Columbia does not resemble the training conducted by law enforcement agencies in other regions because it relies on classroom methods, while most training programs involve exposure to pepper spray (Friend, 1996). Current training in British Columbia also fails to recognize advances made in research, which has recently explored the acquisition and retention of skills learned in training. In addition, current training fails to keep pace with modern training programs in general, which have been progressing for a considerable period of time and typically include realistic simulation exercises and stress inoculation.

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88 Intermediate weapons are defined as any weapon on the cusp of lethal.
Question 4

How does exposure to pepper spray in training affect an officer’s health?

Very few participants indicated that they were seriously injured,89 missed work, or required medical treatment as a direct result of an exposure to pepper spray in training. The number of participants who actually sustained serious injuries, missed work, or required medical treatment is presumably even smaller than reported, since participants often exaggerated their claims. Some officers who indicated that they sustained serious injuries as a result of their exposure provided comments that merely describe adverse reactions, as one officer reported: “I experienced the regular symptoms for about an hour before I collected myself,” or minor injuries,90 as another officer commented: “my vision was blurry for a week after I was sprayed at too close a distance.” These officers either misread the question, or were of the opinion that “any injury at work is significant.” Officers who indicated that they required medical treatment as a result of their exposure listed “regular decontamination from emergency health services” as medical treatment. If officers were severely injured, they would require special treatment from physicians, optometrists, dermatologists, and physiotherapists. Finally, officers who commented that they missed work as a result of this training did not indicate any long-term leave. They simply commented that “[they] missed training for the rest of the day.”

These findings reflect the research consensus on the health consequences of pepper spray exposure and refute any claims that exposure to pepper spray in training causes serious injuries. However, these findings do reveal the threat of eye damage when

89 Serious injuries consist of fractures, lacerations, concussions, and trauma (Brown, 1994).
90 Minor injuries consist of cuts, bruises, pain, and discomfort (Brown, 1994).
exposing trainees at a close range. This problem can be mitigated by issuing goggles to trainees; spraying the propellant through a screen; spraying trainees on the forehead; dabbing trainees with cotton swabs containing pepper spray; having trainees walk into a contaminated room; or having trainees control a contaminated subject.

This training method is often criticized, since trainees react with pain and discomfort. However, “the advantages gained from being exposed in training far outweigh the temporary discomfort involved” (Thompham, 2001: 15). It is far better to experience the effects of pepper spray in a safe and controlled environment, under the supervision of a use of force instructor and with access to emergency medical services, then to experience it for the first time during a hostile encounter in the field. Furthermore, some pain and physical discomfort should be expected in defensive tactics training. For instance, pain compliance is necessary when demonstrating empty hand techniques such as the steel wrist lock, so that the officer applying the technique can differentiate between proper and improper technique (Johnston, 2006).

Some labour boards may still oppose pepper spray exposure in training, based on the trivial costs incurred by a few minor injuries. However, by doing so they are in fact incurring more substantial costs by inciting more frequent and more serious injuries in the field. The number of injuries police suffer in the field is far greater than the number of injuries they sustain in training. Brandl (1996) explored police injuries resulting from accidents and assaults and determined that injuries sustained in training account for 4 percent of injuries sustained by police, while injuries sustained during patrol, custody, investigative, and traffic related duties account for the remaining 96 percent. Also, injuries sustained in the field are more severe than injuries sustained in training. A study
conducted by Brown (1994) determined that injuries sustained in the field result in a great deal of cost in the form of time taken off work. He found that half of the officers who were assaulted took sick leave as a result of their injuries. Forty percent of these officers returned to duty within seven days of the injury, while 5 percent returned after 21 days.

Scope of Findings

A moderate majority of participants were exposed to pepper spray in training, while a moderate minority were not. During the planning stage of this study, the researcher predicted that it would be difficult to obtain a sample of officers who have not been exposed in training that was large enough to conduct an accurate statistical analysis. This means that more officers have not been exposed to pepper spray in training than originally presumed by police trainers and administrators. This finding magnifies the research problem and stresses an immediate response. The importance of a rapid solution is exemplified by the finding that a significant number of participants were assaulted, sustained serious injuries, missed work, and required medical treatment after being exposed in the field.

It was determined that there is no significant variation between the opinions of officers who were exposed to pepper spray in training and the opinions of officers who were not. This finding not only indicates that there is no association between the independent variable and an officer's attitude toward exposure in training—it demonstrates the perceived value of this training. This training has true merit if officers who have never experienced it are able to recognize its worth. It also demonstrates that police desire this training, as one officer commented: “as a new recruit, it was removed
from training. I believe, strongly, that it should be brought back.” Even participants who “strongly disagreed” with measures that are favourable toward exposure in training recognized its importance to some degree. This is evident in one officer’s comment:

I don’t agree with spraying an officer in the face in order to experience pepper spray. It should be sprayed in the air to familiarize the officer of the smell, and the officer should put some pepper spray in the mouth or face area to realize the level of pain it gives, but spraying the face and eyes is not necessary.

Potential Implications

These findings present a number of potential implications. This study may persuade Work Safe BC and labour boards in other jurisdictions to sanction pepper spray exposure in training. This may open “Pandora’s Box” and the impact training curriculum for a variety of less-lethal weapons. For instance, trainees could be exposed to the Taser® when learning tactics for conducted energy weapons, the Shock Knife® when learning tactics for edged weapons, CS gas when learning tactics for riot situations, or bean bag cartridges when learning tactics for lethal force situations. This could potentially increase the effectiveness of police training for a variety of weapons and defensive tactics and thereby enhance officer safety in a broad range of situations.

These findings may impact training programs in other professions as well. Training could evolve to become more practical and realistic, while traditional methods could be phased out completely. As a result, videos and lectures would be discarded as learning instruments in the face of training that features dynamic role-playing scenarios and stress inoculation.
Permitting pepper spray exposure in training may incite ethical concerns if participation is made mandatory. Exposure in training should be voluntary, since officers may wish to be exempt from participating. This presumption is based on the fact that between 5 and 10 percent of police elect not to experience an exposure when participation is made optional (Johnston, 2006). In any event, officers should be pre-screened and given medical clearance before they are exposed in order to avoid any unnecessary injuries (however minor they may be).

Officer safety would be enhanced if exposure in training becomes a requirement to carry pepper spray. This is because it would not be issued to officers who are inadequately trained and so officers with insufficient training would be unable to deploy the spray in situations where its effects may be limited, or when they are likely to expose themselves or fellow officers.

**Recommendations for Future Research**

This study should be replicated in several ways in order to test the validity and reliability of its findings. A longitudinal study involving officers from police forces across Canada should be conducted in order to explore the impact that exposure in training has on officer safety across time and space. A controlled experiment should also be performed in provinces where exposure in training is permitted in order to allow for random sampling and careful observation.

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91 Trainees should be exempt from exposure in training if they have adverse health conditions such as allergies to peppers, corneal disease, hypertension, heart disease, respiratory infection, bronchitis, and asthma (Stopford, 1996).
This training should be explored in greater detail in order to determine which exercises are the safest and most effective;\textsuperscript{92} how it is best delivered;\textsuperscript{93} how many times an officer should be exposed; and how often an officer should participate. This would universalize the best training methods and legitimize a standard training manual.

Some benefits related to exposure in training were considered irrelevant to this study, but they should be explored nonetheless. Researchers should determine whether this training enhances an officer's empathy for suspects who are exposed; whether it enhances an officer's credibility in pepper spray related court cases; whether it enhances an officer's ability to write reports on incidents involving pepper spray; whether it enhances an officer's ability to articulate their decision making rationale after deploying pepper spray; whether it promotes the judicious application of pepper spray; and whether it reduces the number of complaints an officer receives for using pepper spray.

Researchers should employ the survey instrument used in this study to determine whether exposure to other intermediate weapons has a similar impact on officer safety. In addition, this survey instrument should be used in the future to analyze the effectiveness of experimental training methods and newly inducted tools.

**Limitations**

Data collection procedures differed among police departments due to time, distance, and cost. Also, procedures evolved in this study as more effective methods became apparent. As a result, the researcher physically addressed a larger percentage of

\textsuperscript{92} For instance, which tasks improve an officer's physical performance the best: handcuffing, arrest and control tactics, soft hand techniques, weapon retention tactics, or decontamination? Also, what degree of exposure is necessary: skin contact, eye contact, nose contact, or mouth contact?

\textsuperscript{93} For instance, how should trainees be exposed: a direct stream, with goggles, by entering a contaminated room, or by controlling a contaminated subject?
police officers in some departments than in others. There was no real incentive for police to participate when the researcher mailed questionnaires for staff sergeants and watch commanders to disseminate (unless participation was strongly encouraged by their commanding officers). There was a greater incentive for police to participate when the researcher disseminated questionnaires at shift briefings, since officers were provided with an introduction to the research and were supervised during the completion of the questionnaire. As a result, officers who responded to questionnaires that were mailed to them most likely volunteered to participate because they took a keen interest in this research, or because their experiences are relevant to this study. It is therefore possible that these participants represent a sub-population of police officers who share unique characteristics which account for their attitudes and experiences in isolation of the independent variable. Conversely, officers who responded to questionnaires that were disseminated to them by the researcher were all equally enticed and so these officers most likely participated out of convenience, rather than because they share relevant experiences. Also, these participants do not represent a sub-population of officers because the vast majority of police responded when questionnaires were disseminated to them by the researcher. As a result, they represent a more valid and reliable sample than officers who responded to questionnaires that were mailed to them. This limitation is offset by the large response rate obtained from each department.

This study compared the attitudes and experiences of officers who were exposed to pepper spray in training with the attitudes and experiences of officers who were not in order to explore how exposure in training affects officer safety. However, the distinction between these two groups may not be so rudimentary. Some officers may have
experienced only one exposure in training, while some may have experienced several. Also, officers may have experienced different levels of training, depending on when they were first issued pepper spray. In addition, officers who have never been exposed in training may have participated in a non-sanctioned exposure, or may have experienced exposure in the field. This is problematic, since these experiences may account for an officer’s safety in isolation of the independent variable. Furthermore, officers may have been exempt from experiencing an exposure in training when they were first issued pepper spray and then returned later to participate in this training. This is problematic, since the questionnaire used in this study does not distinguish whether officers were exposed in training before or after they were exposed in the field—participants were simply asked: “have you ever been exposed to pepper spray in a training facility?” As a result, the independent variable may not be a valid and reliable measure of officer safety in all cases. Clarifying this in the questionnaire would have enhanced the validity and reliability of responses, but it also would have produced loaded questions and a lengthy survey instrument. These concerns would be avoided altogether in a controlled experiment. However, such a study would be illegal and unethical if conducted in British Columbia.

Behavioural data do not provide enough variability to relate the independent variable to an officer’s actual physical performance. Data obtained from behavioural measures need to be more proportionate in order to conduct an accurate statistical analysis that is capable of producing valid and reliable findings. This limitation is offset

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94 Experiencing multiple exposures to pepper spray in the field would most certainly have a “baptism by fire” effect on police, allowing them to recognize when they have been exposed and predict the ensuing response. However, this would not necessarily condition their reaction to pepper spray or provide them with the skills they need to adapt to its effects.
by data obtained from attitudinal measures of physical performance. Attitudinal data can be used in place of behavioural data, since opinions often translate into actual behaviour or performance.
CONCLUSION

Policing is inherently dangerous and laden with risk. When an officer deploys pepper spray they need to work in the environment they have contaminated, since they have a lawful duty to protect the public. As a result, exposure to pepper spray in the field occurs frequently. This is problematic, since officers could become incapacitated during hostile confrontations and suffer serious injuries as a result. Injuries sustained by police involve considerable costs in the form of lost wages, medical expenses, insurance claims, liability claims, productivity declines, and individual consequences for officers and their families (Brandl, 1996). The environment police work in cannot be made safe with policy—unless this involves the provision of effective tools and training. Since police deploy pepper spray in dangerous situations with a high potential for injury, they should be provided with the best training available. Traditional training methods do not adequately prepare police for an exposure in the field and so different methods need to be considered. This study determined that exposure to pepper spray in training benefits officer safety in a variety of ways. It enhances an officer’s physical performance, decision making ability, confidence, and knowledge. It also enhances officer safety during non-sanctioned exposures. In addition, this study determined that exposure in training does not cause serious or long-term health problems. These results are confirmed by literature on the health consequences of pepper spray, simulation training, stress inoculation training, and pepper spray exposure in training, as well as presumptions
made by defensive tactics trainers. These findings suggest that realistic simulation exercises and stress inoculation are crucial when training police on a variety of less-lethal weapons and defensive tactics. However, additional research is necessary to explore this prospect.
Invitation to Participate in Police Research

Dear (Recipient):

My name is Shane McLaughlin. I am conducting a study on pepper spray training in partial fulfillment of the requirements for the degree of Master of Arts in the School of Criminology at Simon Fraser University. This research is being supervised by Sergeant Rick Parent, the manager of research and academic development at the Justice Institute of British Columbia.

Work Safe BC regulations prohibit police officers in British Columbia from being exposed to pepper spray in training. It is believed that this training enhances officer safety and reduces injuries sustained in the field.

In order to test this hypothesis, I am administering questionnaires and conducting interviews with police officers in British Columbia and comparing the attitudes and experiences of officers who have been exposed to pepper spray in training with the attitudes and experiences of officers who have not.

This study will contribute to research on police training and could potentially impact police training policy. Your participation is vital to the success of this research.

Please support this study by distributing questionnaires to your members and encouraging them to participate in a telephone interview. Please mail the completed questionnaires to either myself or Rick Parent and distribute my contact information to your members so that interviews can be arranged.

Thank you for your time and consideration.

Sincerely,

Shane McLaughlin
Sgt. Rick Parent
APPENDIX B
*Instructions—Please encircle the number that describes your response to the following statements. Please use the space provided for additional comments. Please respond to questions on both sides of the page. Thank you.

1) Enhances their ability to defend against an assailant when they are exposed to pepper spray in the field

   1  2  3  4  5  6  7

Comments:

2) Enhances their ability to retain their weapons when they are exposed to pepper spray in the field

   1  2  3  4  5  6  7

Comments:

3) Enhances their ability to control a suspect when they are exposed to pepper spray in the field

   1  2  3  4  5  6  7

Comments:

4) Enhances their ability to communicate with fellow officers when they are exposed to pepper spray in the field

   1  2  3  4  5  6  7

Comments:
5) Enhances their ability to call for assistance when they are exposed to pepper spray in the field

Comments:

6) Discourages them from using pepper spray in situations where its effects may be limited

Comments:

7) Discourages them from using pepper spray in situations where they are likely to expose themselves or fellow officers

Comments:

8) Enables them to adapt to the effects of pepper spray

Comments:

9) Conditions their reaction to the effects of pepper spray

Comments:

10) Enhances their confidence in the effectiveness of pepper spray

Comments:
11) Reduces their anxiety over being exposed to pepper spray

Comments:

12) Improves their ability to learn and retain pepper spray decontamination procedures

Comments:

13) Improves their knowledge of the physical and psychological effects of pepper spray

Comments:

14) Encourages them to over-rely on pepper spray

Comments:

15) Encourages them to use pepper spray prematurely

Comments:

*Note—The following statements are read as presented

16) Tactics taught in use of force training are difficult to learn

Comments:
17) Use of force training enhances an officer’s ability to defend against an assailant

Comments:

18) Use of force training should be attended as frequently as possible

Comments:

19) Videos and lectures are effective in describing the effects of pepper spray

Comments:

20) Using an inert spray in training prepares an officer for when they are exposed to pepper spray in the field

Comments:

21) Using intermediate weapons in training enhances an officer’s performance in the field

Comments:

22) Have you ever been exposed to pepper spray in a training facility?

YES NO

If NO, proceed to question 26

Comments:
23) Have you ever been seriously injured as a result of being exposed to pepper spray in training?

   YES          NO

   Comments:

24) Have you ever missed work as a result of being exposed to pepper spray in training?

   YES          NO

   Comments:

25) Have you ever required medical treatment as a result of being exposed to pepper spray in training?

   YES          NO

   Comments:

26) Have you ever voluntarily exposed yourself to pepper spray outside of a training facility?

   YES          NO

   If NO, proceed to question 29

   Comments:

27) Were you supervised by a certified use of force instructor?

   YES          NO

   Comments:

28) Did you have immediate access to emergency medical service personnel?

   YES          NO

   Comments:
29) Have you ever been physically assaulted after being exposed to pepper spray in the field?

   YES  NO

   If NO, proceed to question 34

Comments:

30) Were you exposed to pepper spray in training prior to this incident?

   YES  NO

Comments:

31) Did you sustain any serious injuries as a result of this assault?

   YES  NO

Comments:

32) Did you miss work as a result of this assault?

   YES  NO

Comments:

33) Did you require medical treatment as a result of this assault?

   YES  NO

Comments:

34) Have you ever lost control of your weapon after being exposed to pepper spray in the field?

   YES  NO

Comments:
35) Have you ever lost control of a suspect after being exposed to pepper spray in the field?
   YES  NO

Comments:

36) Have you been incapacitated after being exposed to pepper spray in the field?
   YES  NO

Comments:

37) Are you involved in martial arts or defensive tactics related training outside of your department?
   YES  NO

Comments:

*Please Provide the following information:

Age:

Sex:

Rank:

Number of Years Served:
APPENDIX C
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*Number of sworn members obtained from BCPSSG summary statistics 1996-2005.

Figure 1. Number of sworn members, patrol or traffic personnel, officers sampled, and participants from each department.
Figure 2. Number of responses from each department.

Figure 3. Age distribution.
Figure 4. Policing experience distribution.

Figure 5. Enhances an officer’s ability to defend against an assailant.
Figure 6. Enhances an officer's ability to retain their weapons.

Figure 7. Enhances an officer's ability to control a suspect.
Figure 8. Enhances an officer’s ability to communicate with fellow officers.

Figure 9. Enhances an officer’s ability to call for assistance.
Figure 10. Discourages an officer from using pepper spray when its effects are limited.

Figure 11. Discourages an officer from exposing themselves or fellow officers.
Figure 12. Enables an officer to adapt to the effects of pepper spray.

Figure 13. Conditions an officer's reaction to the effects of pepper spray.
Figure 14. Enhances an officer's confidence in the effectiveness of pepper spray.

Figure 15. Reduces an officer's anxiety over being exposed to pepper spray.
Figure 16. Improves an officer’s ability to learn decontamination procedures.

Figure 17. Improves an officer’s knowledge of pepper spray’s effects.
Figure 18. Encourages an officer to over-rely on pepper spray.

Figure 19. Encourages an officer to use pepper spray prematurely.
Figure 20. Effectiveness of videos and lectures.

Figure 21. Effectiveness of using an inert spray in training.
Figure 22: Effectiveness of using intermediate weapons in training.

Figure 23. Association between exposure to pepper spray in training and supervision by a certified use of force instructor.

*Not exposed in training(1), Exposed in training(2).*
*Not exposed in training(1), Exposed in training(2).

Figure 24. Association between exposure to pepper spray in training and immediate access to emergency medical services personnel.
*Note—The following statements begin with the phrase “Exposing an officer to pepper spray in training:”*

1) Enhances their ability to defend against an assailant when they are exposed to pepper spray in the field

**Descriptive:**
- Mean: 5.06; Median: 5; Mode: 6; Standard deviation: 1.19; Skewness: -1.59; Kurtosis: 2.49; Valid: 466; Missing: 33

**Independent Means T-Test:**
- On average, officers who were exposed to pepper spray in training agree more strongly with this statement (M = 5.15, SE = 0.06) than officers who were not exposed to pepper spray in training (M = 4.87, SE = 0.11). This difference is significant t(238) = -2.18, p<0.05, with a small effect r = 0.14.

**Spearman Point-Biserial Correlation Coefficient:**
- Exposure to pepper spray in training is not significantly related to an officer’s response to this statement r = 0.08, p>0.05.

2) Enhances their ability to retain their weapons when they are exposed to pepper spray in the field

**Descriptive:**
- Mean: 5; Median: 5; Mode: 6; Standard deviation: 1.16; Skewness: -1.45; Kurtosis: 2; Valid: 465; Missing: 34

**Independent Means T-Test:**
- On average, officers who were exposed to pepper spray in training agree more strongly with this statement (M = 5.09, SE = 0.06) than officers who were not exposed to pepper spray in training (M = 4.83, SE = 0.10). This difference is significant t(252) = -2.06, p<0.05, with a small effect r = 0.12.

**Spearman Point-Biserial Correlation Coefficient:**
- Exposure to pepper spray in training is not significantly related to an officer’s response to this statement r = 0.07, p>0.05.
3) Enhances their ability to control a suspect when they are exposed to pepper spray in the field

Descriptive:
-Mean: 4.97; Median: 5; Mode: 6; Standard deviation: 1.18; Skewness: -1.36; Kurtosis: 1.68; Valid: 461; Missing: 38

Independent Means T-Test:
-On average, officers who were exposed to pepper spray in training agree more strongly (M = 5.05, SE = 0.06) than officers who were not exposed to pepper spray in training (M = 4.81, SE = 1.09). This difference is not significant t(249) = -1.38, p>0.05.

Spearman Point-Biserial Correlation Coefficient:
-Exposure to pepper spray in training is not significantly related to an officer’s response to this statement r = 0.07, p>0.05.

4) Enhances their ability to communicate with fellow officers when they are exposed to pepper spray in the field

Descriptive:
-Mean: 4.97; Median: 5; Mode: 6; Standard deviation: 1.18; Skewness: -1.4; Kurtosis: 1.82; Valid: 455; Missing: 44

Independent Means T-Test:
-On average, officers who were exposed to pepper spray in training agree more strongly (M = 5.08, SE = 0.06) than officers who were not exposed to pepper spray in training (M = 4.02, SE = 0.10). This difference is not significant t(252) = -1.81, p>0.05.

Spearman Point-Biserial Correlation Coefficient:
-Exposure to pepper spray in training is not significantly related to an officer’s response to this statement r = 0.07, p>0.05.

5) Enhances their ability to call for assistance when they are exposed to pepper spray in the field

Descriptive:
-Mean: 4.99; Median: 5; Mode: 6; Standard deviation: 1.17; Skewness: -1.47; Kurtosis: 2.08; Valid: 459; Missing: 40

Independent Means T-Test:
-On average, officers who were exposed to pepper spray in training agree more strongly
(M = 5.07, SE = 0.06) than officers who were not exposed to pepper spray in training (M = 4.81, SE = 0.10). This difference is significant t(244) = -2.05, p<0.05, with a small effect r = 0.13.

**Spearman Point-Biserial Correlation Coefficient:**
- Exposure to pepper spray in training is not significantly related to an officer's response to this statement r = 0.08, p>0.05.

6) Discourages them from using pepper spray in situations where its effects may be limited

**Descriptive:**
- Mean: 4.81; Median: 5; Mode: 6; Standard deviation: 1.32; Skewness: -1.26; Kurtosis: 1.02; Valid: 449; Missing: 50

**Independent Means T-Test:**
- On average, officers who were exposed to pepper spray in training agree more strongly (M = 4.82, SE = 0.07) than officers who were not exposed to pepper spray in training (M = 4.77, SE = 0.11). This difference is not significant t(442) = -0.375, p>0.05.

**Spearman Point-Biserial Correlation Coefficient:**
- Exposure to pepper spray in training is not significantly related to an officer's response to this statement r = 0.02, p>0.05.

7) Discourages them from using pepper spray in situations where they are likely to expose themselves or fellow officers

**Descriptive:**
- Mean: 4.86; Median: 5; Mode: 6; Standard deviation: 1.28; Skewness: -1.27; Kurtosis: 1.14; Valid: 462; Missing: 37

**Independent Means T-Test:**
- On average, officers who were exposed to pepper spray in training agree more strongly (M = 4.85, SE = 0.10) than officers who were not exposed to pepper spray in training (M = 4.87, SE = 0.07). This difference is not significant t(454) = -0.144, p>0.05.

**Spearman Point-Biserial Correlation Coefficient:**
- Exposure to pepper spray in training is not significantly related to an officer's response to this statement r = 0, p>0.05.

8) Enables them to adapt to the effects of pepper spray
Independent Means T-Test:
-On average, officers who were exposed to pepper spray in training agree more strongly
\( (M = 4.88, SE = 0.07) \) than officers who were not exposed to pepper spray in training \( (M = 4.68, SE = 0.12) \). This difference is not significant \( t(234) = -1.39, p>0.05 \).

Spearman Point-Biserial Correlation Coefficient:
-Exposure to pepper spray in training is not significantly related to an officer’s response to this statement \( r = 0.04, p>0.05 \).

9) Conditions their reaction to the effects of pepper spray

Independent Means T-Test:
-On average, officers who were exposed to pepper spray in training agree more strongly
\( (M = 4.90, SE = 0.07) \) than officers who were not exposed to pepper spray in training \( (M = 4.59, SE = 0.12) \). This difference is significant \( t(237) = -2.17, p<0.05 \), with a small effect \( r = 0.13 \).

Spearman Point-Biserial Correlation Coefficient:
-There is a significant positive relationship between exposure to pepper spray in training and an officer’s response to this statement \( r = 0.10, p<0.05 \). However, exposure to pepper spray in training accounts for only 1 percent of the variability in responses, meaning that 99 percent of the variability is accounted for by extraneous variables.

Partial Correlation:
-There is a significant positive relationship between exposure to pepper spray in training and an officer’s response to this statement when controlling for age \( (r =0.11, p<0.05) \), policing experience \( (r =0.10, p<0.05) \), rank \( (r =0.11, p<0.05) \), department \( (r =0.11, p<0.05) \), martial arts involvement \( (r =0.10, p<0.05) \), self-efficacy \( (r =0.10, p<0.05) \), and motivation to train \( (r =0.11, p<0.05) \). However, this relationship is insignificant when controlling for sex \( (r =0.08, p>.05) \) and attitude toward training \( (r =0.09, p>.05) \).

10) Enhances their confidence in the effectiveness of pepper spray

Descriptive:
Independent Means T-Test:
On average, officers who were exposed to pepper spray in training agree more strongly (M = 4.84, SE = 0.06) than officers who were not exposed to pepper spray in training (M = 4.55, SE = 0.10). This difference is significant \( t(253) = -2.32, p<0.05 \), with a small effect \( r = 0.14 \).

Spearman Point-Biserial Correlation Coefficient:
There is a significant positive relationship between exposure to pepper spray in training and an officer’s response to this statement \( r = 0.10, p<0.05 \). However, exposure to pepper spray in training accounts for only 1 percent of the variation in responses, meaning that 99 percent of the variability is accounted for by extraneous variables.

Partial Correlation:
There is a significant positive relationship between exposure to pepper spray in training and an officer’s response to this statement when controlling for age \( r =0.12, p<0.05 \), policing experience \( r =0.13, p<0.05 \), sex \( r =0.10, p<0.05 \), rank \( r =0.11, p<0.05 \), department \( r =0.11, p<0.05 \), martial arts involvement \( r =0.11, p<0.05 \), self-efficacy \( r =0.11, p<0.05 \), attitude toward training \( r =0.10, p<0.05 \), and motivation to train \( r =0.11, p<0.05 \).

11) Reduces their anxiety over being exposed to pepper spray

Descriptive:
-Mean: 4.83; Median: 5; Mode: 5; Standard deviation: 1.19; Skewness: -1.22; Kurtosis: 1.35; Valid: 451; Missing: 48

Independent Means T-Test:
On average, officers who were exposed to pepper spray in training agree more strongly (M = 4.87, SE = 0.07) than officers who were not exposed to pepper spray in training (M = 4.73, SE = 0.09). This difference is not significant \( t(443) = -1.22, p>0.05 \).

Spearman Point-Biserial Correlation Coefficient:
Exposure to pepper spray in training is not significantly related to an officer’s response to this statement \( r =0.08, p>0.05 \).

12) Improves their ability to learn and retain pepper spray decontamination procedures

Descriptive:
-Mean: 4.88; Median: 5; Mode: 5; Standard deviation: 1.09; Skewness: -1.21; Kurtosis:
Independent Means T-Test:
- On average, officers who were exposed to pepper spray in training agree more strongly (M = 4.97, SE = 0.05) than officers who were not exposed to pepper spray in training (M = 4.69, SE = 0.10). This difference is significant t(231) = -2.41, p<0.05, with a small effect r = 0.15.

Spearman Point-Biserial Correlation Coefficient:
- There is a significant positive relationship between exposure to pepper spray in training and an officer’s response to this statement r = 0.10, p<0.05. However, exposure to pepper spray in training accounts for only 1 percent of the variation in responses, meaning that 99 percent of the variability is accounted for by extraneous variables.

Partial Correlation:
- There is a significant positive relationship between exposure to pepper spray in training and an officer’s response to this statement when controlling for age (r =0.13, p<0.05), policing experience (r = 0.14, p<0.05), sex (r = 0.11, p<0.05), rank (r = 0.12, p<0.05), department (r = 0.12, p<0.05), martial arts involvement (r = 0.19, p<0.05), self-efficacy (r = 0.11, p<0.05), and motivation to train (r = 0.10, p<0.05). However, this relationship is insignificant when controlling for attitude toward training (r = 0.08, p>0.05).

13) Improves their knowledge of the physical and psychological effects of pepper spray

Descriptive:
- Mean: 5.12; Median: 5; Mode: 6; Standard deviation: 1.01; Skewness: -1.62; Kurtosis: 3.6; Valid: 468; Missing: 31

Independent Means T-Test:
- On average, officers who were exposed to pepper spray in training agree more strongly (M = 5.23, SE = 0.05) than officers who were not exposed to pepper spray in training (M = 4.91, SE = 0.09). This difference is significant t(248) = -3.00, p<0.05, with a small effect r = 0.18.

Spearman Point-Biserial Correlation Coefficient:
- There is a significant positive relationship between exposure to pepper spray in training and an officer’s response to this statement r = 0.12, p<0.05. However, exposure to pepper spray in training accounts for only 1.5 percent of the variation in responses, meaning that 98.5 percent of the variability is accounted for by extraneous variables.

Partial Correlation:
- There is a significant positive relationship between exposure to pepper spray in training and an officer’s response to this statement when controlling for age (r =0.16, p<0.05),
policing experience ($r = 0.16, p<0.05$), sex ($r = 0.13, p<0.05$), rank ($r = 0.14, p<0.05$), department ($r = 0.15, p<0.05$), martial arts involvement ($r = 0.14, p<0.05$), self-efficacy ($r = 0.14, p<0.05$), attitude toward training ($r = 0.13, p<0.05$), and motivation to train ($r = 0.14, p<0.05$).

14) Encourages them to over-rely on pepper spray

**Descriptive:**
- Mean: 2.33; Median: 2; Mode: 2; Standard deviation: 1.26; Skewness: 1.10; Kurtosis: 0.82; Valid: 417; Missing: 82

**Independent Means T-Test:**
- On average, officers who were exposed to pepper spray in training disagree more strongly ($M = 2.30, SE = 0.07$) than officers who were not exposed to pepper spray in training ($M = 2.41, SE = 0.10$). This difference is not significant $t(409) = 0.77, p>0.05$.

**Spearman Point-Biserial Correlation Coefficient:**
- Exposure to pepper spray in training is not significantly related to an officer's response to this statement $r = -0.05, p>0.05$.

15) Encourages them to use pepper spray prematurely

**Descriptive:**
- Mean: 2.11; Median: 2; Mode: 2; Standard deviation: 1.13; Skewness: 1.38; Kurtosis: 2.17; Valid: 421; Missing: 78

**Independent Means T-Test:**
- On average, officers who were exposed to pepper spray in training disagree more strongly ($M = 2.07, SE = 0.06$) than officers who were not exposed to pepper spray in training ($M = 2.20, SE = 0.10$). This difference is not significant $t(413) = 1.01, p>0.05$.

**Spearman Point-Biserial Correlation Coefficient:**
- Exposure to pepper spray in training is not significantly related to an officer's response to this statement $r = -0.05, p>0.05$.

*Note—The following statements are read as presented*

16) Tactics taught in use of force training are difficult to learn

**Descriptive:**
Independent Means T-Test:
The average officers who were exposed to pepper spray in training agree more strongly (M = 2.23, SE = 0.06) than officers who were not exposed to pepper spray in training (M = 2.11, SE = 0.08). This difference is not significant t(363) = -1.14, p>0.05.

Spearman Point-Biserial Correlation Coefficient:
Exposure to pepper spray in training is not significantly related to an officer’s response to this statement r = 0.02, p>0.05.

17) Use of force training enhances an officer’s ability to defend against an assailant

Descriptive:
-Mean: 5.33; Median: 6; Mode: 6; Standard deviation: 1; Skewness: -2.23; Kurtosis: 6.06; Valid: 487; Missing: 12

Independent Means T-Test:
On average, officers who were exposed to pepper spray in training agree more strongly (M = 5.36, SE = 0.05) than officers who were not exposed to pepper spray in training (M = 5.28, SE = 0.08). This difference is not significant t(479) = -0.71, p>0.05.

Spearman Point-Biserial Correlation Coefficient:
Exposure to pepper spray in training is not significantly related to an officer’s response to this statement r = 0, p>0.05.

18) Use of force training should be attended as frequently as possible

Descriptive:
-Mean: 5.26; Median: 6; Mode: 6; Standard deviation: 1.03; Skewness: -2.04; Kurtosis: 5.2; Valid: 482; Missing: 17

Independent Means T-Test:
On average, officers who were exposed to pepper spray in training agree more strongly (M = 5.29, SE = 0.05) than officers who were not exposed to pepper spray in training (M = 5.21, SE = 0.08). This difference is not significant t(474) = -0.80, p>0.05.

Spearman Point-Biserial Correlation Coefficient:
Exposure to pepper spray in training is not significantly related to an officer’s response to this statement r = 0, p>0.05.
19) Videos and lectures are effective in describing the effects of pepper spray

**Descriptive:**
- Mean: 3.51; Median: 4; Mode: 4; Standard deviation: 1.52; Skewness: -0.11; Kurtosis: -1; Valid: 430; Missing: 69

**Independent Means T-Test:**
- On average, officers who were not exposed to pepper spray in training agree more strongly (M = 3.54, SE = 0.11) than officers who were exposed to pepper spray in training (M = 3.49, SE = 0.09). This difference is not significant $t(325) = 0.29$, $p>0.05$.

**Spearman Point-Biserial Correlation Coefficient:**
- Exposure to pepper spray in training is not significantly related to an officer’s response to this statement $r = -0.09$, $p>0.05$.

20) Using an inert spray in training prepares an officer for when they are exposed to pepper spray in the field

**Descriptive:**
- Mean: 2.63; Median: 2; Mode: 1; Standard deviation: 1.58; Skewness: 0.73; Kurtosis: -0.60; Valid: 436; Missing: 63

**Independent Means T-Test:**
- On average, officers who were exposed to pepper spray in training agree more strongly (M = 2.71, SE = 0.09) than officers who were not exposed to pepper spray in training (M = 2.45, SE = 0.11). This difference is not significant $t(350) = -1.68$, $p>0.05$.

**Spearman Point-Biserial Correlation Coefficient:**
- Exposure to pepper spray in training is not significantly related to an officer’s response to this statement $r = 0.03$, $p>0.05$.

21) Using intermediate weapons in training enhances an officer’s performance in the field

**Descriptive:**
- Mean: 5.09; Median: 5; Mode: 5; Standard deviation: 0.91; Skewness: -1.15; Kurtosis: 2.31; Valid: 459; Missing: 40

**Independent Means T-Test:**
- On average, officers who were exposed to pepper spray in training agree more strongly (M = 5.18, SE = 0.04) than officers who were not exposed to pepper spray in training (M = 4.92, SE = 0.08). This difference is significant $t(456) = -2.68$, $p<0.05$, with a small effect $r = 0.12$. 

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Spearman Point-Biserial Correlation Coefficient:
- There is a significant positive relationship between exposure to pepper spray in training and an officer's response to this statement \( r = 0.11, p < 0.05 \). However, exposure to pepper spray in training accounts for only 1 percent of the variation in responses, meaning that 99 percent of the variability is accounted for by extraneous variables.

Partial Correlation:
- There is a significant positive relationship between exposure to pepper spray in training and an officer's response to this statement when controlling for age (\( r = 0.15, p < 0.05 \)), policing experience (\( r = 0.15, p < 0.05 \)), sex (\( r = 0.13, p < 0.05 \)), rank (\( r = 0.14, p < 0.05 \)), department (\( r = 0.13, p < 0.05 \)), martial arts involvement (\( r = 0.13, p < 0.05 \)), self-efficacy (\( r = 0.14, p < 0.05 \)), attitude toward training (\( r = 0.14, p < 0.05 \)), and motivation to train (\( r = 0.14, p < 0.05 \)).

22) Have you ever been exposed to pepper spray in a training facility?

Descriptive:
- Yes frequency: 320; No frequency: 173; Yes percentage: 64.9; No percentage: 35.1; Valid: 493; Missing: 6

23) Have you ever been seriously injured as a result of being exposed to pepper spray in training?

Descriptive:
- Yes frequency: 2; No frequency: 319; Yes percentage: 0.6; No percentage: 99.4; Valid: 321; Missing: 178

24) Have you ever missed work as a result of being exposed to pepper spray in training?

Descriptive:
- Yes frequency: 1; No frequency: 320; Yes percentage: 0.3; No percentage: 99.7; Valid: 321; Missing: 178

25) Have you ever required medical treatment as a result of being exposed to pepper spray in training?

Descriptive:
- Yes frequency: 7; No frequency: 314; Yes percentage: 2.2; No percentage: 97.8; Valid: 321; Missing: 178
26) Have you ever voluntarily exposed yourself to pepper spray outside of a training facility?

Descriptive:
- Yes frequency: 86; No frequency: 405; Yes percentage: 17.5; No percentage: 82.5; Valid: 491; Missing: 8

Cross-Tabulation:
- Of the 173 officers who were not exposed to pepper spray in training, 17 officers or 9.94 percent voluntarily exposed themselves outside of a training facility. Of the 320 officers who were exposed to pepper spray in training, 69 officers or 21.56 percent voluntarily exposed themselves outside of a training facility.

Chi-square:
- There is a significant relationship between exposure to pepper spray in training and voluntary exposure to pepper spray outside of a training facility $X^2 = 10.41$, df(1), $p<0.001$.

Chi-square with layered variable:
- There is a significant relationship between exposure to pepper spray in training and voluntary exposure to pepper spray outside of a training facility when controlling for sex [male] ($X^2 = 7.07$, df(1), $p<0.008$), rank [constable] ($X^2 = 9.19$, df(1), $p<0.002$), and martial arts involvement [no] ($X^2 = 8.56$, df(1), $p<0.003$). However, this relationship is insignificant when controlling for sex [female]: ($X^2 = 2.87$, df(1), $p>0.05$), rank [sergeant] ($X^2 = 1.03$, df(1), $p>0.05$), and martial arts involvement [yes] ($X^2 = 1.73$, df(1), $p>0.05$).

27) Were you supervised by a certified use of force instructor?

Descriptive:
- Yes frequency: 54; No frequency: 32; Yes percentage: 62.8; No percentage: 37.2; Valid: 86; Missing: 413

Cross-Tabulation:
- Of the 18 officers who were not exposed to pepper spray in training and were voluntarily exposed to pepper spray outside of a training facility, 4 officers or 22.22 percent were supervised by a certified use of force instructor. Of the 68 officers who were exposed to pepper spray in training and were voluntarily exposed to pepper spray outside of a training facility, 50 officers or 73.52 percent were supervised by a certified use of force instructor.

Chi-square:
- There is a significant relationship between exposure to pepper spray in training and
supervision by a certified use of force instructor when voluntarily exposed to pepper spray outside of a training facility $X^2 = 16.03$, df(1), $p<0.0005$.

**Chi-square with layered variable:**
- There is a significant relationship between being exposed to pepper spray in training and supervision by a certified use of force instructor when voluntarily exposed to pepper spray outside of a training facility when controlling for sex [male] ($X^2 = 16.60$, df(1), $p<0.0005$), rank [constable] ($X^2 = 12.90$, df(1), $p<0.0005$), rank [sergeant] ($X^2 = 8.00$, df(1), $p<0.005$), and martial arts involvement [no] ($X^2 = 20.24$, df(1), $p<0.0005$). However, this relationship is insignificant when controlling for rank [sergeant] ($X^2 = 1.73$, df(1), $p<0.05$), and martial arts involvement [yes] ($X^2 = 1.35$, df(1), $p>0.05$).

28) Did you have immediate access to emergency medical service personnel?

**Descriptive:**
- Yes frequency: 36; No frequency: 50; Yes percentage: 41.9; No percentage: 58.1; Valid: 86; Missing: 413

**Cross-Tabulation:**
- Of the 18 officers who were not exposed to pepper spray in training and were voluntarily exposed to pepper spray outside of a training facility, 1 officer or 5.55 percent had immediate access to emergency medical services personnel. Of the 68 officers who were exposed to pepper spray in training and were voluntarily exposed to pepper spray outside of a training facility, 35 officers or 51.47 percent had immediate access to emergency medical services personnel.

**Chi-square:**
- There is a significant relationship between being exposed to pepper spray in training and immediate access to emergency medical services personnel when voluntarily exposed to pepper spray outside of a training facility $X^2 = 12.32$, df(1), $p<0.0005$.

**Chi-square with layered variable:**
- There is a significant relationship between exposure to pepper spray in training and immediate access to emergency medical services personnel when voluntarily exposed to pepper spray outside of a training facility when controlling for sex [male] ($X^2 = 8.35$, df(1), $p<0.004$), sex [female] ($X^2 = 5.60$, df(1), $p<0.01$), rank [constable] ($X^2 = 12.17$, df(1), $p<0.0005$), and martial arts involvement [no] ($X^2 = 12.15$, df(1), $p<0.0005$). However, this relationship is insignificant when controlling for rank [sergeant] ($X^2 = 1.73$, df(1), $p<0.05$), and martial arts involvement [yes] ($X^2 = 1.35$, df(1), $p>0.05$).

29) Have you ever been physically assaulted after being exposed to pepper spray in the field?
Descriptive:
- Yes frequency: 61; No frequency: 428; Yes percentage: 12.5; No percentage: 87.5; Valid: 489; Missing: 10

Cross-Tabulation:
- Of the 173 officers who were not exposed to pepper spray in training, 24 officers or 13.95 percent were physically assaulted after being exposed to pepper spray in the field. Of the 320 officers who were exposed to pepper spray in training, 37 officers or 11.70 percent were physically assaulted after being exposed to pepper spray in the field.

Chi-square:
- There is no significant relationship between exposure to pepper spray in training and being physically assaulted after being exposed to pepper spray in the field \( X^2 = 0.51, \ df(1), p>0.05 \).

30) Were you exposed to pepper spray in training prior to this incident?

Descriptive:
- Yes frequency: 37; No frequency: 23; Yes percentage: 61.7; No percentage: 38.3; Valid: 60; Missing: 439

Cross-Tabulation:
- Of the 36 officers who were exposed to pepper spray in training and were physically assaulted after being exposed to pepper spray in the field, 36 officers or 100 percent were exposed to pepper spray in training prior to being physically assaulted.

31) Did you sustain any serious injuries as a result of this assault?

Descriptive:
- Yes frequency: 2; No frequency: 58; Yes percentage: 3.3; No percentage: 96.7; Valid: 60; Missing: 439

32) Did you miss work as a result of this assault?

Descriptive:
- Yes frequency: 2; No frequency: 58; Yes percentage: 3.3; No percentage: 96.7; Valid: 60; Missing: 439

33) Did you require medical treatment as a result of this assault?
34) Have you ever lost control of your weapon after being exposed to pepper spray in the field?

Descriptive:
- Yes frequency: 0; No frequency: 484; Yes percentage: 0; No percentage: 100; Valid: 484; Missing: 15

35) Have you ever lost control of a suspect after being exposed to pepper spray in the field?

Descriptive:
- Yes frequency: 14; No frequency: 468; Yes percentage: 2.9; No percentage: 97.1; Valid: 482; Missing: 17

36) Have you been incapacitated after being exposed to pepper spray in the field?

Descriptive:
- Yes frequency: 36; No frequency: 446; Yes percentage: 7.5; No percentage: 92.5; Valid: 482; Missing: 17

37) Are you involved in martial arts or defensive tactics related training outside of your department?

Descriptive:
- Yes frequency: 401; No frequency: 89; Yes percentage: 18.2; No percentage: 81.8; Valid: 490; Missing: 9

*Please include the following information

Age:

Descriptive:
- Mean: 36.13; Median: 35; Mode: 38; Valid: 482; Missing: 17
Sex:

**Descriptive:**
-Male frequency: 396; Female frequency: 88; Male percentage: 81.8; Female percentage: 18.2; Valid: 484; Missing: 15

Rank:

**Descriptive:**
-Cst. frequency: 434; Sgt. frequency: 48; Cst. percentage: 90; Sgt. percentage: 10; Valid: 482; Missing: 17

Number of Years Served:

**Descriptive:**
-Mean: 8.9; Median: 5; Mode: 3; Valid: 476; Missing: 23
APPENDIX E
*Index—(Exposed)/(Not Exposed)/(Unknown) indicates whether the participant was exposed to pepper spray in training; [#] indicates the number of participants who provided a similar comment.

*Note—The following statements begin with the phrase “Exposing an officer to pepper spray in training:”

1) Enhances their ability to defend against an assailant when they are exposed to pepper spray in the field

-Your decision making is affected—you will respond better with various levels of force when confronted with pepper spray…but only if you had a significant reaction in training (Exposed).

-Allows you to know if lethal force is justified, based on your reaction (Exposed).

-Enables officers to perform better when they receive a mild exposure…but training will not help you when you receive a full, direct stream (Exposed).

-This depends on the person you are dealing with and whether they are mentally ill, on drugs, or goal oriented (Not exposed) [2].

-This depends on a variety of factors. For instance, the situation, the environment, the officer, and the suspect involved (Unknown).

2) Enhances their ability to retain their weapons when they are exposed to pepper spray in the field

-Only if the exposure is combined with weapons retention training (Not exposed).

3) Enhances their ability to control a suspect when they are exposed to pepper spray in the field

-After being cross contaminated with pepper spray in the field, I was able to take a suspect into custody and then request assistance from another officer (Exposed).

-This depends on the dose of pepper spray received (Exposed).

-Exposure must be combined with defensive tactics training to enhance control (Not exposed).
6) Discourages them from using pepper spray in situations where its effects may be limited

-Being sprayed allows you to realize its limitations—the spray may not work on persons who are high on drugs or goal oriented (Exposed) [6].

-It teaches you that you shouldn’t bring pepper spray to a knife fight (Exposed).

-Pepper spray gives you a false sense of security. If you aren’t made aware of its limitations against goal oriented individuals, you become complacent and you won’t be prepared to escalate your force response if necessary (Exposed) [3].

-Makes you aware that you should always have a back up plan—you shouldn’t deploy it, and then be left guessing what to do next (Exposed).

-Pepper spray is demystified as a miracle weapon by doing this (Exposed).

7) Discourages them from using pepper spray in situations where they are likely to expose themselves or fellow officers

-Due to the knowledge and experience gained from being sprayed, one will think about using the spray a bit more before deploying it (Exposed) [2].

8) Enables them to adapt to the effects of pepper spray

-This is important—to learn how to develop some form of distraction to the effects of the pepper spray and to allow members to overcome in every situation (Exposed) [2].

-Teaches you how to fight beyond physical and mental barriers (Exposed) [3].

-Not necessarily…it may not affect you at all (Exposed).

-No amount of training will prepare you for an exposure. It’s not the same as real life, even when training is made realistic. Training cannot guarantee this. There are too many variables that affect the outcome of a situation (Not exposed).

9) Conditions their reaction to the effects of pepper spray

-Being exposed heightens ones senses and survival instincts (Exposed).

-Being sprayed is essential so you know how you will react (Exposed).
-Expectation of pain is key...so as not to panic from exposure (Exposed).

-You can never really be prepared to build a resistance because each time that you are sprayed is different (Exposed) [3].

-One exposure does not condition an individual (Exposed).

10) Enhances their confidence in the effectiveness of pepper spray

- Based on the effect it had on me, I am probably over-confident in its effectiveness (Exposed).

- This is a danger when dealing with the highly motivated or mentally ill (Exposed).

- It could also reduce your confidence in its effectiveness if you don’t react strongly (Exposed) [2].

11) Reduces their anxiety over being exposed to pepper spray

- Knowing that pepper spray won’t kill them reduces an officer’s anxiety over being exposed (Exposed) [2].

12) Improves their ability to learn and retain pepper spray decontamination procedures

- I have never forgotten (Exposed).

- It encouraged me to follow proper procedure. I avoid aggravating my symptoms by rubbing my eyes, for instance (Exposed).

- It taught me the importance of immediate decontamination. It also taught me which methods work the best—using baby shampoo, for instance (Exposed).

13) Improves their knowledge of the physical and psychological effects of pepper spray

- Knowing the effects helped me operate after being sprayed in the field (Exposed).

14) Encourages them to over-rely on pepper spray

- Not when they realize the limitations it has (Exposed).
*Note—The following statements are read as presented*

19) Videos and lectures are effective in describing the effects of pepper spray

- A good method, but not effective when compared to being sprayed (Exposed) [2].

- The best way to understand the effects is to experience them yourself (Exposed) [5].

20) Using an inert spray in training prepares an officer for when they are exposed to pepper spray in the field

- Inert spray helps develop skills necessary to train with and properly deploy pepper spray, but exposure to the real stuff allows them to understand what to expect, to fight through it, and to realize the limitations it may have on suspects (Exposed) [4].

- Only good in combination with an actual exposure (Exposed) [2].

22) Have you ever been exposed to pepper spray in a training facility?

- I don’t agree with spraying an officer in the face in order to experience pepper spray. It should be sprayed in the air to familiarize the officer of the smell, and the officer should put some pepper spray in the mouth or face area to realize the level of pain it gives, but spraying the face and eyes is not necessary (Not exposed).

- As a new recruit, it was removed from training. I believe, strongly, that it should be brought back (Not exposed).

23) Have you ever been seriously injured as a result of being exposed to pepper spray in training?

- I had an adverse reaction to pepper spray in training. It’s good that I was able to identify this in training, rather than being severely incapacitated in the field (Exposed).

- I had effects lasting 6 hours (Exposed).

- I experienced the regular symptoms for about an hour before I collected myself (Exposed).

- It was painful for 30 minutes (Exposed) [2].

- My vision was blurry for a week after I was sprayed at too close a distance (Exposed).
24) Have you ever missed work as a result of being exposed to pepper spray in training?
-I missed training for the rest of the day (Exposed).

25) Have you ever required medical treatment as a result of being exposed to pepper spray in training?
-Just regular decontamination procedures (Exposed).

26) Have you ever voluntarily exposed yourself to pepper spray outside of a training facility?
-I wanted to be exposed to pepper spray to increase my knowledge, experience, credibility, and psychological reaction (Exposed).
-I volunteered to be sprayed because I needed to know how I would handle the effects of pepper spray...I didn’t want to be in a position of the ‘unknown’ in an unsafe environment (Exposed).
-I will in the near future (Not exposed).

28) Did you have immediate access to emergency medical service personnel?
-Not required—it’s just pepper spray! (Exposed).

29) Have you ever been physically assaulted after being exposed to pepper spray in the field?
-I was sprayed with pepper spray several times (Exposed).

31) Did you sustain any serious injuries as a result of this assault?
-Any injury at work is significant (Exposed).

33) Did you require medical treatment as a result of this assault?
-I had to go to the hospital due to respiratory complications after being bear sprayed (Exposed).
-Just regular decontamination from emergency health services (Not exposed) [3].

35) Have you ever lost control of a suspect after being exposed to pepper spray in the field?

-A fellow officer sprayed me and I lost control of the suspect, leading to a foot pursuit (Exposed) [2].

-The suspect ran from me and I had to quit chasing due to the effects (Exposed).

-I couldn’t see. I removed myself from the fight (Not exposed).

- No, because there were other members there to assist (Not exposed).

-I had a suspect by the neck during a bar fight...I got sprayed, and then lost control of him (Not exposed).

36) Have you been incapacitated after being exposed to pepper spray in the field?

-I fought through the effects and continued to arrest two more suspects in a small riot situation (Exposed).

-I couldn’t see for a short time until my eyes were flushed (Exposed) [2].

-Slightly...not enough to require medical assistance (Exposed).

-In a large fight at the PNE, I was sprayed by another officer while I had someone in a headlock. I lost my vision and ability to breathe (Exposed).

-I was still able to radio dispatch to give up dates but unable to see (Not exposed).

-I felt pain and discomfort, but otherwise able to cope (Not exposed) [3].

-I have been exposed several times through cross-contamination but fought through it (Not exposed).
Transcripts from Patrol and Traffic Operations Personnel Interviews

*Index—(Exposed)/(Not Exposed) indicates whether the participant was exposed to pepper spray in training

*Note—Participants were asked to discuss an incident(s) where they were exposed, and there was an injury or potential for an injury to occur.

1) Describe how you reacted when you were exposed to pepper spray during this incident.

-I immediately recognized that I had been exposed. This allowed me to predict the ensuing reaction, maintain my composure and avoid panicking until help came (Exposed).

-I entered a room that had been contaminated. I knew what to expect before entering the room, and so I didn’t panic when I began feeling the effects (Exposed).

-I was sprayed point blank in the face with a full can of bear spray. It felt like hot ember was put in my eye...I had problems breathing and I couldn’t see. I ended up spending two days in the hospital as a result (Exposed).

-The first time I was sprayed, I felt the effects for 6 hours. On one occasion I was sprayed and I couldn’t see—I was temporarily blind. I stumbled around and almost walked onto a highway that was busy with traffic. Another officer had to grab me and decontaminate me (Exposed).

-While pursuing a suspect who had stolen liquor, I felt something wet hit my face and it immediately started burning. I tried to wipe it off while running, but my eyes began to burn like they were on fire and I lost almost all vision...my nose was running like a tap and I started to cough uncontrollably...then I started choking and I couldn’t breathe—I was completely disoriented. It wasn’t until I succumbed to the effects that I realized I had been exposed to pepper spray (Not exposed).

-I experienced a mild cross-contamination after I was forced to spray a pit bull inside a car. I was able to maintain my composure throughout the incident (Not exposed).
2) Describe how you performed after you were exposed to pepper spray during this incident.

-I was sprayed in the face by another officer while arresting a combative subject, and had to continue with the arrest. Even though I experienced a severe reaction when I was exposed in training, I didn’t experience a severe reaction during this incident since I was motivated and goal oriented—the symptoms I was experiencing from the spray were only a secondary thought due to my focus (Exposed).

-I sprayed a suspect who was much larger than me, but he proceeded to charge me despite being exposed. I became cross-contaminated when I took him down. I was able to realize the necessity of a different force response—hard hand techniques in this case, make the arrest single handedly, decontaminate the suspect, and transport him to jail while dealing with the effects (Exposed).

-After deploying pepper spray through the window of a car, I had to climb into the vehicle to arrest and control an extremely resistant suspect. I remained focused and goal oriented, and never stopped fighting (Exposed).

-I stopped a stolen vehicle on a roadway at 3 in the morning. It was driven by a convict who had recently escaped from prison. As I approached the vehicle, the driver sprayed me in the face with a large dose of bear spray. I turned around and ran to the back of my vehicle, where I fell to the ground. When I looked up at the stolen vehicle, I could see the break lights fully lit, and noticed that the suspect wasn’t coming out of his vehicle. I began succumbing to the effects of the spray. At this point, I made the decision to use lethal force, and fired a couple of rounds into the back of the truck. I was able to make this determination based on my severely incapacitating reaction to pepper spray in training. I knew that I would soon be incapacitated and unable to protect my gun. The suspect was not leaving the scene, so I had reason to believe that he was waiting for the effects of the spray to kick in so that he could finish me off. Had I not been sprayed in training, I wouldn’t have known how I was going to react, and so I wouldn’t have made the appropriate decision. For instance, I wouldn’t have known the timeframe I had before my visual acuity shut down, and so I wouldn’t have used the level of force necessary—in this case it was lethal force—to prevent the suspect from inflicting serious harm on me. My decision making ability was further enhanced in this case by the way I maintained my composure and staved off panic when I noticed the suspect wasn’t fleeing in the stolen vehicle (Exposed).

-I protected myself by stepping back and putting my hands up. After the assailant fled, I chased him for a block, but lost track of him when I became incapacitated. I was still
able to radio for assistance and provide a description of the suspect as well as my location (Exposed).

-I was sprayed while attending a call for a home invasion. I was able to help a family by getting them out of the house and away from an assailant before succumbing to the effects (Exposed).

-I tried to fight through the effects, and took wild swings at the suspect, just hoping to connect. I was overwhelmed by the spray and was unable to prevent the suspect from spraying me again with the remainder of the canister. After I was sprayed a second time, I saw the shadow of a figure running towards me. I didn’t know if it was the guy coming back or another assailant. I immediately put my hand on my gun, thinking I would have to shoot the suspect because he had returned to finish me off. The individual was in fact an off duty fireman who was rushing over to decontaminate me. I got lucky that the firemen were there or it could have been more painful. Had I been attacked at this point, I wouldn’t have been able to defend myself. After the fireman rinsed my face with water, I tried to radio my partner on the radio to determine whether he needed assistance, but I couldn’t reach him, so I decided to track him down in my patrol car, even though I was disoriented, confused, and in shock from being sprayed. While driving, I began sweating in the car. The sweat from my forehead mixed with the pepper spray remaining in my hair. I was unable to predict this, since I thought that the decontamination provided by the fireman was sufficient—I didn’t know that the water would only give me temporary relief. I ended up experiencing the nightmarish effects again—only this time behind the wheel of a car. Because I had never been sprayed before, I was unable to recognize that I was sprayed right away, so I panicked. Had I been sprayed previous to this incident, I would have been able to fight through the effects and communicate with the fireman and my partner...I would have known how much time was needed to properly decontaminate, that you need to decontaminate your hair and head in addition to your eyes—and I wouldn’t have operated a vehicle immediately after being exposed (Not exposed).

-I was able to fight the effects and make an arrest after receiving a mild respiratory exposure (Not exposed).
APPENDIX G
Transcripts from Defensive Tactics Trainer Interviews

*Index—[#] indicates the number of participants who provided a similar comment.

1) How does being exposed to pepper spray in training affect an officer's performance in the field?

- It will let them know that they can fight through it if they have to—that they won't immediately succumb to the effects [9].

- It will inoculate them for a real world experience—they will know what to expect, so they won't panic when they are exposed in the field [5].

- They will be more capable of defending themselves and retaining their weapons when exposed in the field.

- Allows you to know that if you spray someone, they are able to fight through it, so that when it happens in real life, you know to escalate to the next level of force, rather than spray them again or in larger doses.

- It enables them to learn what they can do, and what they can't do—it's important to learn the capabilities as well as the limitations of pepper spray [5].

- They are more aware of the consequences of using the spray. For instance, you are less likely to spray it when other officers are around and likely to be cross-contaminated.

- Officers will have a greater appreciation for the tool [2].

- Here is an opportunity to experience pain, discomfort, burning of the skin...the worst experience of your life—fighting through the worst experience of your life is empowering—it makes you feel as though you can survive anything. This is a big milestone, as it sets the ground work for confidence in other dangerous scenarios [5].

- The best thing you can do for a recruit is to provide them with an opportunity to fight through something and succeed...being exposed to pepper spray is the most significant thing you can make someone struggle through—outside of being shot. For many, it's the first time they experience real pain, real fighting—unless you have fought before or
played contact sports for instance. This is the only thing you can do—you can’t shoot
trainees, and you can’t baton them without equipment...pepper spray is the only thing
you can do 100 percent and not hurt anyone.

-If they do not react strongly to the spray, there is a danger that they will lose confidence
in its effectiveness.

-Trainees will have a better understanding of the psychological and physiological effects
of pepper spray.

-Allows them to understand how it will affect them personally—this will allow them to
know how soon they need to seek medical attention and how seriously they should
respond to an exposure [4].

-Experiencing the pain, discomfort, and distress associated with an exposure puts you in
the subject’s shoes, thereby enhancing empathy and compassion. This in turn encourages
a faster decontamination response, and teaches you how to communicate effectively with
an exposed subject. It also makes officers more judicious in its application and
discourages them from using it unless they absolutely have to—and when they do, they
will use the absolute minimum amount necessary and promptly decontaminate the
exposed subject [5].

-Trainees are able to understand pepper sprays rate of flow and trajectory using an inert
spray, but a live exposure takes it to the next level by improving confidence and
credibility in court. Without an exposure, you are unable to explain how intense pepper
spray is, or how much it burns without providing a text book answer. Being sprayed
allows you to provide a more qualitative, subjective answer [4].

-Enhances the quality of reports involving pepper spray exposure.

-Testing for allergies in training allows you to know whether you will have an adverse
reaction, so that dispatch and management is aware, and you aren’t sent into a situation
where pepper spray has been deployed.

-It serves as a team building function—it builds a stronger team during training.
2) How does removing this component of training affect officer safety when they are exposed to pepper spray in the field?

-When sprayed, you won't have time to gather your senses, because your primary instincts take over. When training is practical and realistic, it becomes instinctual, and you resort to it in times of stress. If training does not reflect the realities of the street, it will be forgotten.

-Without this training, you won't be able to react when exposed in the field—you become helpless—because the body won't go where the brain hasn’t been before. If you haven't experienced it before, you won't want to do it, especially if it's scary—and being sprayed is scary [2].

-Being exposed in the field before being exposed in training is comparable to jumping over the Grand Canyon before jumping over a ditch.

-Although advocates against this training are well meaning, they are killing officers with kindness.

-When an officer doesn’t know what happened to them, panic sets in, which causes danger to the officer, civilians, and the suspect—it could lead to an unnecessary escalation of force, since they have a heightened sense of fear [3].

-If they get it on the street for the first time during a hostile encounter, their senses will be overwhelmed—they will be reacting first and foremost to the effects of the spray, and they will be distracted from the dangerous task in front of them [2].

-There is a potential for problems any time you deal with a high risk person, and this is magnified when you are sprayed, whether an officer’s response is momentary distraction, or complete debilitation. Any time you slow down in a situation where you need to control a suspect, defend against an assailant, or retain your weapon, you are in obvious jeopardy of losing [4].

-Trainees are no longer able to appreciate the effectiveness of pepper spray, and so they may be less likely to use a tool which has greatly reduced officer injuries in the field.
Trainees are no longer able to grasp the potential consequences of an exposure. For instance, some officers respond by having a full on panic attack—they can’t see, can’t breathe—they become completely incapacitated, which means that they are unable to defend against an assailant and could be disarmed. Such a reaction is potentially life threatening and could justify a lethal response. If trainees do not understand these implications, they may not resort to the appropriate level of force.

When officers are forced to experience pepper spray for the first time in the street, they are unable to fully realize the spray’s limitations, or recognize that goal oriented behaviour can be applied to work through the effects.

This increases an officer’s chance of being cross-contaminated, since they are less likely to deploy pepper spray with caution.

Trainees are more apt to recognize particulars—for instance, how much water do you need for decontamination, what symptoms are most prevalent—lots of little things that you aren’t likely to remember otherwise.

You can’t do a practical decontamination with inert spray or by watching movies—you are limited to having a theoretical understanding.

Some officers who want the experience, confidence and skills are doing it on their own. There is no credible benefit in exposing police to pepper spray if they are not monitored by defensive tactics trainers who are able to teach them how to mentally prepare for an exposure, or psychologically adapt to the effects of pepper spray and it is unlikely that they will consider vital use of force tactics such as weapons retention, escalation of force, and follow up control options on their own. Also, police are more likely to be injured when participating in non-sanctioned exposures, home is where the injuries occur, since they do not have access to proper decontamination facilities and do not practice safe decontamination procedures [2].
REFERENCE LIST


Lawrence, C. (2007). *Telephone Interview with Defensive Tactics Trainer*. 142


