

Regis University

## ePublications at Regis University

---

Regis University Student Publications  
(comprehensive collection)

Regis University Student Publications

---

Fall 2014

# Excited Delirium Syndrome and Conducted Electrical Weapons

Adam A. Nielsen  
*Regis University*

Follow this and additional works at: <https://epublications.regis.edu/theses>



Part of the [Criminology and Criminal Justice Commons](#)

---

### Recommended Citation

Nielsen, Adam A., "Excited Delirium Syndrome and Conducted Electrical Weapons" (2014). *Regis University Student Publications (comprehensive collection)*. 215.  
<https://epublications.regis.edu/theses/215>

This Thesis - Open Access is brought to you for free and open access by the Regis University Student Publications at ePublications at Regis University. It has been accepted for inclusion in Regis University Student Publications (comprehensive collection) by an authorized administrator of ePublications at Regis University. For more information, please contact [epublications@regis.edu](mailto:epublications@regis.edu).

**Regis University**  
College for Professional Studies Graduate Programs  
**Final Project/Thesis**

# **Disclaimer**

Use of the materials available in the Regis University Thesis Collection ("Collection") is limited and restricted to those users who agree to comply with the following terms of use. Regis University reserves the right to deny access to the Collection to any person who violates these terms of use or who seeks to or does alter, avoid or supersede the functional conditions, restrictions and limitations of the Collection.

The site may be used only for lawful purposes. The user is solely responsible for knowing and adhering to any and all applicable laws, rules, and regulations relating or pertaining to use of the Collection.

All content in this Collection is owned by and subject to the exclusive control of Regis University and the authors of the materials. It is available only for research purposes and may not be used in violation of copyright laws or for unlawful purposes. The materials may not be downloaded in whole or in part without permission of the copyright holder or as otherwise authorized in the "fair use" standards of the U.S. copyright laws and regulations.

Excited Delirium Syndrome and Conducted Electrical Weapons

By

Adam A. Nielsen

A Capstone Project Presented in Partial Fulfillment  
of the Requirements for the Degree  
Masters of Criminology

Regis University

December, 2014

Excited Delirium Syndrome and Conducted Electrical Weapons

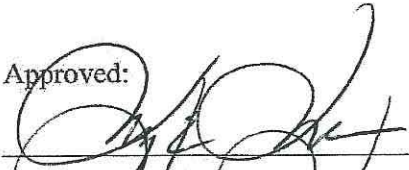
By

Adam A. Nielsen

has been approved,

December, 2014

Approved:

\_\_\_\_\_, Faculty Facilitator

\_\_\_\_\_, Thesis Advisor

\_\_\_\_\_, Faculty Chair

## Table of Contents

Abstract	Pg. 3
Chapter One - Introduction	Pg. 4
A. The Problem: Statement and Significance	Pg. 4
B. Research Questions	Pg. 5
C. Limitations and Delimitations	Pg. 5
D. Definitions of Terms	Pg. 6
E. Chapter Summary	Pg. 7
Chapter Two - Literature Review	Pg. 8
A. Theoretical Framework	Pg. 8
B. The Literature Reviewed	Pg. 9
C. Chapter Summary	Pg. 17
D. Contributions This Research Will Make to the Literature	Pg. 17
Chapter Three – Research Procedures	Pg. 19
A. Research Methodology	Pg. 19
B. Sample & Instrumentation	Pg. 19
C. Data Collection & Analysis	Pg. 20
D. Chapter Summary	Pg. 20
Chapter Four – Results	Pg. 22
Chapter Five – Discussion	Pg. 25
Conclusion	Pg. 26
References	Pg. 28

### Abstract

Excited delirium syndrome (ExDS) is defined as delirium coupled with extreme agitation (Vilke et al., 2012). ExDS is a bona fide medical condition that requires immediate medical attention, as 8% of patients will die from it. Some research only classifies ExDS as “true ExDS” if the subject dies; most research does not and this research does not wish to exclude the 92% of ExDS cases where the subject does not die. ExDS is well known because it oftentimes comes into play during and after a violent encounter with law enforcement. Because over 7,000 U.S. law enforcement agencies use TASER® brand conducted electrical weapons (CEW), many of these violent encounters involve some application of the TASER (TASER International, 2014). Due to the fact that some people struggle with law enforcement, have a TASER applied to them, and later experience ExDS symptoms, there is a rush to associate TASER application with ExDS. The purpose of this study is to evaluate if there is a relationship between the application of a TASER and a later onset of ExDS.

## Chapter One

### Introduction

Excited delirium syndrome (ExDS) occurs when neurochemical systems in the brain are disrupted. Often times, there is a violent encounter that occurs just before symptoms arise and there is usually a presence of stimulants in the blood stream at the time of symptom occurrence (Excited Delirium ERI, 2014). Excited delirium has been discussed and researched since 1849, but it has recently gained more attention due to its recent association with CEWs. Research on ExDS is thus far incomplete at best, and this research has aimed at taking steps towards identifying the relationship, if any, between ExDS and CEWs. CEWs have now become acceptable use of force tools employed by law enforcement agencies across the United States.

#### The Problem: Statement and Significance

There is a growing body of research dedicated not only to ExDS but also to the syndrome's association with CEWs. Recent research has shown a possible connection between CEW application and ExDS but most of these connections are anecdotal and there is not a significant body of research showing a definitive link. There are many factors present in the small number of deaths associated with ExDS and this research has attempted to further examine any possible connections between CEWs and ExDS deaths.

Research surrounding ExDS employs many different styles; Jauchem (2011) notes that it would be unethical to repeatedly expose human subjects to CEWs, so the research located by this author was secondary research. The use of both qualitative and quantitative research appears to be nearly evenly distributed across research and within selected research papers and articles. This research examined the varying methodologies

employed by authors in this topic area but the overwhelming majority of research appears to be secondary research that attempts to examine a correlational relationship between CEWs and ExDS.

### Research Questions

This research has been directed at identifying a relationship between CEW applications and ExDS. Current research exists showing that some people have experienced ExDS symptoms including death after a CEW was applied to them. This research has attempted clear up some of these instances to see if the CEW was involved in the ExDS episodes or if CEW application was only proximate to the episodes. Specific questions that have been answered in this research include: How often are ExDS subjects exposed to CEWs? Are there instances where ExDS symptoms present without a CEW being involved? Finally, is there a relationship between CEW applications and ExDS symptoms?

### Limitations and Delimitations

Limitations to this research involved the fact that all of the research was secondary in nature. As Jauchem (2011) states, it would be unethical and impractical to attempt to recreate repeated CEW applications that also involve violent struggles and/or fleeing on foot. This author did not locate any studies where researchers attempted to induce ExDS and this research does not include this tactic either. Also, this research was limited by the fact that comprehensive surveys were not conducted. Future research could involve surveying law enforcement agents as well as medical personnel, but these types of methods are not useful for time sensitive and financially limited research projects such as this one.



Delimitations for this research were primarily directed at the content of studies that are being examined. First, this research has avoided any studies that were sponsored or supervised by TASER International, the primary vendor for CEWs. Careful consideration and examination was given to studies' conflicts of interest and ethical standards. Finally, excited delirium or other variations of the syndrome's name, has been commented on in studies since the 19<sup>th</sup> centuries. Because this study looked for the most current data and due to the fact that CEWs are a relatively new type of weapon, this research focused mainly on studies conducted within the past 20 years. This will help to ensure that the data gathered is the most current and has not been refuted since publishing.

#### Definition of Terms

- Conducted Electrical Weapon (CEW) – An electronic weapon commonly used by law enforcement to control suspects. These weapons involve pain compliance but they also interfere with signals between the brain and muscles.
- Excited Delirium Syndrome (ExDS) – Acute onset of delirium coupled with extreme agitation. Neurochemical systems in the brain are disrupted; oftentimes stimulant drug use is involved. Presentation includes but is not limited to: aggressive behavior, paranoia, unusual physical strength and hyperthermia.
- Neuromuscular Incapacitation (NMI) – A term used by TASER International to describe how their CEWs interrupt the signals between the brain and muscles.
- TASER® - The most common CEW used currently by law enforcement.  
Manufactured by TASER International in Scottsdale, AZ. These CEWs operate

at 50,000 volts and use a combination of pain compliance and NMI to incapacitate subjects.

### Chapter Summary

Although there are many brands and models of CEWs, this research only referenced the most common brand of CEWs, the TASER®. This research focused on establishing whether or not there is a relationship between CEW application and the presentation of ExDS signs and symptoms. Although ExDS is widely researched and studied, it is often under diagnosed and there is some dissent over whether or not ExDS is a true medical condition or a manufactured excuse used by TASER International and law enforcement to explain in custody deaths. The goal of this research was to add to existing research and discover if there is a true relationship between CEWs and ExDS.

## Chapter Two Literature Review

### Theoretical Framework

The theoretical framework surrounding this research is social disorganization theory. Warner et al. (2010) posit that social disorganization occurs when there is a deficit of social capital leading to lack of social controls like crime, disrespecting of authority, etc. This is caused by several factors related to neighborhood, lack of social standing, as well as feelings of inadequacy and lack of systemic involvement. People and societies that have social disorganization usually lack social ties, neighborhood pride, and other factors that lead to social controls within other groups (Warner et al., 2010). Although there is a lack of social organization, there is usually an accepted feeling of distrust towards authority where criminal activity is sometimes higher. In these cases, people will engage in illicit and unhealthy activities such as drinking to excess, drug abuse, property crimes and sometimes even violent crimes. These crimes are less likely to be reported to police and if they are, witnesses want to remain anonymous so that they do not have to get involved in the criminal justice process. However, it is this combination of drugs, alcohol, and crime that will frequently draw the attention of police to these areas and to these people. Once involved, there are small percentages of times where the offenders resist arrest and in our modern society, a CEW is likely to come into play to effect the arrest of a resistive and/or combative subject. Social disorganization can trace its roots to a lack of informal intervention, watching for crime and misbehavior and calling police before the situation gets out of hand as well as a lack of direct intervention where residents and bystanders directly address the problems at hand (Warner et al., 2010). Social disorganization theory plays a large role in studies where

law enforcement officers engage in arrests that ultimately lead to uses of force and CEW applications.

### Literature Review

There are multiple brands of CEWs on the market and currently in use. However, TASER® brand CEWs are the most common in the world at the present time. Also, the term CEW is the currently accepted term to describe these weapons; even though other terms and weapons have been used over time, this research has focused on TASERs and the term CEW. TASER International markets and sells many different CEWs that all operate in the same way. The weapons use electricity to activate small nitrogen tanks, which propel two probes towards the target. The probes are connected to the weapon via wires that carry electrical current and the electrical circuit is completed between the probes. Although the weapon operates at 50,000 volts, that voltage is only necessary to activate the nitrogen tanks and the voltage carried into the human body is much less (usually 1,500-5,000 volts). Also, the voltage is not continuous and is carried in a very low current (TASER International, 2014). The electrical current is sent in a pattern that mimics and interferes with the brain's communication with the muscles. This interference is called neuromuscular incapacitation, or NMI. This NMI is what disrupts a person's ability to control their extremities, thus making it easier for officers to take combative subjects into custody. Per their website, TASER International has spent over \$4.2 million dollars funding over 250 peer-reviewed studies to ensure that their products are safe.

Vilke et al., (2011) examine the history, characteristics, features, and treatment of ExDS. Delirium and excited delirium are not synonyms. Delirium is a disturbance of

consciousness and it involves the reduced ability to focus, sustain, or shift attention.

ExDS is a subcategory of delirium and is characterized by delirium, agitation, acidosis and it usually occurs in the setting of acute-on-chronic drug abuse, serious mental illness or both (Vilke et al., 2011). The majority of ExDS cases show onset occurring alongside or directly after stimulant abuse such as cocaine, methamphetamine, or PCP. Triggers can also include mental illness, or the abrupt termination of psychotic medication usage. This article notes that ExDS is a real syndrome with uncertain and multiple causes. ExDS is difficult to clinically diagnose because the behaviors and signs exhibited by the subject overlap with many other clinical diseases. Also, practitioners are unlikely to encounter a large number of cases and this lack of familiarity can lead health professionals to misdiagnose or under diagnose ExDS. Finally, symptoms similar to those of ExDS can and have occurred without the application of a CEW. This is usually referred to as cocaine induced, methamphetamine induced, or stimulant induced delirium (Vilke et al., 2011).

In a 1985 study by Wetli & Fishbain, the term excited delirium was used for the first time in a medical study. They describe a typical ExDS patient as suffering from acute drug intoxication, having a history of mental illness (especially paranoid disorders), having a recent struggle with law enforcement that included physical controls, chemical sprays, CEW application (or all of these techniques during the struggle), sudden and unexpected death, and an autopsy that fails to reveal a definite cause of death. The 10 main features of ExDS include: high pain tolerance, rapid breathing, sweating, agitation, tactile hyperthermia, non-compliance with police, EMS and medical personnel, extreme stamina, unusual or “superhuman” strength, inappropriately clothed, and attraction to

mirrors or glass. This research states that true ExDS is probable when six of these 10 factors are present in the subject (Vilke et al., 2011). Physical control methods employed by police or medical personnel should minimize the time spent struggling while safely achieving physical control. Treatment of ExDS symptoms should be prompt because some ExDS cases do end in sudden death. Treatment should revolve around reversing obvious medical abnormalities and will include aggressive chemical sedation (Vilke et al., 2011).

Stratton, Rogers, Brickett, and Gruzinski (2001) set out to identify and rank factors that were present after sudden deaths related to excited delirium. 214 cases were examined for this study and of these 214 cases, 18 of the individuals died. All of the individuals that died were involved in a prolonged struggle with police where they had to be restrained, 78% were found to have recently engaged in stimulant drug use, 56% had chronic diseases, and 56% were classified as being obese (Stratton et al., 2001). The 18 individuals that died were chosen for inclusion in this study, not only because they died, but also because EMS personnel were present for their arrest and restraint and could provide accurate and detailed information about the restraint process, use of arrest control techniques (physical strikes, CEW application, pepper spray, etc.), and subject symptoms leading up to their death. This research took a descriptive approach and noted that causal conclusions would require more research. The research shows that there are several applicable factors that can contribute to ExDS deaths but these authors argue that restraint techniques, stimulant use, and prior medical issues are the biggest contributors.

Much of the controversy surrounding ExDS is due to the instances when the subject dies in the presence of law enforcement and later, there is no pathognomonic

autopsy finding (Gill, 2014). There are many factors that are present during an episode of ExDS; the subject will display bizarre, violent behavior, hyperthermia, and they will often display violent and disruptive behavior to the point that law enforcement is involved. Once law enforcement is present, the ExDS subject will most certainly resist arrest and will need to be physically restrained. Secondary force options like strikes, kicks, chemical sprays, choke or pressure restraints, and/or CEW applications usually are the result of the violent behavior exhibited by the subject (Gill, 2014). Although there are many contributing factors to examine when looking at ExDS deaths, this article notes that CEW applications do not cause or contribute to death in a vast majority of cases.

The potential impacts of CEW exposure on respiratory and/or cardiovascular functions have been the focus of several studies that involve human subjects. The available published data, suggests that CEW exposures have minimal impact on these systems (Van Meenen, K., Lavietes, M., Cherniack, N., Bergen, M., Teichman, R., & Servatius, 2013). This research studies 23 police officer trainees who volunteered for five-second exposures from a TASER X26 CEW. Five seconds is the duration of a standard cycle on a TASER CEW (TASER International, 2013). The research relied on informed consent from the participants, followed TASER International protocols for voluntary exposures, and the researchers instructed the participants to consciously sniff through their nostrils before, during, and after the exposures. Respiration levels were measured for a total of 45 seconds, 20 seconds before the exposure, the duration of the five-second cycle, and 20 seconds after the cycle (Van Meenen et al., 2013).

Forty four percent of the subjects complied and attempted to breathe during the exposures; none reported being able to sniff through their nostrils during the exposure.

The other 56% reported not remembering if they breathed or not or not being able to breathe during the exposure. Data from monitors that were attached to the subjects confirmed no respiration occurred but also that there were no significant changes in heart rates (Van Meenen et al., 2013). Although the study showed that most participants stopped breathing during the five-second cycle, all normal breathing resumed immediately upon the termination of the five-second cycle. Also, there was no evidence of cardiac disruption and no evidence of missed heartbeats (Van Meenen et al., 2013).

Hall, Kader, McHale, Stewart, Fick, and Vilke (2013) created a checklist for police officers that applied physical force during an arrest to study ExDS. This checklist was then applied to all uses of force in a large Canadian city over a period of 36 months. In this 36-month period there were over 1.5 million police contacts that resulted in 1,269 uses of force, which shows that over 99.9% of police contacts did not result in uses of force. Out of these 1,269 uses of force there was one death, again 99.9% of police uses of forces did not end in a fatality (Hall et al., 2013). This research applied the same 10 features of ExDS as did Vilke et al., (2011). In this research, nearly 86% of the subjects involved in a police use of force that exhibited ExDS characteristics exhibited at least three of the 10 features at the time that force had to be applied (Hall et al., 2013). Although the data were gathered from police officers filling out a checklist, the authors were able to discount any positive recall bias because over 20% of the completed surveys contained “none of the above” when describing how many ExDS features were present at the time of the force application.

The role of the CEW in ExDS deaths is unknown and controversial. Research shows that the potential for CEWs to cause ventricle fibrillation is very low and that



neurological side effects caused by CEWs are only anecdotal (Pasquier M, Carron P, Vallotton L, Yersin B, 2011). A recent case study of 1201 CEW exposures failed to prove that the two deaths occurred due to the CEW; another study of 1101 exposures showed no deaths at all (Pasquier et al., 2011).

ExDS seems to have more of a role in deaths than the application of a CEW. In a review of 37 autopsy records where death occurred within 24 hours of a CEW application, only 27% of the autopsy reports even mentioned a CEW application and in all of those cases, the CEW was labeled as a “potential” or a “contributory” factor (Pasquier et al., 2011). This research notes that the CEW role in deaths is speculative at best because there is no scientific way to determine if the deceased would have died even without CEW application. This is because almost every death that involves a CEW also includes several other risk factors that could have played a role in the death. Reviews of autopsies where there was a CEW application and a later death, showed that 50% had pre-existing cardiovascular disease, 75% had stimulants in their toxicology reports, ExDS signs were present in 76%, and more than half had CEW exposures that were three to four times longer than a standard five-second TASER cycle (Pasquier et al., 2011).

Noting that ExDS is a true medical emergency and has a high risk of sudden death, Vilke, G., DeBard, M., Chan, T., Ho, J., Dawes, D., Hall, C., & Bozeman, W. (2012) conducted a case study on an ExDS subject that did not die. In the case study, the subject was described as a 34-year-old male who was called into police after he was observed wandering around a park, talking to himself and disrobing. By the time police arrive he is completely naked, sweating, and talking about aliens contacting him. Witnesses on scene tell police that he is a known methamphetamine user and has used

methamphetamine on this day. As officers approached, the male became more aggressive and the officers decided to use a TASER to incapacitate him. Four officers eventually restrain him until EMS can arrive to immediately treat his ExDS signs. EMS personnel attempt to treat the subject but he continues to struggle; they note that his skin is hot to the touch and his blood pressure and heart rates are very high (Vilke et al., 2012). ExDS has a high fatality rate (10%) so the fact that EMS personnel were able to recognize, intervene, and proactively treat very well may have saved this subject's life. This research states that EMS staff needs to protect themselves from the patient and the patient from himself.

CEW use in instances like this is preferable to more drawn out physical confrontations. Heavy physical exertion like fighting can contribute to a higher risk of sudden death compared to CEW use which only subjects the patient to a short electrical burst and faster restraint (Vilke et al., 2011). Less physical exertion combined with faster restraint reduces the use of large muscle groups and oxygen consumption, factors that are sure to lead to a higher risk of death in ExDS cases (Vilke et al., 2011).

Using a retrospective, cohort design, Strote et al. (2012) studies all CEW uses by a police department over a six-year period. During this time frame, 1101 subjects were included and 1.4% met the authors' criteria for ExDS. Medical records of the subjects were examined as were use of force reports completed by involved officers. The data gathered from these two sources included: race, age, gender, height, weight, suspected mental conditions, type of incident, number and location of CEW applications, effectiveness of the CEW, and any secondary injuries (falls, puncture wounds, etc.). Eight hundred and thirty two or 93.9% of the subjects had a history of drug and/or

alcohol abuse. Over 59% of the subjects were diagnosed with a psychiatric illness, and during the six-year period no subjects died. These authors noted that CEWs have a “strong safety record” because only four of the 1101 subjects displayed multiple criteria that related to ExDS. All four of these subjects engaged in violent struggles with police. Three of the subjects were admitted to the hospital and the fourth was discharged after being diagnosed with a heart problem that is usually caused by chronic drug use (Strote et al., 2012).

White et al. (2012) took a descriptive analysis approach when they examined media and medical reports of deaths that followed the application of a CEW. This study took place over a seven-year period and the study stated that TASERs pose a low physiological risk to healthy adults (White et al., 2012). Subjects that died after having a CEW applied to them were also frequently intoxicated, they actively and aggressively resisted police, and their causes of death were commonly drugs, heart problems, ExDS. Causes of death were only linked or associated to the CEW in two cases, but the CEW was never listed as the actual cause of death (White et al., 2012).

In a two-part analysis, Storey (2012) looked to answer two questions. First, is ExDS a legitimate cause of death? Also, how should recognition of and training for ExDS subjects factor into a determination of what is an objectively reasonable police use of force? ExDS is a physical response to a psychological problem that results in the production of too much adrenaline. Nearly all ExDS deaths are due to a combination of factors including but not limited to the following: physiological changes after a prolonged struggle, ingestion of medications and/or illegal drugs, natural diseases, and the overdose of adrenaline. These combined factors result in organ failures that if not treated

immediately, will lead to death (Storey et al., 2012). Law enforcement's role is to take a rapid, three pronged approach to dealing with these subjects. First, they need to recognize the ExDS characteristics being exhibited by the subject. Next, the suspect needs to be quickly, efficiently, and safely taken into custody. CEW application can be an effective way to accomplish this goal because oftentimes, the CEW application reduces the chances of a long, violent struggle. Finally, the ExDS subject needs to be turned over to EMS personnel as quickly as possible. Multiple federal and appeals courts have noted that these practices are effective in saving lives and protecting the involved officers from excessive force allegations. Specifically, in 2009, the 11<sup>th</sup> circuit court of appeals noted in *Mann v TASER International* that ExDS presents a "serious medical need" (Storey et al., 2012).

#### Contributions This Research Will Make to the Literature

As noted earlier, there is a large volume of research that deals with ExDS and at least mentions the role that CEWs may play in the onset of presentation. This research attempted to add to the existing literature by examining more in depth the relationship, or lack thereof, between CEWs and ExDS. Much of the research located states that there is no reason to suspect that CEWs are related to ExDS deaths; but there is still a large population of people, media outlets, and private organizations who feel otherwise. The goal of this research has been to add to the existing body of literature and give more focus and attention to the controversy surrounding CEWs and ExDS.

#### Chapter Summary

The literature located for this research was comprehensive and diverse. The literature is generally secondary in nature but some literature has been located where law

enforcement personnel or emergency medical personnel were surveyed. The literature is complete when describing ExDS signs and symptoms, but the literature appears to be incomplete at best, when describing actual causes. Also, there was little evidence located that CEWs have a role or a relationship in ExDS cases. The mere fact that ExDS symptoms present proximate to CEW application will need to be investigated further in other research.

### Chapter Three

#### Research Methodology

Many methodological approaches have been used to study ExDS; many of these approaches use quantitative and/or qualitative approaches. Jauchem (2010 & 2011) authored two separate studies where the data is gathered via complimentary approaches of quantitative and qualitative methods. In the 2010 work, Jauchem uses several different quantitative measures to show the physical effects that CEWs and ExDS have on the human body. Comparing data sets from human subjects as well as swine that had CEW exposures, this research uses many facts, figures and statistics to describe the effects that CEWs and ExDS have on the body. The author notes that ventricle fibrillation (VF) is often a claim offered up by plaintiffs in civil lawsuits against law enforcement agents that use a CEW and a death occurs afterwards. The research shows that through the year 2006, there were over 610,000 documented CEW applications by law enforcement and not one case of VF has been documented.

#### Sample and Instrumentation

This research took a secondary approach that employed both qualitative and quantitative studies. The instrumentation included studies and articles that were scholarly and peer reviewed in nature. These articles were obtained via the Regis University online library accessing databases such as Academic Search Premiere, MEDLINE, and PSYCInfo. Outside websites for entities like TASER International, the Excited Delirium Research Institute, and the Academy of Criminal Justice Sciences were utilized and provided statistical as well as ethical information that was critical to this research. Articles selected for the research were peer-reviewed and had verifiable references.

Articles and studies without references were not included in this research. The sample for this study attempted to be as representative as possible so that the research was able to show as many perspectives and theories as possible. Random samples would not work for this study and a purposive sample would not adhere to ethical guidelines or academic standards because excluding certain articles would give the appearance that the only articles chosen for inclusion were those articles that supported a certain hypothesis or position.

### Data Collection & Analysis

Once the data were collected from the scholarly and peer-reviewed journals, it was organized into sections that allowed the data to be presented in an orderly fashion. Also, the data was analyzed so that it could be adequately presented. Due to the fact that most of the data was qualitative in nature, this research has attempted to identify recognizable patterns in the studies and the data which was obtained from them. Key themes and data points that occurred regularly were examined and reviewed. Any data sets that appeared to be outside of the normal data, were also examined because it would have been unethical to exclude data simply because it did not fit into other theories and studies.

### Chapter Summary

Research methodologies on this particular study have been, and will continue to be secondary in nature. It is impractical and unethical to try to recreate the factors necessary to induce ExDS. This research aimed at taking the secondary research even further by using previously published works that have solid references and are peer-

reviewed. This type of research is effective and has allowed this research to examine if in fact, there is relationship between CEW applications and ExDS.



## Chapter Four

### Results

As stated earlier, the purpose of this secondary research was to determine if there is a relationship between CEWs and ExDS and if so, to what extent? There have been some media reports and thus, public perception exists that CEWs actually cause the onset of ExDS symptoms. There is not an ethical or safe way to determine causation because applying the CEW multiple times to subjects under the influence of alcohol and/or drugs, and who have pre-existing medical conditions is not an acceptable or safe form of research. Upon beginning this research, it was hoped that a large body of research could be located on this subject and this was the case. Studies from a broad spectrum of authors, publications, and specialties were located and examined.

Fourteen peer reviewed journal articles that contained specific information on ExDS and CEWs were located and examined for this research. Two websites, TASER International and the Academy of Criminal Justice Sciences were consulted only for their technical specifications and ethical considerations respectively. A third website, the Excited Delirium Institute (ERI) was used in this research to gather statistics, trends, and previous studies on the syndrome itself. A fourth article by Warner et al. (2010) was used to provide a theoretical framework for this study. In the 14 peer reviewed articles, there were five consistent risk factors that were examined to attempt to explain ExDS. These factors were: drug abuse, CEW applications, mental illness, prolonged struggles, and chronic diseases. The leading contributory factors were drug abuse and prolonged struggles; these factors were both present in 9 out of 14 articles or 64.2%. Mental illness appeared in five articles, with a frequency of 35.7%. CEW applications and chronic

diseases both appeared six times, with a frequency of 42.8% (See Table 4.1). It should be noted, however, that CEW applications were present in two articles (Gill, 2014 & Van Meenen et al., 2013) where the CEW was described as not having any negative effects on the human body; or at least not as much as has been stated in prior research. When adjusting for these two articles, the CEW is only listed as a possible contributor to ExDS in four or 28.5% of the articles.

**Table 4.1**

<b>Risk Factor</b>	<b>Drug Abuse</b>	<b>CEW</b>	<b>Mental Illness</b>	<b>Prolonged Struggle</b>	<b>Chronic Diseases</b>
<b>Number of Times Present in Articles</b>	<b>9</b>	<b>6</b>	<b>5</b>	<b>9</b>	<b>6</b>
<b>Percentage</b>	<b>64.2%</b>	<b>42.8%</b>	<b>35.7%</b>	<b>64.2%</b>	<b>42.8%</b>

This research was directed at attempting to answer three research questions. First, how often are ExDS subjects exposed to CEWs? Early research tends to imply that either CEWs are the major cause of ExDS or that CEWs are not involved in ExDS presentation at all. Second, are there instances where ExDS symptoms present without a CEW being involved? Many media outlets seem to imply that ExDS only presents after CEW applications. Finally, is there a relationship between CEW applications and ExDS symptoms? Although this research does not deal with causation, it has aimed to investigate whether or not there is a relationship between CEWs and ExDS.

CEW application proximate to the onset of ExDS application appeared in less than half of the literature reviewed for this research. CEW application also never appeared in the literature without a clustering of several other factors like prior medical

issues, drug abuse, mental illness, etc. Also, CEW applications appeared in six journal articles reviewed for this research and in two of those articles, CEW effects on subject health were described to be very low. In regards to ExDS cases that do not involve a CEW at all, there is a large body of literature dedicated to this fact. Multiple syndromes existed decades before the CEW was invented that have symptoms that mirror ExDS. Cocaine induced delirium, methamphetamine delirium, and even early research on excited delirium all pre-date and does not involve CEWs. Additionally, research like Vilke et al. (2011) actually recommend CEW applications to subdue ExDS subjects because the CEW allows law enforcement to detain and control the subject faster and safer than a long, drawn out physical struggle. Lastly, this research shows that a bona fide relationship between CEW applications and ExDS cannot be shown. This is true because of multiple factors. ExDS symptoms can present outside of the presence of CEWs, there is no research available that will even explore causation, much less prove it. Also, research exists recommending prompt restraint via a CEW as opposed to long, physical confrontations.

## Chapter Five

### Discussion

Excited Delirium Syndrome is not a new syndrome and there has been a lot of research and controversy surrounding this condition. Research thus far has been fairly descriptive and the purpose of this study was to see if there was a relationship between ExDS and CEW applications. Much of the research on ExDS has taken a broad look at the syndrome and at the myriad of conditions that are present when symptoms present. The signs and symptoms of ExDS include hyperthermia, delirium with accompanying agitation, superhuman strength, insensitivity to pain, and in many cases, death. Contributing factors to ExDS are numerous but the most common are drug abuse, CEW applications, mental illness, prolonged struggles, and chronic diseases. Analyzing the data gathered during this secondary research has led to the following findings.

In order to determine if there is a relationship between ExDS and CEWs there are key points that must be addressed. First, as noted earlier, no research exists where causation could be determined; because of the risks involved there may never be one benchmark study that will definitively show or rule out causation. Second, there is a wide body of research dedicated to conditions similar to ExDS but that have different names, like sudden in custody death, cocaine induced delirium, etc. Like ExDS these conditions are also true medical conditions but they do not involve any application of CEWs. Third, although CEWs appear proximate to ExDS onset in 42.8% ( $n=6$ ) of the literature that was reviewed in this research, one third of these appearances ( $n=2$ ) were in studies where the researchers discounted or ruled out the effects that the CEW had on the human body. Finally, because ExDS involves a cluster of symptoms that singularly,

would be cause for medical attention, there is not an easy way to discern if the presence of a CEW application has any relationship with the onset of ExDS. ExDS subjects are highly agitated, usually on drugs and/or alcohol, and frequently have chronic medical issues. Because there are other serious medical conditions that are similar to ExDS but do not involve a CEW application, and most CEW applications do not result in the onset of ExDS, it would be unwise to claim a strong relationship exists. Future research should be directed at exploring what combination of factors lead to ExDS most often.

### Conclusion/Summary

This research has been directed at addressing the problem related to ExDS and the role, if any, CEWs play into the syndrome. ExDS is a complicated syndrome that involves many symptoms and characteristics. Most of these characteristics, hyperthermia, extreme agitation, delirium, and illicit drug use will most certainly draw the subject to the attention of law enforcement. When law enforcement contacts an ExDS subject, frequently there is a violent encounter. Since a large number of police agencies equip their officers with TASER ® brand CEWs, many officers will rely on these weapons to subdue the subject.

This study attempted to make a valid contribution to the already lengthy body of literature that exists on this topic. Some doctors and medical examiners attempt to make a causal link between ExDS and CEWs and this study was not fashioned in that manner. This study attempted to investigate recent studies on the topic of ExDS to see if there is a relationship between the syndrome and CEWs. There is a large body of literature available and the literature reviewed so far utilizes a wide array of methodologies. This body of literature has shown that ExDS symptoms do present in situations that do not

involve CEWs. In these cases, the subject usually has prior chronic medical issues, is under the influence of alcohol and/or drugs, and they almost always have engaged in exhaustive activities like running, fighting, etc. Although there are many cases where the ExDS presented symptoms proximate to a CEW application, there has not been any definitive data located where the CEW was the absolute and sole cause of ExDS.

## References

- Academy of Criminal Justice Sciences. (2014). Code of ethics. Retrieved from [http://www.acjs.org/pubs/167\\_671\\_2922.cfm](http://www.acjs.org/pubs/167_671_2922.cfm)
- Excited Delirium Research Institute. (2014). What is excited delirium?. Retrieved from <http://exciteddelirium.org/indexwhatisED2.html>. Accessed September 1, 2014.
- Gill, J. (2014). The syndrome of excited delirium. *Forensic Science, Medicine & Pathology*, 10(2), 223-228. doi:10.1007/s12024-014-9530-2
- Hall, C., Kader, A., McHale, A., Stewart, L., Fick, G., & Vilke, G. (2013). Frequency of signs of excited delirium syndrome in subjects undergoing police use of force: Descriptive evaluation of a prospective, consecutive cohort. *Journal Of Forensic And Legal Medicine*, 20(2), 102-107. doi:10.1016/j.jflm.2012.05.008
- Jauchem, J. (2010). Deaths in custody: Are some due to electronic control devices (including TASER® devices) or excited delirium? *Journal Of Forensic And Legal Medicine*, 17(1), 1-7. doi:10.1016/j.jflm.2008.05.011
- Jauchem, J. (2011). Pathophysiologic changes due to TASER® devices versus excited delirium: potential relevance to deaths-in-custody?. *Journal Of Forensic And Legal Medicine*, 18(4), 145-153. doi:10.1016/j.jflm.2011.01.014
- Monaghan, L., O'Dwyer, M., & Gabe, J. (2013). Seeking university research ethics committee approval: the emotional vicissitudes of a 'rationalised' process. *International Journal Of Social Research Methodology*, 16(1), 65-80. doi:10.1080/13645579.2011.649902
- McCarron, M., & Challoner, K. (1999). Emergency department treatment of patients in police custody. *Topics In Emergency Medicine*, 21(3), 39-48.

- Pasquier M, Carron P, Vallotton L, Yersin B. (2011). Electronic control device exposure: a review of morbidity and mortality. *Annals Of Emergency Medicine* [serial online]. August 2011;58(2):178-188. Available from: CINAHL with Full Text, Ipswich, MA. Accessed September 6, 2014.
- Stratton, S., Rogers, C., Brickett, K., and Gruzinski, G. (2001) Factors associated with sudden death of individuals requiring restraint for excited delirium. *American Journal of Emergency Medicine* 19:187- 191
- Storey, M. L. (2012). Explaining the unexplainable: Excited delirium syndrome and its impact on the objective reasonableness standard for allegations of excessive force. *St. Louis University Law Journal*, 56(2), 633-663.
- Strote, J., Walsh, M., Angelidis, M., Basta, A., & Hutson, H. (2010). Conducted electrical weapon use by law enforcement: an evaluation of safety and injury. *Journal Of Trauma*, 68(5), 1239-1246. doi:10.1097/TA.0b013e3181b28b78
- Taser International. (2014). How a TASER ® CEW works. Retrieved from <http://www.taser.com/research-and-safety/how-a-taser-works>.
- Van Meenen, K. M., Laviates, M. H., Cherniack, N. S., Bergen, M. T., Teichman, R., & Servatius, R. J. (2013). Respiratory and cardiovascular response during electronic control device exposure in law enforcement trainees. *Frontiers In Physiology*, 41-9. doi:10.3389/fphys.2013.00078
- Vilke, G., DeBard, M., Chan, T., Ho, J., Dawes, D., Hall, C., & Bozeman, W. (2012). Excited Delirium Syndrome (ExDS): Defining Based on a Review of the Literature. *Journal Of Emergency Medicine*, 43(5), 897-905. doi:10.1016/j.jemermed.2011.02.017



Warner B, Beck E, Ohmer M. (2010). Linking informal social control and restorative justice: moving social disorganization theory beyond community policing.

*Contemporary Justice Review*. December 2010;13(4):355-369.

White, M. D., Ready, J., Riggs, C., Dawes, D. M., Hinz, A., & Ho, J. D. (2013). An Incident-Level Profile of TASER Device Deployments in Arrest-Related Deaths.

*Police Quarterly*, 16(1), 85-112. doi:10.1177/1098611112457358