


2015

Influences of CSI Effect, Daubert Ruling, and NAS Report on Forensic Science Practices

Timothy Patrick Scanlan
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Walden University

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Timothy Scanlan

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2015

Abstract

Influences of CSI Effect, Daubert Ruling, and NAS Report on Forensic Science Practices

by

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MSFS, Florida International University, 2003

BCJ, Loyola University of New Orleans, 1998

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Public Policy and Administration

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Abstract

The media exaggerates the capabilities of crime laboratories while it publicizes the wrongdoings of individual forensic scientists. Such portrayals skew the perspectives of jurors and hinder expert witness testimony. Complicating the problem are separate, but related, phenomena that influence how forensic laboratories conduct casework. These phenomena are Cole and Dioso-Villa's conceptualization of the unrealistic expectations of forensic science created by fictional television, known as the CSI Effect; the Daubert ruling on the admissibility of expert testimony; and some federal policy changes as a result of a National Academy of Sciences (NAS) report that impacted requirements for the daily operation of crime laboratories. This study sought to better understand which among these phenomena had the greatest effect on policy development and implementation related to crime lab operations. Quantitative survey data were collected through an online survey from a nationwide sample ($n = 124$) of forensic practitioners belonging to the American Society of Crime Laboratory Directors. The data were analyzed using ANOVA to evaluate the influence of each factor (CSI Effect, Daubert ruling, and NAS report) on policy creation within crime laboratories. Results indicate that the CSI Effect has a statistically greater impact on policy creation than did either the Daubert ruling or the NAS report ($p < .001$). The implications for positive social change stemming from this study include recommendations to lawmakers and administrators to reevaluate performance objectives related to operations and increase awareness of the CSI Effect in order to promote scientifically sound results and increase the effectiveness of testimony at trial.

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Dedication

This dissertation is dedicated to my family for making me the man I am today.

To my father, who taught me how to be a husband and a dad. Your example as husband, father, and law enforcement officer created the foundation upon which I have built my life. To my mother, who taught me the importance of faith and a love of teaching. Your example as a person of faith and teacher has driven me to continue to develop my mind, heart, and soul. To my children, Abi and Tim, who teach me the value of being a good father. Thank you for always “being part of the solution” and letting me play an active role in your lives. You all make me proud beyond words.

Lastly, to my wife, Marideli, you are the love of my life. Without you, I could not have accomplished half of the achievements in my life and certainly not this dissertation. You make me a better person each day.

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Chapter 1: Introduction to Study

Introduction

Forensic scientists play a significant role in criminal investigations and must be able to accurately apply science so that justice is served. This role often begins at the crime scene, continues as evidence is analyzed at the crime laboratory, and leads to the witness stand as they present findings in a court of law. Pyrek (2007) discussed factors and challenges forensic scientists face as they perform their duties. These factors include an increase in the standards set by the courts and greater scrutiny by the general public. Of the influences facing forensic science, three have affected expert testimony more than others, and play a critical role in how experts prepare for court and present their findings to a judge or jury. First, a United States Supreme Court ruling, the Daubert Ruling, has changed the method by which the admissibility of expert testimony and scientific analysis is judged by the court (Daubert v. Merrell Dow Pharmaceuticals, 1993). The Daubert Ruling stressed the trial judge's role as the gatekeeper for the admissibility of scientific evidence and added specific guidelines for judges to follow when acting in this role. Secondly, the proliferation of fictional forensic science based television shows has created a phenomenon known as the *CSI Effect*. Among other factors, it is thought that the CSI Effect can lead to an unrealistic expectation of forensic evidence in criminal trials (Schweitzer & Saks, 2007; Thomas, 2005). Thirdly, and most recently, the National Academy of Sciences published a report entitled "Strengthening forensic science in the United States; a path forward" (Collins, 2009; Mays, 2009; NAS Report, 2009). The authors of this report challenged the reliability of forensic science and focused on specific

disciplines within the field. The report additionally outlined some of the perceived weaknesses in the field, factors that have created those weaknesses, and possible methods for strengthening the field as a whole. Many practitioners, supervisors, and members of the academic community have referenced the Daubert Ruling, CSI Effect, and NAS Report as influences in crime laboratory practices and expert witness testimony.

The Daubert Ruling gives trial judges discretion in determining the admissibility of scientific evidence and provides a set of guidelines that judges may choose to use. They include asking four questions of a theory or technique, (a) can it be tested, (b) has it been subjected to peer review and publication, (c) is there a known or potential error rate, and (d) has it gained general acceptance in its field. Although many studies have been conducted to determine how judges and juries react to and utilize the guidelines set forth by the Daubert Ruling, there is not an extensive study that focuses on how this ruling is perceived by forensic scientists and how it has ultimately influenced the practice of forensic science (Dobbin, 2007; Edmond & Mercer, 2004; Gatowski, Dobbin, Richardson, Ginsburg, Merlino, & Dahir, 2001). This research may provide additional information as to how this ruling is guiding the operation of crime laboratories and the individual practices of forensic scientists.

There have been numerous studies regarding the CSI Effect and its influence on jurors' decision making at trial. The CSI Effect defined as, an unrealistic expectation placed on forensic science that is based on misinformation presented in the hit fictional television show, CSI: Crime Scene Investigation (CSI), and the many spinoffs that have followed (Mann, 2006; Thomas, 2005).

Once this evidence is not as plentiful or conclusive as what they have witnessed on television, jurors often find that prosecutors have not met their burden of proof and acquit the defendant (Mann, 2006). Although studies differ in their findings and the true existence of a CSI Effect is debatable, the general definition provided above is the premise with which most researchers begin their analysis (Brickell, 2008; Shelton, Kim, & Barak, 2006/2009; Stephens, S.L.; Ungvarsky, 2006). However, none of these studies examined whether a real or perceived CSI Effect influences the practices of crime laboratories or individual forensic scientists. If the forensic science community is reacting to the notion of a CSI Effect then proving the reality of such an effect is moot.

Because the NAS Report was published recently, its true effect on the practice is unknown. Although the report was a lengthy critique of forensic science and its various fields, the general findings can be summarized. The authors found there is little standardization in forensic disciplines outside of DNA analysis and that the lack of standardization jeopardizes the reliability of many of the disciplines (NAS Report, 2009). The authors also cited a lack of appropriate funding and national oversight as weaknesses in forensic science that could also affect its proper application. At this time, lawmakers, administrators, and the forensic science community are still debating the merits of the findings and determining which to apply to the practices already in place. Some professional organizations have responded to the NAS Report in whole or in part, but there is no consensus in these responses (Bohn & Jackson, 2009; Garrett, 2009). Of the limited data, little examined the views of individual forensic practitioners or administrators. Examining how individual forensic scientists view the findings of the

NAS Report may assist in evaluating the influence of the report as a whole and allow the forensic community to properly utilize its findings.

The study differs from others because it focused on how the Daubert Ruling, CSI Effect, and NAS Report are perceived by forensic scientists. Regardless how judges and juries view the Daubert Ruling, forensic scientists must abide by it. Despite how juries or attorneys view evidence in comparison to fictional television shows, forensic scientists are forced to compare their work to that of fictional crime scene investigators. This study examined how forensic scientists and crime laboratory administrators perceive these three factors and the influence of these factors on creating laboratory policy and conducting casework. A goal of this research was to better serve justice through the findings in order to develop guidelines that best utilize forensic science.

Problem Statement

Fictional television shows and the media in general have played a role in sensationalizing the analytical capabilities of crime laboratories, while publicizing the wrongdoings of individual forensic scientists. This burdens forensic scientists with unattainable performance expectations. This study contributes to the body of knowledge needed to address this problem by surveying forensic practitioners and laboratory directors in an effort to gauge their perception of how these factors affect the practice of forensic science and, ultimately, expert witness testimony.

Purpose Statement

The purpose of this nonexperimental, survey design study was to test the hypothesis that the United States Supreme Court ruling in *Daubert v. Merrell Dow*

Pharmaceuticals (Daubert Ruling), the CSI Effect, and the National Academy of Sciences 2009 report on forensic science (NAS Report) have a significant impact on the field of forensic science, from the examination of evidence, through the reporting of results and the testimony by members of the forensic science community, including both supervisors and practitioners, within crime laboratories from multiple jurisdictions.

Research Questions

1. What influence does the Daubert Ruling, the CSI Effect, the NAS Report, or all three have on the operation of a crime laboratory?
2. What influence does the Daubert Ruling, the CSI Effect, the NAS Report, or all three have on the analysis of evidence within the forensic science community?
3. What influence does Daubert Ruling, the CSI Effect, the NAS Report, or all three have on the testimony of expert witnesses at trial?
4. In the future will the Daubert Ruling, the CSI Effect, or the NAS Report have the greatest impact on the forensic science community?

Data Collection

This research explored how the Daubert Ruling, CSI Effect, and NAS Report have affected the practice of forensic science as practitioners analyze, report, and testify to their findings. In addition to a review of various texts, academic journals, law review journals, and other sources, a survey was distributed to the 600 members of ASCLD. This survey was distributed to forensic practitioners and laboratory directors in an effort to gauge their perception of how these factors affect the practice of forensic science as it interacts with the criminal justice system from the crime scene to the courtroom.

Limitations

One weakness of this study was that much of the data collected is related to personal perception. Respondents were asked how the Daubert Ruling, the CSI Effect, and the NAS Report affect specific aspects of forensic science. If these perceptions govern changes in policy they are significant and must be studied. As with any survey there are specific strengths and weaknesses. The strength of any survey method is that it allows for precise examination of mass, diverse, and geographically separated populations. Additionally, these data can be obtained with a low cost to the researcher and easily tabulated for analysis. Because this survey was of a quantitative design utilizing predominately close-ended questions, the data can be amassed from a large population and examined in different manners. There are various limitations and pitfalls when utilizing surveys to conduct research. The two greatest are ensuring validity and reliability.

The success of any study relies on the content being valid and reliable. Because surveys utilize the responses of uncontrolled individuals, questions can always be raised regarding the honesty or correctness of these responses. There are several factors that cause respondents to be dishonest. For example, they may not want to admit wrongdoing or any past negative actions. Additionally, poorly worded questions or choosing a population that cannot accurately answer a particular question may lead to incorrect answers. There are various methods that can be utilized to limit these issues and increase the reliability and validity of survey research, but those will be fleshed out in chapter three.

Because this survey was administered via the internet, additional challenges and limitations presented themselves. These included incomplete responses, multiple submissions, ensuring the intended target population responded, and limited access to the delivery method. There are proven techniques to combat these issues and they too are addressed in Chapter 3. Although this research design does have specific limitations, utilizing an online close-ended survey to examine the perceptions of forensic scientists and administrators was an effective tool to collect this data.

Terms and Definitions

Controlled substances analysis: Commonly referred to as drug analysis, this is the analysis of a drug whose manufacture, possession, and use are regulated by the government. Unlike toxicology this field of forensic science focuses on the analysis of the actual drugs, not how they interact with the body.

Crime laboratory: A scientific laboratory utilizing the various disciplines and sub-disciplines of forensic science in the examination and analysis of evidence for criminal proceedings, also known as criminalistics and forensic science laboratories.

Crime laboratory director (administrator): The senior supervisor of a crime laboratory, who is responsible for the administrative and technical operation of the facility and for the quality of the analysis offered by its personnel.

Crime scene (investigation and processing): The area of forensic science that has as its focus the proper preservation and documentation of crimes scenes, as well as the collection of physical evidence. The crime scene technician is accepted as a forensic

specialist, whose area of expertise is considered the professional, organized, and analytical approach to the processing of a crime scene.

CSI Effect: An unrealistic expectation placed on forensic science that is based on misinformation presented in the hit fictional television show, CSI: Crime Scene Investigation (CSI), and the many spinoffs that have followed (Mann, 2006; Thomas, 2005).

Daubert Ruling: Term used to describe the United States Supreme Court decision in *Daubert v. Merrell Dow Pharmaceuticals*, 509 U.S. 579 (1993).

Expert witness: In the broadest sense, an individual who has more knowledge than the average person in a particular field and is allowed by a member of the judiciary to testify to that knowledge in a court of law in the form of an opinion.

Expert witness testimony: Testimony offered by a witness qualified as an expert by knowledge, skill, experience, training or education. This testimony has two stages, a qualification stage and a stage dedicated to questions regarding the facts at issue. Numerous laws and Supreme Court decisions have shaped the scope of this testimony and its admissibility in a court of law.

Firearms and tool mark examination: The field of forensic science that focuses on the examination of tool marks to determine if a particular tool can be uniquely linked to a specific tool mark, including those markings produced by firearms.

Footwear and tire track analysis: The area of forensic science that has as its goal to determine the size, style, and manufacturer of a footwear or tire track impression and when possible associate a particular print to a unique source.

Forensic biology (DNA analysis, screening, serology): the application of the biological sciences in forensic matters. Typically, limited to the analysis of cellular material and biological fluids to identify the substance and determine its origin through DNA analysis.

Forensic science: In general, the application of scientific analysis to answer questions of interest in legal proceedings. Its various sub-disciplines include, but are not limited to forensic biology, forensic chemistry, firearm and tool mark analysis, questioned document analysis, trace evidence analysis, and forensic toxicology.

Forensic scientist: A general term used to describe a practitioner of one of the many fields of forensic science.

Forensic toxicology: The study of the effects of chemicals, such as drugs or poisons, on humans.

Latent print analysis: The area of forensic science that has as its goal to locate, develop, analyze, and compare fingerprint evidence and other specimens containing friction ridges in order to determine if a particular print can be identified to a unique source.

NAS report: Term used to describe the National Academy of Sciences 2009 report entitled “Strengthening forensic science in the United States: A path forward.”

Professional organization: an organization of individuals linked through professional credentials in some area of forensic science. These organizations can be broad in scope or limited to a specific discipline. Typical applicants must meet specific requirements to become a member.

Questioned documents examination: The area of forensic science that has as its goal the analysis of documents in which the authenticity and origin are challenged criminally or civilly.

Trace evidence analysis: The area of forensic science that focuses on the analysis of minute quantities of a substance. Most commonly this examination is conducted on such objects as hairs, fibers, paints, glass, but may be applied to any substance collected in small quantities.

Significance of Study

The study was significant for several reasons and had as its goal applying the findings to promote positive social change. Because the criminal justice system relies on the field of forensic science to assist in determining the guilt or innocence of individuals charged with a crime, it is imperative that it is applied accurately and appropriately. Unlike the observation of eye witnesses or statements made by suspects or defendants, the findings of forensic scientists rely on principles that can be tested and verified independently. If applied properly, forensic science can provide a truth that can only be delivered through rigorous study and utilizing best practices, developed utilizing scientific reasoning.

Increased scrutiny placed on forensic science by the courts, the public, and the media have changed the general perception of this area of criminal justice. Justifiably or not, this change may influence how the science of forensic science is practiced and, ultimately, alter the application and limitations of all fields of forensic science. It is the focus of this study to determine if crime laboratory administrators have altered the

practices within their respective laboratories based on their own preconceived idea of how recent major events are affecting forensic science.

The Daubert Ruling, the CSI Effect, and the NAS report all may have altered how laboratories train their employees and write their operating procedures. If laboratory administrators are reacting to criticism from the court or organizations challenging forensic science this may affect how forensic scientists collect and analyze evidence, as well as testify as experts. If laboratory administrators perceive that the CSI Effect is changing the application of forensic science by the law enforcement community, attorneys, jurors, and the courts, this may also alter how they manage their laboratories technically and administratively.

To create positive social change within the criminal justice system, one must first understand its workings. More specifically, it is important to study the use of forensic science and how it is applied in criminal trials. By studying how the Daubert Ruling, the CSI Effect, and the NAS Report influenced the process and by surveying laboratory administrators to ascertain how they viewed these challenges, it is possible to make recommendations that will help properly shape the use of forensic science. It is important to all parties involved, law enforcement, prosecutors, defendants, defense attorneys, and the triers of fact to utilize forensic science in its purest form so that it plays a significant role in ensuring that the innocent are not wrongfully convicted and that guilty parties are imprisoned. Ultimately, this is the objective of our criminal justice system and forensic science should assist in reaching that goal.

In the next chapter, a literature review was conducted to determine the breadth and depth of the current research, regarding the Daubert Ruling, the CSI Effect, and the NAS Report. Also, this chapter will review topics such as leadership, bias, and ethics. These topics directly influence a crime laboratory administrator's ability to recognize, react to, and overcome the challenges facing forensic science. Lastly, the literature review conducted in the next chapter will demonstrate the need for the research conducted in this study. This was done by demonstrating what research has been conducted previously, possible limitations in that research, and a need to study the personal perceptions of those individuals working within and managing crime laboratories. As previously stated, no research was found that focused on the personal perceptions of forensic scientists, regarding the influence of the Daubert Ruling, the CSI Effect, and the NAS Report on various aspects of forensic science.

Chapter 2: Review of Literature

Introduction

There are many factors that affect the application of forensic science and expert witness testimony. In this chapter I reviewed studies, articles, and other works related to this field. Chiefly, I examined the CSI Effect, the Daubert Ruling, ethics, and leadership in order to better shape the research tool utilized in this study. The first section, CSI Effect: Fact or Fiction focuses on the various studies that attempt to define and prove the CSI Effect. Section two, The Dauber Ruling and Its Effect on Expert Witness Testimony, will explain the actual ruling, its application by the courts, and how this application has influenced expert witness testimony. Section three, Forensic Science: Who Bears the Burden, will examine various ethical and leadership issues within the field, as well as discuss some criticisms of the field. There have been many studies conducted to improve forensic science and its application in the courtroom; however, none of these studies accurately reflects how issues such as the CSI Effect or the Daubert ruling influence the practices of crime laboratories or the perceptions of individual forensic scientists. Typically, these studies focus on judges and jurors reaction to forensic science and ignore forensic scientists and crime laboratory administrators. Additionally, having an understanding of how these individuals react to other administrative issues, such as ethics, leadership, and criticisms of the field, will also provide valuable insight into the workings of the crime laboratory. Gaining a better understanding of this population may provide a guideline to better utilize this component of the criminal justice system.

The CSI Effect

Introduction

In recent years the term CSI Effect has made its way into the popular culture. This portion of the review will focus on defining the CSI Effect, determining the validity of the many claims associated with this effect, and reviewing how this form of media influences various aspects of the criminal justice system (Cole and Dioso-Villa, 2007; Dioso-Villa 2014). As the media continues to air television shows and produce movies that focus on forensic science, crime scene processing, and the crime laboratory, the significance of this medium must be studied to ensure that the criminal justice system is not negatively affected. Because this phenomenon has the potential to skew juror's verdicts and change the use and operation of crime laboratories, the CSI Effect may have the power to alter the course of justice from processing the crime scene, through laboratory analysis, and into the courtroom,.

Defining the CSI Effect

Although there is much speculation regarding the influence of CSI-type television shows, most sources define the CSI Effect in a similar manner; however, this definition is limited in nature and narrowly focused (Mann, 2006; Thomas, 2005). Beyond this simple definition researchers vary greatly on formulating a working explanation for this effect and how it influences various aspects of the criminal justice field. Most authors enhance this basic definition based on their studies or research they have conducted.

Although this phenomenon of unrealistic expectations was thought to exist, the now generally accepted term CSI Effect must have originated at some point. In order to find

the roots of the phrase and its subsequent influence, Cole and Dioso-Villa (2007) traced the origin of the CSI Effect to a 2002 episode of the *CBS Early show*. In this context, the term was utilized to discuss the correlation between the growing interest of college students in forensic science based academic programs and the emergence of CSI-type shows. Cole and Dioso-Villa also found that the majority of media reports are from local entities because most of the actors, the law enforcement agency, crime laboratory, and prosecutors are local entities.

Cole and Dioso-Villa (2007) utilized the various media reports and scholarly articles to help narrow the definition of the CSI Effect. What they found was variation among the many actors in the criminal justice system. Ultimately, they found six variations of the CSI Effect. They label these various effects as: *strong prosecutor*, *weak prosecutor*, *defendant*, *producer*, *professor*, and *police chief*. Each entity has its own take on what the CSI Effect means to their small portion of the criminal justice system.

Cole and Dioso-Villa (2007) defined the effect CSI has on the prosecutor between strong prosecutor and weak prosecutor. Here, the terms strong and weak refer to the level of the effect, not the strength of the prosecutor. The strong prosecutor's effect is the textbook version of the CSI Effect, where guilty defendants are wrongly acquitted because of the jury's unreasonable expectations of forensic science. The strong effect focuses on the jury's perceptions. On the other hand, the weak prosecutor's effect focuses on how CSI has changed the actions of prosecutors. In the weak prosecutor's effect, Cole and Dioso-Villa explained that prosecutors often take preemptory measures to combat the possible influence of CSI. These include asking jurors about their CSI

viewing habits, during *voir dire*, the jury selection process where jurors are asked questions and answer under oath. This introduces CSI prior to the trial even starting and allows attorneys to select jurors based on their answers. Once trial begins, the weak prosecutor adds specific language to opening statements and closing arguments that injects the world of CSI. Additionally, weak prosecutors utilize experts during trial to explain many of the myths of CSI. By altering their tactics prosecutors may be increasing the presence of CSI in the minds of the jury and the defense attorneys, who will use this as a gateway to discuss how the CSI Effect applies to their case.

Cole and Dioso-Villa (2007) also discussed the defendant's effect. This aspect of the CSI effect is often referred to as *reverse CSI*, because the proposed influence differs greatly from the standard definition. In this view of the CSI Effect, defense attorneys and defense advocates assert that television shows like CSI portray a positive view of forensic science and elevates forensic science practitioners to near mythical status. Ultimately, Cole and Dioso-Villa stated that defense attorneys argue that the CSI Effect actually empowers jurors to put too much weight on forensic science and its perceived infallibility and that this view leads to convictions where acquittals would have occurred prior to the effect. This view of the CSI Effect flies in the face of what was previously stated in this chapter and has been studied to determine its validity. Opponents of this view believe that forensic science and its practitioners can never live up to this mythical status. This allows defense attorneys to challenge experts based on these unrealistic expectations.

Based on their research of previous works, Cole and Dioso-Villa (2007) also presented the producer's effect. Here, the proponents of this view state that television shows such as CSI actually educate the public, by creating a greater awareness of forensic science. According to Cole and Dioso-Villa, the producers of these shows believe that the educational benefit far outweighs the negative influences. In what Cole and Dioso-Villa referred to as the professor's version of the CSI Effect education is also a primary component. Here, proponents have cited an increased interest in forensic science based programs, due to the CSI Effect. This has led to an increased number of institutions adding forensic science courses, majors, and minors to their curriculum, as well as graduate degrees.

Cole and Dioso-Villa (2007) also discussed the negative influence of the proponents of the professor's view. Many students enroll in forensic science programs, only to find that the courses are nothing like the fast-paced drama of CSI. This leads to a high turnover rate in these programs. To avoid this, academic advisors must stress the science in forensic science and clearly explain the differences between criminology, which more closely focuses on sociology, and criminalistics, which is the study of forensic science.

Lastly, Cole and Dioso-Villa (2007) presented the police chief's version of the CSI Effect. Here, the law enforcement officials discuss how the increased study of forensic science leads to better-educated criminals. From those who watch the television show to college students who gain an in-depth knowledge of the crime laboratory, criminals can use what they learn to thwart law enforcement. Forensic science

practitioners report that criminals now have a better understanding of how clean up a crime scene, limit the evidence left behind, and the limitations of the crime laboratory. These various views of the CSI Effect demonstrate how the media can influence the criminal justice field by changing the perception of those who must operate within it.

Tyler (2006) looked at the CSI Effect as a part of the influence of the mass media on an individual's ability to make decisions based on sound facts and principles. To do so, Tyler reviewed a series of studies of juror behavior to look at the psychological perspective of these individuals. Tyler states that individuals have difficulty distinguishing between various forms of media. Quite often the lines are blurred between the nightly news, fictional entertainment, and commercials. Individuals often utilize fictional events depicted on crime dramas when justifying their stance on a legal theory. Furthermore, individuals cannot recall from which form of media they obtained information when pressed. This leads to a blending of fiction with fact, altering the public's perception of what actually has occurred or what is true. Tyler utilizes this hybrid reality to assert that fictional depictions of the criminal justice system alter the public perception of what is true. Over time this leads to phenomena, such as the CSI Effect, where fiction alters reality.

Tyler (2006) also defines the CSI Effect by examining how television shows like CSI influence jurors through secondary effects. First, Tyler suggests that CSI simplifies the complicated world of crime and, unlike real crime, provides closure to its audience, by having the case solved and justice delivered at the end of each episode. In an effort to reach this same type of closure, jurors may be more likely to vote for a guilty verdict.

Second, Tyler (2006) has his own take on the exaggerated limits of forensic evidence provided by the media and the probative value of this evidence may be exaggerated by the mythical status of its practitioners. Here, the juror looks at the outlandish methods depicted on CSI and believes that all forensic science is infallible and has a far greater probative value than what can possibly delivered by any scientific field.

Lastly and most significantly, Tyler (2006) points to the fact that most episodes end as the investigation comes to a close and rarely show the trial. For this reason, Tyler speculates that jurors may see the trial as an afterthought to the process and may have a preconceived notion that the defendant is guilty. This aspect of the CSI Effect is unique, because it driven by the format of the show and not the myths presented in the script. If this assertion is true, the CSI Effect may have a significant influence on the criminal justice system, but no studies support this view at this point. Other fiction television shows, such as *Law and Order*, show the entire process from crime scene to courtroom. This allows the public to understand the trial process and how the rule of law is applied in a criminal trial.

Studying the CSI Effect

Although the CSI Effect has been presented academically and in the media, does this mean the phenomena associated with the effect truly exist? As Tyler (2006) states, “The CSI Effect has become an accepted reality by virtue of its repeated invocation by the media. Although no existing empirical research shows that it actually occurs, on a basic level it accords with the intuitions of participants in the trial process” (p. 1083).

This portion of the chapter will present relevant studies to determine if the CSI Effect actually exists or is it, like Tyler suggested in 2006, merely a media driven fabrication.

Podlas (2006) constructed a two-stage study to examine the theorized CSI Effect. First, Podlas reviewed episodes from the first two seasons of CSI: Crime Scene Investigation (CSI). This was done to determine what aspects of forensic science are actually presented on the show and with what frequency. Podlas reported that seven subspecialties of forensic science were presented most with repetition, and she identified those specialties as print (fingerprint, shoeprint), blood, fiber/hair, rape kit/semens, guns/ballistics, drug, and DNA. Although vaguely described, these topics reflect the typical evidence analyzed within crime laboratories. Most frequently, evidence containing prints (16) and blood (12) were presented in these episodes. Fiber/hair (9), rape kit/semens (8), gun/ballistics (6), drug (5), and DNA (4) were presented multiple times, but less frequently. At least one of these subspecialties was presented in 39 of 46 episodes viewed by Podlas. Other subspecialties such as metal analysis, glass analysis, and paint analysis were presented in the remaining episodes. Lastly, Podlas found that murders and rapes were the most common type of crime presented.

This review of the first two seasons preceded the major study conducted by Podlas (2006). Here Podlas attempted to determine if there was a link to the amount of time an individual spent watching CSI-type shows and types of verdicts they rendered when presented with a “one-page criminal law scenario and a one-page verdict sheet on which respondents recorded their respective verdicts and ticked ‘reasons’ impacting their respective verdicts.” (p. 455)

The criminal law scenario utilized by Podlas (2006) focused on a rape in which the main concern was to determine if the encounter was consensual or nonconsensual. Because consent was the determining factor, forensic evidence played no role in the case. The verdict sheet required participants to first determine *guilty* or *not guilty* and then select the reasons for their decision. The *not guilty* respondents were asked to select from a list of eight reasons. Some focused on a perceived lack of physical evidence, while others focused on the truthfulness of the suspect or victim. Included in the list was also a half measure, stating that the crime may have been committed but the prosecution did not prove its case beyond a reasonable doubt.

The statistical analysis of the respondents' verdicts, reasoning, and proclivity to watch CSI-type television programs demonstrated the frequent viewers of CSI were no more likely to render "not guilty" verdicts. Podlas (2006) also stated that the CSI viewers who rendered the "not guilty" verdicts rarely listed forensic factors in their reasoning, further strengthening the findings. Podlas also suggested that the data hints that there may be a pro-prosecution effect, because CSI viewers may more vigorously review evidence, understand the criminal justice system, and have a greater proclivity to attend jury duty. Podlas admitted that this was not the focus of the study and that there is limited data upon which to base this opinion. In conclusion, Podlas suggested that the CSI Effect is a myth and does not actually lead to unjust "not guilty" verdicts. If anything, Podlas found that the study points to a proprosecution bias that defense attorneys must work against.

Although this study attempts to determine the validity of the CSI Effect it has two significant flaws. First, Podlas (2006) made the following statement, “because the scenario did not rest on an issue on which forensics could shed light, but solely on weighing the credibility of the alleged victim against that of the accused, the only ‘legally correct’ verdict was ‘not guilty.’” (p. 458) Presumably, the scenario provided in the study did not possess enough information for the respondents to determine credibility, so therefore the absence of evidence would lead to a “not guilty” verdict. This forces the study to focus less on the CSI Effect and more determining if the participants possessed “a guilty until proven innocent mindset.” The study would have been better served if clear forensic issues were presented in the scenario, so that participants could be evaluated as to how they viewed the evidence as it relates to the influence of CSI. Second, presenting an actual scenario, instead of one created by the author, may better isolate the author’s bias and protect the study.

In another study published in 2006, Shelton, Kim, and Barak attempted to provide clear empirical evidence of the CSI Effect. In this study they utilized 1,027 individuals who had been summoned for jury duty. These individuals had not yet been empanelled on a jury, nor had they been exposed to voir dire. Instead they were selected for participation in this study, which analyzed the participant’s need for the prosecution to produce scientific evidence and to see if guilty verdicts were tied directly to this need. Additionally, the study examined the amount an individual watched fictional crime related dramas in an attempt to correlate that amount with the need for scientific evidence.

The first research goal of Shelton, Kim, and Barak (2006) was to determine if jurors' expectations for scientific evidence increased if they were viewers of fictional crime shows versus non-viewers. The study revealed that jurors now have a high expectation for scientific evidence at trial and that those expectations increase with the seriousness of the charge. For example, 46% of those surveyed expected to see some scientific evidence in every case presented by the prosecution and 74% expected to see some form of scientific evidence in murder cases. Viewers of fictional crime related television shows had a greater expectation for all forms of evidence. This includes scientific and non-scientific. Viewers also had slightly greater expectations for scientific evidence than non-viewers. This holds true overall and with scientific evidence tied to specific crimes. For example, viewers expected to see "ballistic" evidence in gun cases or they expect to see fingerprint evidence in breaking and entering cases. The viewer's thirst for all forms of evidence appears to be the major finding in this portion of the study and it is clear that solely circumstantial cases are most influenced by the CSI Effect.

Ultimately, Shelton, Kim, and Barak (2006) studied if watching fictional crime related television shows increased the likelihood of an individual returning a "not guilty" verdict. The study found that although there is a high expectation for scientific evidence among jurors, this increased expectation did not correlate to an increase in "not guilty" verdicts. Shelton, Kim, and Barak found that jurors could place their expectations for scientific evidence aside and weigh all evidence when rendering a verdict, with two exceptions. First, circumstantial cases were much more likely to return "not guilty" verdicts when no scientific evidence was presented. In fact, purely circumstantial cases

led to “not guilty” verdicts 41.7% of the time. Second, jurors required scientific evidence in cases of rape or sexual assault. Jurors would render “not guilty” verdicts 26.5% of the time if no scientific evidence was presented. This holds true with or without testimonial evidence. Ultimately, Shelton, Kim, and Barak found no correlation to viewing fictional crime related dramas and returning “not guilty” verdicts.

Shelton, Kim, and Barak (2006) theorized that crime dramas alone have not changed the manner in which jurors view evidence, but can be attributed to much broader cultural issues in modern society. The authors refer to this as the “tech effect,” believing that the increase in technology and the availability of information has created a greater need for scientific and testimonial evidence by all jurors. Because the “tech effect” has proven to now be in the minds of jurors, members of the criminal justice system must learn to react to this change. Prosecutors must learn to present circumstantial cases more effectively when no scientific evidence has been recovered and develop better explanations for the absence of scientific evidence.

In 2007, Schweitzer and Saks attempted to determine if the CSI Effect existed and, if so it ultimately benefited the prosecution or the defense. To test the existence to the CSI Effect, Schweitzer and Saks created a fictitious transcript, which included expert testimony from a trace evidence analyst. The key piece of evidence presented was a single strand of hair recovered from a ski mask that was left at the crime scene. The analyst was able to conclude, through microscopic examination, that the strand of hair found at the scene was the defendant’s. This fictitious transcript was given to 48 college students for their evaluation.

In addition to answering survey question regarding the transcript itself, these students were also questioned regarding the frequency of which they viewed fictional forensic television shows such as CSI. Based on these responses the students were divided into two groups, viewers and non-viewers. Non-viewers were defined as those individuals who never watched fictional forensic television as non-viewers. Those who watched these types of shows once or more a month were listed as viewers.

Schweitzer and Saks (2007) found that viewers were much more critical of the forensic evidence and found that the analysis was less believable than non-viewers. Although viewers were far less likely to render guilty verdicts than non-viewers (18% guilty verdicts to 29%), both groups overwhelmingly acquitted the defendant. Schweitzer and Saks found that these findings support the CSI Effect and that this effect benefits the defense by making jurors more critical of forensic evidence.

The study conducted by Schweitzer and Saks (2007) contained flaws. First and most significantly, the analysis presented to the students was flawed and no qualified trace analyst would have reached the conclusions stated by the expert in the fictitious transcript. The microscopic analysis of hair is a general class analysis and cannot lead to the hair being positively linked to an individual. Other forms of forensic analysis, such as DNA analysis must be used to form such a specific conclusion (James and Nordby, 2005). It is unknown why Schweitzer and Saks would utilize bad science in their mock transcript, but its use skews the study and may demonstrate bias on their part. Based on the bad science presented, students were correct in overwhelmingly acquitting the defendant. Second, utilizing fictitious transcripts allows the authors to have too much

input into what occurred at the trial. Here, Schweitzer and Saks created every question, response, and ruling. Once again, this may lead to a significant error in the study, allowing the author's bias to skew the results. The study would have been better served if the authors utilized an actual transcript containing sound scientific principles.

Since Tyler's declaration in 2006, that there have been limited studies on the actual existence of the CSI Effect and none created any consensus. In fact the studies by Podlas (2006), Schweitzer and Saks (2007) and Shelton, Kim, and Barak (2006) appear to significantly contradict one another. More research is needed to determine if the CSI Effect is a myth or reality.

The Daubert Ruling and Its Effect on Expert Witness Testimony

Introduction

The expert witness plays a critical role in the criminal justice system. This role has changed with the Supreme Court ruling in *Daubert v. Merrell Dow Pharmaceuticals* (1993). After a brief discussion of the Daubert ruling, this portion of the review will focus on three key elements of post-Daubert expert witness testimony. These include: a critical review of the Daubert ruling and its application, an overview of the field of expert witness testimony and the boundaries that limit its effectiveness, and a discussion of how the Daubert decision has affected the triers of fact in their acceptance and application of expert witness testimony in the trial process. Although the Daubert decision has created a guideline for judges to evaluate science in the courtroom, experts, attorneys, and the triers of fact must have a greater understanding of proper expert witness testimony if the Supreme Court's ruling is to be effective.

The Daubert Ruling

For many years, the courts relied on an outdated Supreme Court ruling to determine the admissibility of expert witness testimony. The ruling in the landmark case, *Frye v. United States* (1923), was handed down in 1923. As Kiely (2006) discussed this case is *Frye v. United States*. The defendant, James Alphonzo Frye, was convicted of second degree murder. The conviction was appealed based on a ruling by the trial judge that prevented the defense from presenting, what it believed was, exculpatory scientific evidence in the form of a “systolic blood-pressure deception test”. The defense claimed that the defendant showed no signs of deception while taking this new test and; therefore, was not guilty of the crime. The state objected to the test and the court ruled in favor of the state. Post-conviction the defense appealed the ruling and that appeal made its way to the United States Supreme Court.

As Kiely (2001) reveals, the court debated vigorously if it was possible to articulate exactly when a scientific principle moves from the experimental to implementation stages. Because it was impossible for the court to draw a clear line defining the progression of any science, it ruled that the methodology at issue must be well-recognized and must have gained general acceptance in the particular field in which it belongs. This ruling was vague and took a conservative stance on the admissibility of expert witness testimony. Because of its vague nature, this ruling raised two questions that were debated in courtrooms for years. The courts needed to define what determines if a scientific principle is “well-recognized” and what level of agreement is needed for “general acceptance.” Although loosely constructed, what came to be known as the Frye

Standard focused on proving the reliability of evidence before it was allowed in court. This standard governed the admissibility of expert witness testimony for almost fifty years.

In the early 1970s the federal government created the *Federal Rules of Evidence*. Of these rules, Rule 702, stood in contrast to the Frye Standard. It focused more on admitting expert witness testimony based on relevance and less on reliability. Rule 702 states:

If the scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact at issue, a witness qualified as an expert by knowledge, skill, experience, training or education, may testify thereto in the form of an opinion or otherwise.

(Federal Rules of Evidence, 1975, p. 14)

This contrast between relying on reliability (Frye) or relevance (Rule 702) forced the Supreme Court to clarify the issue by re-examining how lower courts should evaluate expert witness testimony. In 1993 the Court chose the Daubert case to finally address the issue. This ruling stemmed from a lower court decision excluding expert witness testimony offered by the plaintiffs in an attempt to show that animal studies revealed that a specific drug, Bendectin caused birth defects in children, when taken by the mother during the first trimester of pregnancy. The defendants utilized an epidemiologist who reviewed the testing of 130,000 patients in eight different studies. He found that Bendectin did not cause birth defects in humans. The judge excluded the expert testimony of the plaintiffs and ruled in favor of the defendants who filed a summary

judgment. The lower court excluded the testimony on the basis of the Frye standard. This decision was appealed and found its way to the Supreme Court (*Daubert v. Merrell Dow Pharmaceuticals*, 1993).

Justice Blackmun delivered the opinion of the Court and created what is now known as the Daubert standard. In his opinion Blackmun delivered a four prong guideline that is to govern the acceptance of expert witness testimony, merging the theories of reliability and relevance set forth in Frye and Rule 702. To clearly evaluate the nature of the decision it must be quoted directly. In the opinion Justice Blackmun created the four guidelines by stating:

A key question to be answered in determining whether a theory or technique is scientific knowledge that will assist the trier of fact will be whether it can be (and has been) tested. "Scientific methodology today is based on generating hypotheses and testing them to see if they can be falsified; indeed, this methodology is what distinguishes science from other fields of human inquiry." Green, at 645. (See also C. Hempel, *Philosophy of Natural Science* 49 [1966]) ("[T]he statements constituting a scientific explanation must be capable of empirical test"); K. Popper, *Conjectures and Refutations: The Growth of Scientific Knowledge* 37 (5th ed. 1989) ("[T]he criterion of the scientific status of a theory is its falsifiability, or refutability, or testability.")

Another pertinent consideration is whether the theory or technique has been subjected to peer review and publication. Publication (which is but

one element of peer review) is not a *sine qua non* of admissibility; it does not necessarily correlate with reliability...

Additionally, in the case of a particular scientific technique, the court ordinarily should consider the known or potential rate of error...

Finally, "general acceptance" can yet have a bearing on the inquiry. A "reliability assessment does not require, although it does permit, explicit identification of a relevant scientific community and an express determination of a particular degree of acceptance within that community." *United States v. Downing*, 753 F. 2d, at 1238. See also 3 Weinstein & Berger 702[03], pp. 702-41 to 702-42. Widespread acceptance can be an important factor in ruling particular evidence admissible, and "a known technique that has been able to attract only minimal support within the community," *Downing, supra*, at 1238, may properly be viewed with skepticism (*Daubert v. Merrell Dow Pharmaceuticals*, 1993).

Listed in simpler terms the Daubert guidelines ask four questions of a theory or technique, (a) can it be tested, (b) has it been subjected to peer review and publication, (c) is there a known or potential error rate, and (d) has it gained general acceptance in its field. In delivering these guidelines the Supreme Court established a method by which lower courts were to consider the admissibility of expert witness testimony. Since the 1993 decision was delivered, both the legal and forensic science communities have struggled to interpret these guidelines and apply them to the legal systems in which they

operate. The remaining portion of this study will focus on how these two crucial communities of the criminal justice system are adapting to casework in a post-Daubert world.

Boundaries Limiting the Effectiveness of Expert Witness Testimony

In general, an expert is considered to be an individual who has more knowledge than the average person in a particular field and is allowed to testify to that knowledge in a court of law. This is a vague description that begs to be fleshed out. Each field to which experts belong has specific requirements and codes of ethics to which its members must adhere. To better grasp how Daubert has affected expert witness testimony one must first understand the expert witness. In hopes of gaining this understanding three concepts must be examined. These include the ethics guidelines that govern experts, how experts view and evaluate one another, and how this community is adapting to the challenges of Daubert.

In general, for every field that yields experts there is a professional organization that governs their behavior. These organizations establish guidelines that create standard methodologies and practices for deriving analytical opinions. In addition these organizations also tend to have ethics codes by which their members must abide. Mario (2002) reviewed the codes of ethics of fourteen different forensic professional organizations and found that they varied greatly. Although they varied in specificity and content, all required the members to act ethically or be punished. Many focused on expulsion while others focused on censorship. These professional organizations felt it necessary for their members to remain fair and impartial regardless of the case they

worked or what the evidence established. For example the Association of Firearms and Tool Mark Examiners (AFTE) code of ethics spells out in specific detail what a member should or should not do in the analysis, reporting, and testimonial phases of their case involvement. In addition the code requires experts of competing points of view to meet before testimony to determine if they can come to a common understanding before trial (Association of Firearms and Tool Mark Examiners [AFTE] Code of Ethics, 2000). This is key if forensic scientists are to have the highest ethical standards and if they are to be regarded as fair witnesses with no agenda. It is clear that codes of ethics alone do not create a completely ethical environment, but they do set standards that can be enforced. These codes are the front line of defense against unethical professional expert witnesses that sell themselves and their opinions for a price (Nordby, 2002).

Many experts operate within the boundaries of a crime laboratory. For these experts an additional factor defines them, this is the crime laboratory to which they are associated. The American Society of Crime Laboratory Directors is the largest crime laboratory accrediting body in the United States. In general, ASCLD reviews the procedures and practices of crime laboratories and ensures that those laboratories follow them. In addition ASCLD accreditation places a strong emphasis on ethical policies and procedures.

When viewing the ASCLD Code of Ethics it is quite clear that the burden of ethics is placed on the administration first and foremost. The opening paragraph reads as follows:

The American Society of Crime Laboratory Directors (ASCLD) recognizes that the laboratory managers bear additional ethical responsibilities beyond those expected of forensic scientists involved in the analytical casework. Ethical issues can arise from activities unique to managers, such as hiring, training, and supervising subordinates; establishing policies and procedures for evidence handling and analysis; providing quality assurance; budgeting and expenditure of authorized funds; and proper handling of agency property and supplies. While laboratory managers might not be involved directly in the analysis of evidence and presentation of courtroom testimony, their actions as managers can have a profound impact on the integrity and quality of the work product of a crime laboratory (ASCLD Code of Ethics, 2005).

The opening statement of this code of ethics demonstrates how ethics, morality, and integrity start with the top levels of an administration and trickle down. Expert witnesses are better served by the strict guidelines that govern their analysis, conclusions, and testimony at trial. In light of the Daubert standard it is important for every expert to closely adhere to the guidelines established by his professional organization and, when applicable, the crime laboratory they in which they work.

Ethics is only one aspect of expert witness testimony. Two other factors that affect expert testimony are bias and competency. The guidelines established by Daubert attempt to limit the effect of bias and incompetence on the proffer of scientific evidence.

With this in mind experts must clearly understand that bias exists and how to avoid its effects.

Commons, Miller, and Gutheil (2004) conducted a survey of 46 experts utilizing a questionnaire format. The questions were divided into two groups, one focused on determining factors that may cause bias and the second focused on how the experts viewed bias, as it affected the experts they went up against in cases. These questions yielded useful results.

This survey revealed that experts believe that bias does not affect their analysis and that any bias can be limited if the expert chooses to establish case acceptance criteria. Those surveyed also believed that bias was most strong with experts who only testify for one side in either criminal or civil cases.

When asked to look at their own bias most experts said it was limited in nature and did not affect their findings. However, when asked to discuss the bias of other experts they believe that it was high. Commons, Miller, and Gutheil (2004) found that these data suggest a state of denial within the expert witness community when recognizing their own bias. The authors also state that bias will never be eliminated, but experts can limit its effect by recognizing its existence and working to avoid it infecting their findings.

Experts may not always realize their own bias when conducting analysis. Dror and Charlton (2006) presented a study that focused on what so many authors only discuss in theory. This study examined if bias actually plays a role in the conclusions reached by latent print examiners. The methodology of the study was simple. Latent print

examiners were given latent prints to examine, which included individualizations (matches) and exclusions (non-matches). The same prints were resubmitted to the examiners, but on the second submittal biasing information was given to the examiners in hopes of swaying their results. The conclusions reached were surprising in that two-thirds of the experts had inconsistent findings.

Dror and Charlton (2006) focused on one form of error, an error in fundamental methodology, which may occur when other factors such as the mindset of the examiner are altered. This can occur when psychological and cognitive factors may bias the examiner. In order to study this factor the authors resubmitted eight sets of prints, previously evaluated by the six experts who participated in the study. When resubmitted, the examiners were given information that conflicted with the nature of the prints. For those that matched, the experts were told that the suspects were in police custody at the time of the crime and could not have committed the crime. For those that did not match, the experts were told that the suspects confessed to the crime. This misinformation was given in hopes of skewing the examiners' findings.

Two-thirds of experts made some change to their original findings. This led to changes in analysis in six of the 48 submitted samples (16.6%). In these changed findings, the experts typically changed their opinion of the difficult prints and were more likely to render an inconclusive decision. Although limited in its scope, this study demonstrates that experts may be biased by contextual information.

Although ethics and bias are critical when discussing any expert or forensic science, those are not the only factors that affect testimony. The most ethical

incompetent expert can destroy a case or lead to the wrong individual being convicted for a crime. When looking at the big picture, an incompetent expert can damage the entire field they are attempting to represent. Competency is the goal of Daubert and drives the effectiveness of expert witness testimony. Hiss, Freund and Kahana (2006) discuss the issue of expert witness competency and how that competency affects the field of forensic science. More specifically, the authors give specific examples of how the lack of competency can play a vital role in disrupting the trial process.

The three fields examined in this article, forensic biology, forensic medicine, and forensic anthropology were all examined to demonstrate how incompetent experts can grossly mislead the trier of fact in any case. Once these examples were presented Hiss, Freund, and Kahana (2006) concluded with a discussion that further drove home the issue of competency. First, the authors focus on how the expert's first responsibility is to the court. This responsibility should force the expert to become a competent and independent tool for justice. Experts must be able to understand their limitations and limit their findings to fields they truly grasp. With this in mind, experts must give testimony that is both competent and unbiased. To support this principal, Hiss, Freund, and Kahana utilize a notable quote from Broudel:

“If the law has made you a witness, remain a man of science; you have no victim to avenge, no guilty person to convict and no innocent person to save. You must bear testimony within the limits of science.” (p.93)

In addition to competency, ethics, and bias already discussed, there is a broader topic that affects expert witness testimony, admissibility. This issue stands at the heart of

this study and the Daubert ruling. A premise of our legal system is that a trial is the search for the truth in the interest of justice (Huang, 2000). Gutheil, Hauser, White, Spruiell, and Strasburger (2003) take a look at this statement and try to establish what “truth” is actually provided to the triers of fact.

Although the expert witness swears to tell the “whole truth” the legal system often makes this ideal impossible. Gutheil, Hauser, White, Spruiell, and Strasburger (2003) present legal reasons that the concept of the whole truth is an ideal that is rarely achieved and also offers recommendations to experts that aim to allow them to testify in the most truthful manner possible. Gutheil, et al. (2003) demonstrated that there is a balance between truth and admissibility and experts may be testifying to what they believe to be true instead of what actually is the truth. These two factors limit the truth as it is delivered to the trier of fact. The authors also discuss the fact that justice does not always equal truth and that our system is set up to deliver justice first and foremost.

Admissibility is molded by numerous factors that include justice, relevance, probity, and prejudice. In addition, precedent and case law guide the trial judge in determining what the trier of fact is allowed to take in at trial (Gutheil, et al., 2003). All of these factors often limit what an expert can testify to in the court, and that limitation affects the outcome of trials. For this reason, Gutheil, et al. recommends several ways for the expert to preserve the truth whenever possible. These recommendations focus on the fact that the expert’s testimony must be data driven and that there is a duty to deliver that data in an unbiased manner. In addition the authors believe that it is necessary for the expert to have an understanding of the critical information of the case and deliver

alternate theories if they are applicable. Limiting one's testimony to only one possible theory further prevents the testimony from being completely truthful.

The Daubert ruling at its heart focuses on the concept of admissibility. As discussed by Gutheil, et al. (2003), the guidelines of Daubert are created to limit what the trier of fact hears at trial. Although this limitation was created to ensure that only relevant and reliable expert testimony is presented at trial, this limitation keeps the "whole" truth from being heard. As the gatekeeper, the judge has an enormous responsibility to aid in the preservation of the truth, so that just verdicts are rendered.

The Daubert Ruling's Effect on the Triers of Fact

Although it is important to have a general understanding of the Daubert decision and the theories that govern expert witness testimony, to grasp the actual effect of the Daubert ruling one must consider how it is applied by the triers of fact. Judges must correctly apply the Daubert standard, focusing on both the letter and spirit of the case law developed. Juries, for their part, must be able to comprehend the expert testimony that is deemed admissible by the judge. This section will evaluate the abilities of both the judge and jury.

The decisions rendered by the United States Supreme Court create case law and set a precedent for lower courts to utilize when ruling on proceedings during trial. Although this is the case, the Supreme Court assumes that the lower court judges will correctly interpret and apply their rulings. On some occasions, the Supreme Court's rulings are open to interpretation or simply misunderstood by the lower courts. It can be

argued that the Daubert ruling was written in such a manner that it lends itself to misinterpretation. (Gatowski, Dobbin, Richardson, Ginsburg, Merlino, and Dahir, 2001).

An extensive study conducted by Gatowski et al. (2001) addresses three issues, the importance of the four prongs of Daubert; level at which trial judges understand what is written in the decision; and the different applications of the Daubert rulings based on specific fields of expert testimony. At the heart of the study is the recognition that judges are truly the gatekeepers of expert testimony, and it questions if they can rise to the challenge given to them by the highest court of the land.

The survey conducted by Gatowski et al. (2001) serves as a benchmark that is used to evaluate the mindset of federal judges on many aspects of the Daubert opinion. For this reason, the survey was looked upon with a critical eye in an effort to determine if its methodology and application were sound. Gatowski et al. (2001) created, distributed, and evaluated the survey with a clear and unbiased eye. The thorough nature of this research makes it an excellent tool that can be applied to a host of Daubert related topics.

Before examining the survey, Gatowski et al. (2001) first discuss the inaccurate record regarding the proper application of the Daubert standard. This is due to the fact that much of the research is based on appellate review of trial court decisions. This limits what cases are reviewed and skews the data. In an effort to obtain the most accurate information, Gatowski et al. formulated a two part survey that focused on judges' direct knowledge of Daubert, their level of education in science, and their ability to properly apply the Daubert standard in actual cases. Unlike cases that are published or sent for

appellate review, this survey provided anonymity for the judges and allowed them to answer the questions without relating their answers to specific cases.

Part one of the survey questioned 400 judges. Of these judges, 325 participated in the second more extensive portion of the survey. The surveyed judges were asked biographical information, including time on the bench and level of science education. Half of the judges had been on the bench for more than ten years with only a small percentage having less than five years of experience. More than half of the judges felt that they did have adequate science education; however, 96 percent stated that they did not receive specific CLE training regarding the use of the scientific method.

After the biographical data were obtained, judges were asked specific questions regarding the Daubert ruling and its application. Gatowski et al. (2001) reported on the results of the survey in a question by question manner that clearly established the significance of the data collected. In general the survey found that judges do play an active role as the “gatekeeper” of scientific evidence in their courtrooms as established by Daubert; however, a majority found the guidelines to be difficult to interpret and apply.

Gatowski et al. (2001) revealed that this lack of understanding centered on the concepts of falsifiability and error rate. Although 88% of the judges believed that falsifiability was a good guideline, only 6% understood the scientific meaning of the term. The questions on error rate received similar results. Although 91% of the judges felt that an evaluation of error rate would be useful, only 4% of the respondents had a clear understanding of the concept. A far more optimistic result was observed when it came to the concepts of peer review and publication and general acceptance. Ninety-two

percent of the surveyed judges felt that the evaluation of peers and publication was a useful tool and 71% possessed a clear understanding of the term. Also, 93% of the respondents believed that the evaluation of general acceptance was a useful tool and 82% possessed a clear understanding of the term. The high percentage for general acceptance is most likely due to the use of the term in the Frye Standard.

When asked by Gatowski et al. (2001) to weigh the significance of each guideline, once again, there was little consensus among the respondents. Less than half of the judges (42%) felt that equal weight should not be given to all the guidelines. Half of the judges (52%) would give general acceptance the most weight. Eighteen percent of judges gave the greatest weight to falsifiability (18%), error rate (16%), and peer review and publication (14%). Still 17% of the judges gave equal weight to all four guidelines and 21% were unclear on how to combine the guidelines.

Because judges often misapplied these four concepts when asked to define their meaning and the vast differences that were reflected on how judges viewed the weight of each guideline, it is clear there is no consensus on how to apply the Daubert standard. At least two of the Daubert guidelines, falsifiability and error rate, would be regularly misapplied in determining the admissibility of evidence in actual cases. This lack of agreement and knowledge coupled with the finding that judges want to play an active role as gatekeeper is troubling and suggests that the admissibility of scientific evidence is being ruled upon by a judiciary who lack what is needed to make just decisions.

In addition to their scientific knowledge, the judges were also asked specific questions regarding the Daubert opinion and its value to the justice system. Not

surprisingly, the answers varied greatly. When asked if the intent of Daubert was to raise, lower, or maintain the threshold of admissibility for scientific evidence, the judges disagreed greatly. Thirty-two percent believed the intent was to raise the threshold; 23% believed the intent was to lower the threshold; 36% felt that the Supreme Court neither wanted to raise nor lower the threshold. The remaining judges were uncertain of the Court's intent. Because these judges are charged with applying the intent of the Supreme Court, this vast difference of opinion demonstrates the inconsistent manner in which Daubert is applied.

When asked if the Daubert ruling is a valuable tool to assist the judge in the decision making the process, most of the judges (94%) felt that ruling was at least a somewhat valuable tool. This figure, however, does not truly reflect the opinions of the judges surveyed. Many complained that the ruling could be more specific and more uniformly utilized from state to state. Others thought that the ruling is a good start for creating a framework, but more specific guidelines are needed.

Once the surveys were completed and the data was extrapolated, Gatowski et al. (2001) reported some troubling results. Three findings were overwhelmingly expressed. First, judges strongly accepted their role as gatekeeper and believed that the Daubert standard created guidelines that established a framework for decision making. Second, a genuine lack of understanding exists among judges with regards to the scientific concepts governing the Daubert standard. Third, judges have extreme difficulty operationalizing the guidelines established in Daubert. The combination of these three findings opens the

door for inappropriate rulings when judges have to determine if scientific evidence is admissible.

Based on these findings, Gatowski et al. (2001) believe that strong scientific education must become part of the training of judges. In addition, specific training must be obtained regarding the application of the Daubert standard and the terms used within the ruling. Judges must not only know the letter of the law established by Daubert, but they must be able to accurately apply the standard. Their education must focus on the policy, practice, and philosophy established by Daubert, so that judges can properly utilize their role as gatekeeper.

One area that would be directly affected by increased education is the effectiveness of strategies that judges utilize when dealing with expert evidence. Dobbin, Gatowski, Eyre, Dahir, Merlino, and Richardson (2007) reported that 88% of federal judges and 69% of state judges asked “clarifying questions of experts” from the bench in order to better determine admissibility. According to Dobbin et al., these questions are being asked in the dark, because most of the judges do not have an understanding of scientific concepts nor the Daubert guidelines.

The survey conducted by Gatowski et al. (2001) clearly revealed that judges do not realize their own shortcomings with regards to applying the Daubert standard or the scientific principles it utilizes. Gatowski et al. clearly state that judges do not need to know how to conduct scientific investigations or create scientific protocol for a technique of study. However, they must have the ability to critically analyze the scientific methods presented in court to determine if they fall into the category of “junk science.” For this to

happen trial judges must have a better idea of which questions to ask and what answers to expect. Once this occurs, these judges will more accurately apply the standards set forth by the Daubert ruling.

As expert testimony continues to play an increasing role in the courtroom, science and the law will continue to interact in hopes of delivering just verdicts. As reported by Dobbin et al. (2007), a survey of state trial court judges asked if the frequency of difficult scientific cases has increased. Fifty-two percent of the judges said that the frequency remained the same, and 30% said that difficult scientific cases had increased. Only 6% felt that this type of evidence has decreased. With this in mind judges must develop effective strategies for admitting and managing expert testimony.

The judges were asked to establish when the question of admissibility was typically raised and how they addressed the issue (Dobbin et al. 2007). Seventy-two percent of federal judges stated that the admissibility issue was raised during pretrial motions and 64% stated that objections were also raised at trial. Once the issue was raised judges varied on how they addressed the issue. Half of the judges (49%) stated that they would hold a Daubert hearing regardless of the type of scientific evidence in question. However, the remaining judges felt that Daubert hearings should be reserved for “difficult expert evidence” (29%) and 23% would not hold a Daubert hearing, “regardless of the complexity of the evidence” (p.4).

Dobbin et al. (2007) reported that State judges also varied on how they would address the issue of an objection regarding the admissibility of expert evidence. Once again, approximately half (55%) would hold a Daubert hearing regardless of the type of

expert evidence in question. Twelve percent would reserve Daubert hearings for “complex expert evidence” and 24% would not hold a Daubert hearing to address the issue (p.4). These judges were also asked how they dealt with the admissibility of expert evidence in their last trial where the issue was raised. Not surprisingly, most federal and state judges surveyed allowed all proffered expert testimony without restriction. This research strongly suggests that trial judges often choose to err on the side of caution by allowing more expert evidence to be admissible, instead of possibly being overturned by a higher court for improperly excluding testimony. This suggests that most gatekeepers have an open door policy, but this does not prevent trial judges from finding problems with admitted expert evidence.

In the Federal Judiciary survey reported by Dobbin et al. (2007) judges were given a list of problems typically encountered when dealing with expert witness testimony. They were then asked to select the problems they most frequently encountered. The top four problems cited by these judges were as follows:

1. Experts abandon objectivity and become advocates for the side that hired them.
2. Excessive expense of party-hired experts.
3. Expert testimony appears to be of questionable validity or reliability.
4. Conflict among experts that defies reasoned assessment.

The survey of state trial judges revealed similar results when asked the problems they most frequently encountered. The top four problems cited by these judges were as follows:

1. Extensive disagreement among experts.
2. Experts abandon objectivity and become advocates for the side that hired them.
3. Excessive expense of party-hired experts.
4. Delay in trial schedule caused by unavailability of experts.

These lists of perceived problems punctuate the ideological conflict among the judiciary and contain terms like objectivity, validity, reliability, and conflict. These are the same factors that should be considered in a Daubert hearing. If pretrial Daubert hearings were utilized more frequently, some of these issues may be eliminated at trial. However, with judges seeming to allow increasing amounts of scientific and expert testimony to be heard in the courtroom a greater burden is being placed on juries to comprehend expert evidence and to distinguish between true and junk science.

With a greater burden being placed on jurors it is important to know if they are capable of rising to the challenge. Vidmar (2005) examined the notion that juries are incompetent sheep that blindly follow the expert witness down any path they choose to lead. Vidmar conducted empirical research, reviewing numerous studies that focused on jury competence, accountability, and bias. This research demonstrated that nothing is farther from the truth. In addition Vidmar asked trial judges if they agreed with the verdicts rendered by juries in their courts. He found that the trial judge would have rendered the same verdict as the jury over 80% of the time and that the complexity of evidence offered in the case did not alter the level agreement. Based on his research and data collection Vidmar rendered two significant conclusions. First, juries have a clear

understanding of the adversarial court system that governs both criminal and civil trials. Second, the verdicts rendered indicate that most juries are capable of evaluating expert testimony, use that testimony in conjunction with other evidence presented at trial, and deliver consistent verdicts.

According to Vidmar (2005) judges, trial attorneys, and expert witnesses have mistreated jurors, believing that they were incapable of discerning between fact and fiction. Vidmar (2005) clearly demonstrates that this lack of respect not only undermines the trial process, but also may lead to important cases being lost. Vidmar's research revealed that jurors do an adequate job of sifting through the mountains of evidence presented at trial. This is due in large part to the jurors' abiding by the instructions delivered by the judge in an effort to clearly frame expert witness testimony.

In addition to the instructions of the judge, jurors are also taking part in the adversarial court system, which allows for cross examination. This, coupled with the possibility of dueling experts, allows the jury to see through the smokescreen often offered as true evidence. Vidmar (2005) also found that the ability of the jury to deliberate on the case also plays a significant role in the quality of verdicts delivered. Too often critics forget that the group must come to a reasonable conclusion before the verdict is rendered.

Vidmar (2005) indicates that both experts and judges should learn from this juror research. For experts, the quality of their testimony and the explanation of the analysis conducted play a critical role in the outcome of a trial. They must be prepared to answer tough questions asked during cross examination and counter the claims of other experts.

Jurors are watching testimony through a discerning eye that requires experts to deliver clear accurate information as they testify. For judges, if they are going to place a heavy burden on jurors by allowing increasing amounts of expert testimony, they must offer them clear guidance in how to utilize this evidence. Jury instructions must be clear and create a framework in which jurors can evaluate this scientific and technical testimony.

Summary

As can be established by this research, the Daubert ruling has played a role in the judicial system's ruling on the admissibility of expert witness testimony. However, its role has been minimized by a lack of understanding possessed by both state and federal judges. This shortfall focuses on two factors. First, judges have a poor comprehension of the scientific principles discussed in Daubert. This lack of knowledge coupled with judges wanting to play an active role as gatekeeper has led to the second factor, irregularity. There are vast differences in how the Daubert standard is utilized across the country. For the Daubert standard to be properly utilized and done so in a more uniform fashion, education is the key.

Judges must be educated as to both the scientific principles utilized in the Daubert decision and how to apply the four pronged standard offered by the United States Supreme Court. This education is a must and should begin in law school and continue through throughout one's career. By beginning the education in law school all attorneys will have some exposure to the principles and will be better equipped to argue their case or rule on admissibility. This education should be supplemented with professional organizations, legal and scientific, holding seminars to discuss how the Daubert standard

and expert testimony can apply to that specific field. With greater education on all parts justice will be better served through a better understanding of the role of science in the courtroom.

Ethics Within the Crime Laboratory

The crime laboratory is an important component of the criminal justice system. In recent years interest in the crime laboratory has blossomed. With this newfound interest has come intense scrutiny. Again, the CSI Effect adds to this scrutiny. From the O.J. Simpson trial to current day news stories, crime laboratories have become center stage elements of many criminal trials. This new examination has led to challenges to the ethics of those who work in crime laboratories and a re-evaluation of these laboratories' loyalty to law enforcement.

Ethics and loyalty are an essential part of any organization and play a critical role inside a law enforcement agency and within the crime laboratory. It is incumbent upon administrators to promote good ethical conduct among their personnel, and this starts with a total commitment to hiring, training, and retaining ethical employees (Hoffman, 1997). Administrators must understand that ethics violations destroy public trust and that once that trust is lost it is difficult to regain. As discussed by Beech (2005) many administrators from across the country believe that proper selection criterion is lacking when it comes to hiring law enforcement professionals. They feel that conducting thorough background checks, being selective in the recruiting process, and interviewing potential hires in a personal and careful manner will lead to choosing ethical employees. Thorough screening is the key to hiring ethical employees (Rosen, 1997).

Ethics is a key element in crime laboratories, because of the power of these entities to analyze evidence and to take away a defendant's freedom. If the crime laboratory loses its place as an honest organization, large-scale uncertainty would appear in any case that utilized forensic science. For this reason, unethical persons and practices are removed from crime laboratories as soon as they are discovered. The challenge of ensuring ethical practices is not a twenty-first century issue. In 1997, Dr. Fred Whitehurst "blew the whistle" on the unethical and the unprofessional practices of the Federal Bureau of Investigation (FBI) Crime Laboratory. Two days after his announcement an independent investigation produced a report verifying his claims. The FBI laboratory immediately began to correct the problems, removing employees and changing procedures (Hoffman, 1997). Unfortunately, the problems at the FBI laboratory were not isolated. Another example of this form of scandal occurred in the Houston Police Department Crime Laboratory, where a panel found that there were grievous problems leading to the release of wrongly accused prisoners and the removal of many laboratory staff members (McVicker & Khanna, 2003). At the heart of the panel's findings is not that of crimes, but in fact ethical violations. The panel wrote as follows:

Sadly, we have learned that the knowledge of problems and a lack of action to correct them do not constitute criminal negligence,... Ethics and moral violations, even if they severely violate the public trust, are beyond our jurisdiction.

(McVicker & Khanna, 2003, para.2)

It should be noted that the central problems listed by the panel included ethics and moral violations and a lack of correction by the administration. It is the obligation of the

administration of any crime laboratory to prevent unethical behavior and develop methods to foster moral behavior. In the crime laboratory this is accomplished through accreditation and detailed codes of ethics.

As stated previously, (ASCLD) accredits crime laboratories throughout the United States. Although this accreditation process is completely voluntary, laboratories are facing increasing pressure to undergo the process. It is clear from the section of the ASCLD Code of Ethics presented above that the organization places a strong emphasis on ethical policies and procedures.

In addition to promoting ethical behavior, crime laboratory directors must encourage their forensic scientists to join professional organizations, which foster ethical and scientifically accurate analysis among their members. As previously stated, a review of the codes of ethics of many of these organizations by Mario (2002) revealed that they were not uniform; however, all these codes had consequences for unethical behavior. There are two important aspects to these codes. They prevent unethical and unqualified “scientists,” who sell their opinions for a price, from remaining members. They also combat crime laboratory personnel who have lost sight of their need to remain impartial.

Barnett (2001) presents one of the most specific codes of ethics developed by a forensic organization, *The Code of Ethics of the California Association of Criminalists* (CAC). The purpose of this code is to specifically outline what is deemed ethical and unethical behavior by this organization with a separate document focused specifically on enforcing the code.

The code is divided into sections with situation specific guidelines. The sections include ethical practices as they relate to scientific method, opinions and conclusions, court presentation, general practices, and responsibilities to the profession. Depending on the situation in which a criminalist finds himself, he can rely on this code to provide an ethical framework from which he must work.

Conversely, Barnett (2001) presents the extremely limited Code of Ethics and Conduct of the American Academy of Forensic Science (AAFS). The actual ethics guidelines are a total of five sentences long and focus on the member not causing harm or embarrassment to the organization. This code of ethics is woefully limited with most of its verbiage addressing the proceedings for ethics violations. Unlike the CAC, the AAFS has provided little to guide its member forensic scientists in making ethical decisions.

One of the largest areas in which forensic scientists enter into ethical dilemmas is with misguided loyalty. Much like the issues of loyalty discussed above, regarding law enforcement agencies, crime laboratories often face similar dilemmas. Many crime laboratories are attached to law enforcement agencies. With this attachment sometimes comes the pressure to “make the state’s case.” Forensic scientists must resist this pressure and remain impartial witnesses. The jury should view forensic experts as individuals who do not have a stake in the outcome of the case. For example, most professional codes of ethics preclude members from working off of a contingency fee (AFTE Code of Ethics, 2000). It is not the job of the forensic scientist to help anyone win a case. The sole purpose of a forensic expert is to allow science to provide analytical truth, so that the trier of fact (judge or jury) can reach a fair and just verdict. It should

always be the duty of forensic scientists to remain loyal to the physical evidence and what it has provided during analysis.

In addition to loyalty, ethics should also include best practices in forensic science. It is the responsibility of forensic scientists and crime laboratories as a whole to ensure that scientific findings are unbiased and based on competent analysis. Hiss, Freund, and Kahana (2006) discuss the issue of expert witness competency and how that competency affects the field of forensic science. More specifically, the authors give examples of how the lack of competency can play a vital role in disrupting the trial process.

The three fields examined, forensic biology, forensic medicine, and forensic anthropology were all examined to demonstrate how incompetent experts can grossly mislead the trier of fact in any case. Once these examples were presented Hiss, Freund, and Kahana (2006) concluded with a discussion that further drove home the issue of competency. First, the authors focus on how the expert's first responsibility is to the court. This responsibility should force the expert to become a competent and independent tool for justice. Experts must be able to understand their limitations and limit their findings to fields they truly grasp. With this in mind, experts must give testimony that is both competent and unbiased. It should be the goal of every forensic scientist, professional organization, and crime laboratory to reduce misguided loyalty, bias, and incompetence within the forensic community. Only by addressing each of these issues can ethical practices be insured.

Budowle, Bottrell, Bunch, Fram, Harrison, Meagher, Oien, Peterson, Seiger, Smith, Smrz, Soltis, & Stacey (2009) suggest that crime laboratories put an emphasis on

the quality assurance sections. Although required for accreditation, these sections can barely reach the required standards or they can play an active role in decreasing laboratory error and improving the overall quality of the analysis conducted. Crime laboratory directors must ensure that these sections play a key role within the laboratory and allow quality assurance managers to reach out to professional organizations and their peers to develop uniform best practices throughout the laboratory and within the forensic community.

As stated above, forensic scientists are ethically bound to ensure the integrity of their field through promoting standardization, education, and best practices. Although there is room for improvement in any science, forensic science is often attacked by agenda driven organizations attempting to weaken the criminal justice system. Forensic scientists and law enforcement officials also have an ethical obligation to refute these attacks, so that their findings can be properly utilized throughout the criminal justice system. Recently, several of the forensic sciences have come under attack in a report written by the National Academy of Sciences.

The National Academy of Sciences (NAS) created controversy throughout the criminal justice system and forensic science community with the publication of this report in 2009. Although much of the report was based on sound research and, ultimately, will benefit the forensic science community, the authors used this research opportunity to attack several areas of forensic science. The report criticizes the science of pattern identification (firearms and tool mark examination, latent print analysis, etc.). Many of the claims made by the committee are refuted by the individual disciplines

attacked and by the forensic community as a whole. The committee questioned no members of the field of pattern identification in its research. Instead it received much of its information from academicians not practitioners. Critics of the report focus upon the misconceptions and sometimes agenda driven claims of Michael J. Saks and David L. Faigman.

In an article published in *Crime Lab Report* (Collins, 2009) members of forensic science respond to statements by Saks and Faigman that were utilized in the NAS Report. The authors are highly critical of statements and conclusions reached by Saks and Faigman, believing them to be biased and agenda driven.

At the beginning of the *Crime Lab Report* (Collins, 2009) the authors offer quotes from an article by Saks and Faigman (2008) and then utilize the remainder of the paper to question the validity those quotes. The continuous theme presented by Saks and Faigman in both their published article and what is utilized in the NAS Report is that forensic identification is not based in science, has no ties to academia, and is simply a pawn of law enforcement. The *Crime Lab Report* refutes the claim that forensic pattern identification is not a science by pointing to decades of scientifically sound articles that were published in peer-reviewed journals. Also, the authors point to significant validation studies that were performed across the globe. The second claim that pattern identification has no ties to academia is refuted by pointing to university based studies that have focused on pattern identification and the members of these universities who helped develop the field, to include Dr. J. Howard Matthews. Dr. Matthews worked in the field of forensic pattern identification for over forty years and has authored seminal

works in firearm and tool mark identification. Matthews obtained both his Master's Degree and Doctorate from Harvard University, before serving as a professor of chemistry at the University of Wisconsin for over thirty years.

The *Crime Lab Report* is one of many articles that refute the claims of the NAS Report and addition this individual must have the ability to lead technical individuals such as Saks and Faigman. The authors of the *Crime Lab Report* (Collins, 2009) offer suggestions as to why these organizations and individuals misrepresent the forensic sciences. They believe that ignorance, activism, or a combination of the two drives these individuals to harm the integrity of forensic science. Regardless of the reason why the integrity of forensic science is in need of defense, forensic scientists are ethically bound to create a field that is scientifically sound and that stands on a solid moral foundation and then must defend their practices from those hoping to harm the criminal justice system.

The above information can be utilized by the law enforcement administrators and crime laboratory directors discussed in the preceding cases. Once this information is applied to the Ethics Triangle discussed in the text by Berman, West, and Bonczek (1998), the proper course of action can easily be implemented. A review of the components of this triangle will further focus what needs to be done to insure a strong and ethical foundation. The ethics triangle is comprised of a principle-based side, a virtue side, and a consequences side. All play a critical role in strong intuitional and individual ethics.

When discussing the principle-based angle of the triangle it is clear that forensic scientists must focus on operating by specific principles and ensure that true justice is their goal. It must be remembered that a trial is the search for the truth in the interest of justice. Law enforcement officers provide that truth through ethical investigations and demonstrating the defendant is guilty of the crime for which they are charged. Forensic scientists utilize physical evidence to provide that truth and must ethically and impartially report their findings and testify to the results.

The virtue angle of the ethics triangle ensures that the integrity of the law enforcement officers and forensic scientists are intact. Loyalty should never replace integrity. The “everybody does it” argument holds no ground. These individuals must understand that their loyalty lies with the citizenry first and their peers second.

The consequences angle of the triangle establishes that the ends do not justify the means. It is never proper to “sweeten the pot” by embellishing the facts of a case or tampering with evidence. Regardless of the guilt of the suspect, law enforcement personnel and forensic scientists must play the cards they are dealt and examine the evidence they have in order to reveal its true potential.

There are key aspects of ethics that must be implemented in the crime laboratory, so that their members can properly deal with the complex issues faced on a daily basis. First, these organizations must implement procedures to hire and retain ethical employees. The complex screening tools reviewed above should be utilized. Second, ethics must become a key element of any training program and remain a mainstay of the organization. Without the proper tools even the most ethical individual is doomed to

make unethical decisions. Third, the organizations must develop and implement strict comprehensive ethics policies and procedures, so that they can respond accordingly to ethical issues before they begin to snowball.

Forensic scientists and the law enforcement community must use these practices to ensure ethics is at the heart of administration, investigation, and forensic analysis. Any individual or organization found to be acting unethically must meet harsh punishments. On the other hand, members must oppose agenda driven organizations, which offer false accusations of unethical behavior and work to undermine the criminal justice system by weakening the forensic sciences. In fact, these members are ethically bound to do so. Only through proactive and vocal support of the individual law enforcement organizations and forensic fields will justice be served.

Ethics and loyalty are the two greatest concerns facing criminal justice today. Regardless of where an individual works within the system, all members must strive to remain ethical. Gould (2008) states that members of the criminal justice system have a duty to only convict those who have committed the crime for which they are charged, but they also has an obligation to protect the innocents of society from being plagued by crime.

Leadership Within the Crime Laboratory

Leadership is a much-discussed topic in public administration and in organizational behavior. Although good leaders can cope with a variety of situations and have the ability to lead various personality types, the leader of a crime laboratory, must balance issues seen in both the public and private sectors. In addition this individual

must have the ability to lead technical individuals in a quasi-law enforcement environment. In this section leadership versus management, ethics, and communication will be discussed in general and how these important topics affect the crime lab director's ability to lead effectively.

Leadership Versus Management

Many psychologists believe that leadership is an innate characteristic that one has when they are born. Specific qualities make an individual a leader. Persistence, self-confidence, and a need to influence other individuals top the list (Avolio, 2006). A 1998 study of twins found that there was a strong correlation between genetics and one's ability to lead (Johnson, et al. 1998). In fact, this study compared transactional and transformational leadership, and found that a higher percentage of transformational leadership qualities (59%) were more likely inherited.

Although these qualities come naturally to some individuals, it is still possible to teach sound leadership principles and practices to "non-leaders". The Skills approach to leadership, discussed by Northouse, (2004) opens the door to crime laboratory directors who are often promoted based on their technical skills and less for their proven ability to lead. This approach puts emphasis on one's ability to learn and adapt. It is important for administrators to consider one's technical ability and leadership skills when promoting to the position of crime laboratory director.

In most cases, the crime laboratory director is considered a public sector manager, which adds an additional level of responsibility. Behn (1998) discusses that public managers have a moral obligation to their organizations not simply to occupy space at the

top of an agency. To fulfill this obligation they must act as leaders or allow another individual to take the reins if they cannot lead. Many of the problems inherent in public administration are because of a lack of leadership throughout the organization, and the crime laboratory is no exception. Behn believes that without leadership public organizations will remain bogged down in fragmented management and bureaucracy and will never move forward to accomplish the organization's mission.

How does one compare management and leadership? This is the age-old question that is discussed in almost every management and leadership book written. These two terms definitely overlap in definition; however, they are not one and the same. As discussed by Shafritz and Russell (2005), managers are typically granted their power by a higher authority in their organization. Sometimes this power is not earned (especially in the public sector). Because of this managers typically rule by strictly using the artificial power granted to them. Managers spend much of their time "putting out fires", responding to problems as they arise. Those individuals who only manage hold power close to the vest, delegating little of it to subordinates. In the crime laboratory this creates a situation where analysts are only allowed to conduct their "bench work" and no one is allowed to learn the administrative tasks that they may be called upon to conduct if they are promoted to director. This creates a snowball effect that jeopardizes the stability of the director position. This lack of delegation is due to a lack of knowledge and a fear of losing control of their subordinates. Although it is important to have good managerial skills, these skills alone do not provide what is necessary to lead a crime laboratory.

A leader is never granted that status by a higher power in the organization. In fact, many leaders are never elevated to a “position of power,” but lead from the trenches. The greatest quality of a leader is trust. This is a quality that must be earned. Les Csorba (2004) listed three ways this trust is earned:

1. They develop credibility over a sustained period.
2. They do not make bad decisions willfully.
3. They almost always act and lead with wisdom and integrity. (p.54)

It is important to notice that this list does not say that the leader must always be right, but it focuses more on doing the right thing. When leaders become managers they are not scared to delegate some of their power to others, because they are confident in their abilities. Leaders fight the fights that need to be fought. In addition, leaders have a vision for the organization. That vision may translate into seeking full accreditation from the American Society of Crime Laboratory Directors (ASCLD), creating ethics policies for analysis, or creating and maintaining a critical incident plan for the laboratory. Bennis and Nanus (1985) summarize the topic of leadership versus management well when they stated, “Managers care for the body of the organization; leaders care for the spirit; but truly great leadership does both.”

Ethical Leadership Within the Crime Laboratory

Ethics is a key element in crime laboratories, because of the power of these entities to analyze evidence and to take away a defendant’s life. If the crime laboratory loses its place as an honest organization, large scale uncertainty would appear in any case

that utilized forensic science. For this reason, unethical persons and practices are removed from crime laboratories as soon as they are discovered.

One example of how poor leadership leads to scandal occurred in the Houston Police Department Crime Laboratory, where a panel found that there were grievous problems leading to the release of wrongly accused prisoners and the removal of many laboratory staff members. The central problems listed by the panel included ethics and moral violations and a lack of correction by the administration (McVicker & Khanna 2003). It is the obligation of the administration to prevent unethical behavior in the crime laboratory and develop methods to foster moral behavior. This is accomplished through accreditation, detailed codes of ethics, and proper communication.

Proper communication is a key element in any organization and crucial to the success of any critical incident plan (Alexander, 2002). Because crime laboratory directors are not often chosen for their ability to properly communicate, they must place an emphasis on learning this valuable trait. To be an effective communicator, directors must first know their people. It is important for leaders to evaluate their employees to determine whom they are dealing with on a daily basis. The key is that the evaluations be thorough and consistent. It is also important that the chain of communication be open and less judgmental. Employees need to know that they will not be punished for voicing their opinions in a constructive way. As a leader, it is just as important to be evaluated by your employees, as it is to evaluate them (Goldsmith, Fall 2004).

For proper communications to be conducted on a daily basis the information must be sent and received. For this to work properly the listener must be receptive and the

message itself must be clear (St.Clair, 2003). A summary of successful communication skills is provided by Deaver (2004) as he discusses why President Ronald Reagan was known as the “Great Communicator.” Here, Deaver states that a good communicator must know how and when to communicate specific information and do so only when it is necessary. This is not to say that information should not be free flowing, but directors must provide the correct information in a clear manner. It is better to delay in giving information than it is to provide inaccurate information. By having a clear understanding of the major topics influencing the field of forensic science, the crime laboratory administrator can better manage the organization create policies that that address these issues and lead the organization that causes positive outcomes.

Conclusions

As previously stated, published research on the CSI Effect, Daubert Ruling and NAS Report does not clearly examine the factors that affect the application of forensic science and expert witness testimony. Although previous research suggests that the CSI Effect, landmark United States Supreme Court rulings, and recent critiques of forensic science have a significant influence on public perception, the limitation of this research is that it does not sufficiently examine how actual forensic scientists and crime laboratory administrators interpret these factors. Although previous research strives to determine if the triers of fact react differently to forensic science and expert witness testimony based on these factors, no published research examines if these factors influence how forensic science practitioners analyze, report, and testify to their findings. To understand how these factors influence the application of forensic science in the criminal justice system, a

better understanding must be developed of how forensic scientists and crime laboratory administrators perceive the influence of the media, the Court, and recent critiques. If it can be demonstrated that forensic practitioners are reacting to and changing their practices based on this perception then proving its actual existence is secondary.

In an effort to better understand the influence of the media, the Court, and recent critiques, the following study was conducted that focused on the perceptions of administrators and forensic scientists. Utilizing a survey format, this research study attempted to determine how each of these factors influence policy, training, testimony and the general use of forensic science in the criminal justice system.

Chapter 3: Methodology

Introduction

This chapter focuses on the study that was conducted as part of the requirements for this dissertation. This study utilizes a survey format to evaluate how forensic practitioners and administrators perceive the effects of several key developments in the field of forensic science and the criminal justice system in general. The topics examined are the Daubert Ruling, the CSI Effect, and the NAS Report. Ultimately, the goal of this study is to determine how these topics play a role in expert witness testimony and the use of forensic science in the criminal justice system. A review of the research design, data collection, target population, research instrument, presentation and summary of results will be conducted. The research questions that follow are addressed:

1. What influence does the Daubert Ruling, the CSI Effect, the NAS Report, or all three have on the operation of the crime Laboratory?
2. What influence does the Daubert Ruling, the CSI Effect, the NAS Report, or all three have on the analysis of evidence within the forensic science community?
3. What influence does the Daubert Ruling, the CSI Effect, the NAS Report, or all three have on the testimony of expert witnesses at trial?
4. In the future will the Daubert Ruling, the CSI Effect, or the NAS Report have the greatest impact on the forensic science community?

Research Design

There are numerous approaches from which to choose when conducting research. The three basic research designs are quantitative, qualitative, and mixed methods. Creswell (2009) defines these three approaches as more of a continuum of research methods, rather than complete opposites. Strict quantitative methods focus on analyzing how specific variables influence one another and measuring that influence utilizing strict statistical models. On the other hand, qualitative models focus more on understanding the totality of how a test subject responds to specific situations or interactions. The goal was for the researcher to interpret the details recovered while evaluating general themes and utilizing that information to render sound conclusions. Qualitative research is more flexible than quantitative research and relies less on statistical analysis and more on interpretation.

Creswell (2007) stated that there are as many as 28 different approaches, depending on what classification system is utilized. The mixed method approach spans the gray area between quantitative and qualitative research and utilizes the strict analytical nature of quantitative design with the interpretive qualities of qualitative design to create hybrids of the findings published when these methods are use separately.

When comparing these methods and determining which would best suit the research to be conducted, quantitative analysis proved to be the most logical research tool. Although the topic researched ultimately has social ramifications, the clearest manner in which to test the stated hypotheses and gather data is through statistical measurement. Additionally, qualitative research reduces research bias, because it is less

dependent on interpretation based on judgment and experience. While qualitative research provides a more flexible approach and may be utilized in future studies on this topic, one must first have concrete numbers from which to derive sound scientifically accurate conclusions. Ultimately, the nature of the research questions and the type of information that was sought limited the applicable choices. The decision was made to utilize quantitative analysis over qualitative analysis, so that a broad range of data from a large sample could be reviewed numerically and examined statistically.

Once quantitative analysis was chosen, the next step was to select the specific research method that would be utilized to gather the data. Of the available choices, survey research was selected, so that individual candidates could be examined and their responses analyzed in an analytical and objective format. McNabb (2002) discussed the usefulness of questionnaires or surveys in quantitative research. Of the two most utilized methods, observing behaviors or utilizing survey designed to elicit responses, McNabb states that questionnaires are utilized in over 85 percent of quantitative research studies, because they represent a reliable cost effective method of obtaining information from a sample of a population.

McNabb (2002) stresses that flexibility is another motivation for researchers to utilize a survey design. Surveys can be customized to fit almost any project and easily modified and utilized in future studies. Surveys can be short format or administered over time. They can be designed to be rigidly structured or allow open-ended answers. They can be formatted to reach any target population or generalized to obtain data from many

groups. Additionally, the same survey can be administered to several population samples to allow a researcher to compare the results and evaluate the differences.

Once it was determined that a survey format was to be utilized the researcher compared the use of electronic surveys versus paper or traditional surveys to determine which was the best method to utilize in this study. Boyer, Olson, Calantone and Jackson (2002) conducted a study that evaluated if electronic studies were comparable to traditional surveys as useful data collection tools. The authors found that both survey forms had specific strengths and weakness, but were comparable when it came to reliability, validity, and ability to gather quality information. Boyer, Olson, Calantone and Jackson did find notable differences in the development and analysis of data for each type of survey. They found that print surveys were more easily developed and required less time to structure, write, and organize the actual questionnaire itself. This is due, in part, to the writer having to learn the software of the electronic survey media and overcome any computer compatibility problems. However, the brief delays encountered in the developmental stage are significantly outweighed by the advantages in the analysis stage. Ultimately, collected data is automatically tabulated and analyzed statistically. This leads to greater efficiency and, more importantly, eliminates data entry errors that often occur.

One of the chief concerns discussed by Boyer, Olson, Calantone and Jackson (2002) was the time needed to create the survey itself. This article was published in 2002, prior to the development and widespread use of the many websites that allow for the easy construction of surveys. One such website is surveymonkey.com. The primary

function of this website is to provide quality “do-it-yourself” research tools to the average researcher (Thornton and Mattsson, 2009). Thornton and Mattsson along with Phillips (2009) believe that survey services like SurveyMonkey.com are the future of questionnaire based research and researchers must adapt to the trend or fall behind. Phillips states that SurveyMonkey.com has made the ability to research a topic through utilizing surveys more accessible to all. One problem with that fact, according to Phillips, is that it opens the door for unqualified researchers to “bastardize” the process. For that reason it is important to ensure that one creates a questionnaire that is reliable, valid, and scientifically sound.

Ultimately, the available research indicates that electronic surveys are a reliable, valid, and cost effective method to disseminate questionnaires to a large sample of a particular population. Additionally, SurveyMonkey.com is a reliable and secure method of conducting such a survey. For these reasons, the data collection device utilized for this study was a survey that is disseminated in the electronic format, utilizing SurveyMonkey.com as the delivery service.

Data Collection

This dissertation explores how the Daubert Ruling, CSI Effect, and NAS Report have influenced the practice of forensic science as practitioners analyze, report, and testify to their findings. In addition to a review of various texts, academic journals, law review journals, and other sources conducted in Chapter 2, a survey was distributed to all members of the American Society of Crime Laboratory Directors (ASCLD) to gather data. ASCLD is a professional organization comprised of crime laboratory directors,

supervisors, and practitioners and its mission is “to promote the effectiveness of crime laboratory leaders throughout the world by facilitating communication among members, sharing critical information, providing relevant training, promoting crime laboratory accreditation, and encouraging scientific and managerial excellence in the global forensic community.” (ASCLD, 2008) Because their mission is clear and is directly influenced by the information obtained in this study, this organization has the best population from which to obtain the information needed in this study. For this reason, the survey was distributed to all of the members of ASCLD, which includes forensic practitioners and laboratory administrators. Although a member of this organization, the researcher abstained from participation.

According to Fowler (2002) there is not a universally accepted minimum response rate for survey research. However, Dykema, Elver, Schaeffer, Stevenson, and Thayer-Hart (2010) found that a response rate of 30% to 40% is observed typically with internet based surveys. For this reason, the goal response rate was 30%, but a response rate of 20% was deemed be acceptable to generate sufficient data. The survey questions were constructed in a manner that gauged their perception of how specific factors affect the training of new analysts, their ability to manage forensic scientists, the development of protocols, and how they interact with other members of the criminal justice system from the crime scene to the courtroom.

In an effort to gain the cooperation of ASCLD, permission was requested and received from the Board of Directors to distribute the survey to its all of members. This survey was distributed utilizing the e-mail addresses of its members listed in the

membership directory and the survey link was disseminated directly from the ASCLD Board of Directors. Having the actual board of directors send out the survey was determined to be the best method of increasing the response rate from the members, because an accurate roster of membership was utilized and the members understood that the survey is legitimate and the documentation of this agreement is provided in Appendix A. E-mail is the primary communication device for this organization, so its members regularly receive and provide information via this media. This should ensure a suitable response rate for this study. The targeted response rate was not met initially, so a follow-up e-mail was sent to the members of ASCLD to encourage their participation. This second e-mail yielded enough responses to exceed the target response rate.

Cross-Tabular Analysis

In addition to analyzing the survey results for each separate question, utilizing frequency distribution, cross-tabular analysis was utilized to further explore the data that are recovered. Cross-tabulation demonstrates how two or more variables are related by cross referencing the answers to specific questions in a survey (Rubin, 2009). This form of analysis, referred to as inferential statistics, allows conclusions to be reached beyond basic frequency distribution. Inferential statistics allows for inferences to be made as to how specific groups will answer questions based on such things as demographic data. More specifically, this form of analysis divides respondents by how they answered a specific question and applies those subcategories to another variable. For example, male respondents answered this question in the following manner; while female respondents answered in this manner.

For the purposes of this study, inferential statistics were gathered to determine how members of specific demographic groups responded to specific questions. Factors such as one's length of time as a supervisor or specific forensic discipline may influence his perception of the CSI Effect or NAS report. A complete list of these factors can be found in the attached blank survey, Appendix B. This is crucial to this study, because there are many forensic disciplines and each may be affected differently by the factors presented. In addition, each forensic discipline has different strengths and weaknesses with regard to such topics as training, validation, error rate, and court presentation. For this reason, the study may be flawed if only the total of all respondents was used in analysis. To avoid such a potential flaw each group was subdivided by such demographic groups as years in the field, years as a supervisor, and discipline to refine the results and to gain greater insight.

Instrumentation

As stated above, survey research was chosen for methodology. The survey was distributed to members of the American Society of Crime Laboratory Directors and was comprised of opened-ended, multiple choice, and Likert scale formatted questions. The survey itself was distributed by e-mail, utilizing the mailing list for the organization. This e-mail contained an internet link that led participants directly to the survey. Additionally, a description of the study and an informed consent notification was posted in the text of the e-mail and, as well as the guarantee of anonymity. To further ensure informed consent, the survey began with an informed consent statement and individuals wishing to participate in the survey had to agree to participate prior to beginning. The

chosen delivery system and data collection device for the survey, SurveyMonkey.com, has a strict policy on anonymity and was a major factor in its selection. Additionally, an advantage of utilizing this online survey format is that it allowed for easy distribution, limits bias, provides flexibility in question format, delivers instantaneous statistical updates, and has report-generating capabilities.

Because the survey instrument was developed for the purpose of this study, efforts were made to limit bias and ensure its effectiveness. First, the study was piloted within a small group of forensic scientists and their feedback was utilized to refine the survey. Second, steps were taken to avoid biased language, questions with multiple parts were not be utilized, and other standard survey protocols helped ensure accuracy. Lastly, the sample population was competent to answer the questions and was willing to do so. As the researcher gained a better understanding of the population and its desire to respond to the survey, a more definite respondent number was known. The survey was closed with 124 of the 600 members participating. A printed copy of the electronic survey can be reviewed as Appendix B.

Target Population

The target population for this study was forensic scientists and crime laboratory administrators. As stated above, the survey was distributed to members of the American Society of Crime Laboratory Directors (ASCLD). ASCLD is a professional organization comprised of 600 members, who have varying training, education, and level of experience. Additionally, this population is comprised of members from numerous specialties within forensic science, included but not limited to, forensic biology, forensic

chemistry, forensic identification and other sub-specialties. For this reason, the survey included members of many forensic science disciplines, broadening its scope. In addition analysts, mid-level supervisors, and crime laboratory directors were included. Utilizing this biographical information, as well as years of experience, area of expertise, and size of jurisdiction added to the demographics retrieved in the study. A summary of the demographic data information obtained in the survey is as follows:

- Years worked in the field of forensic science
- Years worked as a supervisor in the field of forensic science
- Type of jurisdiction one works (federal, state, local, etc.)
- Current position in the crime laboratory
- Primary discipline of forensic science the analyst works within
- Admissibility standard in the state one testifies (Daubert, Frye, or Combination)

Because the survey was limited to a specific professional organization, the findings were limited to forensic scientists and administrators belonging to that group. In an effort to avoid overstating the significance of these findings, the results may not be generalized beyond the members of ASCLD.

Threats to Validity and Reliability

In order for the study to yield sound results it must address the issue of validity. According to Babbie (2007) validity refers to the level to which a study actually measures what it set out to measure. Babbie divides validity into two categories internal and

external, and presents twelve threats to internal validity. Each of these threats was addressed when developing this survey and study. They were as follows:

- **History:** Although it is possible that an event may have occurred during the survey process, the length of time was limited and the majority of the survey questions focused on how past events affect forensic science. Although no such events occurred, the nature of the event and its possible influence would have been recorded.
- **Maturation:** This survey was conducted at a single fixed point. The participant began the survey and ended the survey in a short period of time and there was no threat of growing more informed on the topic. The short length of the survey eliminated the possible influence of fatigue.
- **Testing:** Because this survey was used as a single instrument, the possible effects of a pretest and posttest format was avoided. Also, the questions focused on concrete noncontroversial topics, such as prejudice, ethics, or religion. The fear of the respondents answering questions in a specific manner to avoid looking prejudiced, unethical, or dishonest was limited.
- **Instrumentation:** Once again, the testing instrument did not change over the course of the experiment. The survey was given at the outset and the data was then collected and analyzed. Because pretest and posttest format was not utilized, there was not a threat of the measurement device changing nor did experience or data from any pretest alter later testing.

- Statistical regression: Because this study did not focus on the extremes of the target population, statistical regression should not have played a role. The study utilized demographic data, but only used this data on a wide scale. Although it did not occur, if one group at the extreme end of any demographic value had skewed results this outcome would have been examined.
- Selection bias: To avoid selection bias the survey was sent to all members of the target group. This group of forensic professionals belongs to a professional organization and the results obtained apply to the members of that particular organization. Additional testing will be needed to further generalize those findings.
- Experimental morality: Once again, this was not a prolonged experiment, so there was no need to protect against individuals removing themselves from the pool once the experiments begins.
- Causal time order: Because the survey asked participants to evaluate the effect of past events on current practices, the chronology was pre-determined. As with most social research, this independent variable was not a threat to this study.
- Diffusion of treatments: Although this element did not directly apply to this study, there was a possibility of “contamination” of the surveyed group by those who have previously taken the survey. With this said the influence of others on the manner in which an individual answers the survey questions was extremely minimal, because the answers to the survey were not a test of knowledge but of one’s opinion.

- Compensation: Because this was a simple survey with no control group, the effect of compensation did not exist. All participants were given the self-administered survey electronically and had no contact with the individual collecting the data or conducting the analysis.
- Compensatory rivalry: This survey design did not allow for this effect to occur. Because the participant was not being tested and there were no control group/experimental group dynamic in which to contend, there was not a threat of one group compensating to improve their standing.
- Demoralization: Once again, there was no fear of this effect because of the simple nature of the survey design and the fact that it was not administered over time. It was self-administered in a single short sitting.

Presentation and Summary of Results

Obviously, the results of the survey will be discussed in upcoming chapters. At this point the survey has been compiled and analyzed, but the method of presenting results is as influential as the collection of data. In general, the presentation will utilize graphical data and text to illustrate the nature of the results. The results of analysis will focus on the responses to the multiple choice and Likert scale formatted questions. The open-ended questions will be utilized in future research on this topic. When this occurs a priori procedure for generating coding may be utilized. Well established research has shown that this method is far more effective than simply coding open ended questions (Montgomery &, Crittenden, 1977). Great care will be taken to ensure that bias is limited

and the results are presented in a clear and concise manner that is statistically and academically sound.

Conclusions

As previously stated, the purpose of this research was to determine the level of influence the Daubert Ruling, CSI Effect, and NAS Report play in the practice and administration of forensic science. Research has established that little is known of how these factors affect the daily operation of crime laboratories. By surveying the members of ASCLD, the researcher has gained an understanding of how forensic scientists and administrators are reacting to and altering their practices based on these influences. Analyzing this data can be utilized to promote positive social change, by allowing the researcher to better understand the role that the Daubert Ruling, CSI Effect, and NAS Report play within this vital aspect of the criminal justice system, and may allow for recommendations that will help shape the proper use of forensic science.

Chapter 4: Results

Introduction

This chapter focuses on reviewing and analyzing the results obtained in this study. A survey was designed and distributed to all members of the American Society of Crime Laboratory Directors (ASCLD) to gather data. ASCLD members belong to various disciplines of forensic science, including but not limited to, controlled substance analysts, DNA analysts, toxicologists, trace evidence analysts, and members of the forensic identification. The purpose of this study was to evaluate how forensic practitioners and administrators perceive the effects of several key developments in the field of forensic science and the criminal justice system in general. Chiefly, the influence of the Daubert Ruling, the CSI Effect, and the NAS Report will be examined. Additionally, these perceived effects will be evaluated as to their influence on several subdivisions among the participants. The subdivisions include such demographic data as years of service, primary discipline of forensic science the analyst works within, type of jurisdiction one works within, and admissibility standard in the state one testifies. Ultimately, the goal of this study was to determine how these topics play a role in expert witness testimony and the use of forensic science in the criminal justice system by exploring the aforementioned research questions.

Once the basic demographic data is presented, this chapter reviews the data collected, provide and analysis of that data, reveal the findings, and provide some general conclusions, based on those findings. At the end of this chapter the reader should have an

understanding of what data was collected and how that data may be applied to the research questions proposed in this dissertation.

Data Collection

The data collected in this survey can be divided into several categories. These are demographic, comparison, and topic specific categories. Each category will be explored individually, and then cross tabulated to determine if group specific data can be generated, as it relates to the research questions. As previously stated, the data was collected utilizing an internet survey instrument that was distributed by e-mail utilizing the mailing list maintained by ASCLD. This study utilized the multiple choice and Likert scale formatted questions of the survey. The open-ended questions will be utilized in future research on this topic. This e-mail was sent by ASCLD to all members of the organization and contained an internet link that led participants directly to the survey. The chosen delivery system and data collection device for the survey, SurveyMonkey.com and the data reviewed below was extracted from this collection device for analysis.

Of the 600 members e-mailed, 124 responded to the survey, which equals 20% of the entire population. This met the goal of the study and yielded statistically significant results provided below. The survey itself was distributed by e-mail utilizing the mailing list for the organization. This e-mail contained an internet link that led participants directly to the survey. Additionally, a description of the study and an informed consent notification was posted in the text of the e-mail, as well as the guarantee of anonymity. The chosen delivery system and data collection device for the survey,

SurveyMonkey.com, has a strict policy on anonymity and was a major factor in its selection. Additionally, an advantage of utilizing this online survey format is that it allows for easy distribution, limits bias, provides flexibility in question format, delivers instantaneous statistical updates, and has report-generating capabilities.

Results

Descriptive Statistics

Data were collected for 124 participants of varying age and regional demographics. The largest age groups of participants were 40 – 49 (38, 31%) and 50 – 59 (44, 36%). A large group of the participants were workers in the forensic science field for over 25 years (49, 40%). Over half of the participants had a graduate degree (71, 57%). Large groups of participants worked in a laboratory in either state (49, 40%) or local (57, 46%) jurisdiction. Half of the participants indicated their position as crime laboratory director (62, 50%). Twenty-nine percent of participants reported their current state uses the Daubert standard ($n = 36$), while 20% reported use of the Frye standard ($n = 25$). Thirty-three percent reported use of a combination of the two in their state ($n = 40$). Table 1 below presents frequencies and percentages for sample demographics.

Table 1

Frequencies and Percentages for Sample Demographics

Demographic	<i>n</i>	%
Age range		
21 – 29	2	2
30 – 39	22	18
40 – 49	38	31

(table continues)

Demographic	<i>n</i>	%
50 – 59	44	36
60 +	18	15
Years working in the forensic science field		
0 – 5	2	2
5 – 10	8	7
10 – 15	24	19
15 – 20	17	14
20 – 25	24	19
26 +	49	40
Years working as a forensic science supervisor		
0 – 5	17	14
5 – 10	34	28
10 – 15	30	24
15 – 20	17	14
20 – 25	19	15
26 +	6	5
Highest level of education		
Some college but no degree	2	2
Associate degree	2	2
Bachelor degree	49	40
Graduate degree	71	57
Region of employment		
Northeast	14	11
Midwest	29	24
South	49	40
West	27	22
Jurisdiction of crime laboratory		
Federal	5	4
State	49	40
Local	57	46
Private	4	3
Not applicable	8	7
Position in crime laboratory		
Crime laboratory director	62	50
Assistant director	9	7
QA/QC manager	10	8
Section head	15	12
Senior analyst	2	2
Other	19	15
Not applicable	7	6
Primary specialty		

Demographic	<i>n</i>	%
Controlled substances analysis	25	20
Toxicology analysis	9	7
Biology (DNA analysis, screening, serology)	32	26
Trace evidence analysis	13	11
Firearm and tool mark examination	10	8
Latent print analysis	14	11
Footwear and tire track analysis	1	1
Questioned document analysis	2	2
Crime scene (investigation and processing)	11	9
Other	7	6
Current state's standard		
The Daubert standard	36	29
The Frye standard	25	20
A combination of the two	40	33
Neither ruling has been adopted	12	10
I do not know	10	8

Note. Due to rounding error, some percentages may not sum to 100%.

Cronbach's Alpha Reliability

Once the demographic data was obtained, the research questions themselves were examined. Six composite scores were created for use in the analyses. Prior to computation, survey questions 16, 46, 24, and 28 were reverse coded to contribute to internal consistency. After constructing the composite scores, NAS composites were again reversed to maintain consistency with the rest of the variables, where strongly agree (1) corresponded to a lesser effect and strongly disagree (5) corresponded to a positive effect. Internal consistency was conducted on the composite scores to establish internal reliability. The Cronbach's alpha test of reliability provides a mean correlation, as an alpha coefficient, between each pair of items and the number of items in a scale (Brace, Kemp & Snelgar, 2006). According to the rules of thumbs suggested by George and Mallery (2010), alpha coefficients range from unacceptable to excellent where $> .9$ -

Excellent, > .8 - Good, > .7 - Acceptable, > .6 - Questionable, > .5 - Poor, < .4 - Unacceptable. One subscale had less than unacceptable reliability; NAS effect on evidence analysis had an alpha of .05. The means, standard deviations, and alpha coefficients for the variables of interest are presented below in Table 2.

Table 2

Means, Standard Deviations, and Cronbach's Alpha Reliability for Composite Scores

Score	<i>M</i>	<i>SD</i>	No. of Items	α
CSI effect on operation	2.77	0.65	3	.40
Daubert effect on operation	2.76	0.95	2	.89
NAS effect on operation	2.72	0.49	11	.57
NAS effect on evidence analysis	2.83	0.78	3	.17
CSI effect on testimony	2.83	0.78	3	.60
Daubert effect on testimony	3.13	0.37	8	.49

Research Question 1

What influence does the Daubert Ruling, the CSI Effect, the NAS Report, or all three have on the operation of the crime laboratory?

H₀1: There is no statistically significant difference in the effect of the Daubert ruling, the CSI effect, and or the NAS report on operation of the crime laboratory.

H_a1: There is a statistically significant difference in the effect of the Daubert ruling, the CSI effect, and or the NAS report on operation of the crime laboratory.

To examine research question one, first descriptive statistics were conducted to describe opinions on the Daubert ruling versus the CSI effect on operation of the crime laboratory. Frequencies and percentages were calculated for survey questions 10, 12, and 13. Survey question 10 asked, “Which of the following has had the greatest impact on the overall practice of forensic science?” Options included the CSI effect, the Daubert ruling, both, or neither. The most common response was the CSI effect (54, 47%), followed by both (25, 22%), then the Daubert ruling (24, 21%), and then neither (11, 10%). Survey question 12 asked, “Which of the following has had the greatest impact on expert witness testimony?” Options included the CSI effect, the Daubert ruling, both, or neither. The highest group of responses was for the CSI effect (51, 45%), followed by both (30, 26%), then the Daubert ruling (28, 25%), and then neither (5, 4%). Survey question 13 asked, “Which of the following has had the greatest impact on the interaction between forensic scientists and law enforcement?” Responses were again the CSI effect, Daubert ruling, both, or neither. A majority of the participants indicated the CSI effect (81, 72%), followed by neither (19, 17%), then both (7, 6%), then the Daubert ruling (6, 5%). Frequencies and percentages for these survey question responses are presented below in Table 3.

Table 3

Frequencies and Percentages for Responses to Survey Questions 10, 12, and 13

Survey question	<i>n</i>	%
Which of the following has had the greatest impact on the overall practice of forensic science?		
CSI effect	54	47
Survey question		
Daubert ruling	24	21
Both have had an equal effect	25	22
Neither has had an effect	11	10
Which of the following has had the greatest impact on expert witness testimony?		
CSI effect	51	45
Daubert ruling	28	25
Both have had an equal effect	30	26
Neither has had an effect	5	4
Which of the following has had the greatest impact on the interaction between forensic scientists and law enforcement?		
CSI effect	81	72
Daubert ruling	6	5
Both have had an equal effect	7	6
Neither has had an effect	19	15

Note. Due to rounding error, some percentages may not sum to 100%.

To further evaluate research question one, a one within analysis of variance (ANOVA) was conducted to determine statistically significant differences between CSI specific, Daubert ruling specific, and NAS report specific Likert type responses pertaining to impact on operation of the crime laboratory. Prior to analysis, the assumptions of a one within ANOVA were assessed. To assess for normality, three Kolmogorov Smirnov (KS) tests were conducted and the Daubert specific scale ($p = .001$) violated the assumption. However, the F statistic is quite robust to violations of normality, and these violations should not dramatically shift results (Stevens, 2009).

Sphericity was assessed using Mauchly's test and the assumption was not met ($p < .001$), requiring use of the Greenhouse-Geisser degrees of freedom to examine statistical significance.

Results of the one within ANOVA did not indicate statistically significant differences in the three scores ($F(1.58, 164.69) = 0.23, p .743$) and no further examination was conducted. Because no differences were found, the null hypothesis, there is no statistically significant difference in the effect of the Daubert ruling, the CSI effect, and or the NAS report on operation of the crime laboratory, could not be rejected. Results of the one within ANOVA are presented below in Table 4.

Table 4

One Within ANOVA for CSI Effect, Daubert Ruling, and NAS Effect on Operation

Source	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>p</i>	Partial η^2
Impact	1.58	0.28	0.18	0.23	.743	.00
Error	164.69	128.73	0.78			

Research Question 2

What influence does the Daubert Ruling, the CSI Effect, the NAS Report, or all three have on the analysis of evidence within the forensic science community?

H₀2: There is no statistically significant difference in the effect of the Daubert ruling, the CSI effect, and or the NAS report on analysis of evidence within the forensic science community.

H_a2: There is a statistically significant difference in the effect of the Daubert ruling, the CSI effect, and or the NAS report on analysis of evidence within the forensic science community.

To examine research question two, first descriptive statistics were conducted to describe opinions on the Daubert ruling versus the CSI effect on analysis of evidence within the forensic science community. Frequencies and percentages were calculated for survey question 11. Survey question 11 asked, “Which of the following has had the greatest impact on the analysis of evidence?” Options included the CSI effect, the Daubert ruling, both, or neither. Thirty-five percent of participants responded that the CSI effect had the greatest impact on analysis of evidence ($n = 40$). Twenty-nine percent of participants responded that the Daubert ruling had the greatest impact ($n = 33$), while 19% ($n = 22$) responded both had an equal effect, and 17% responded that neither had any effect at all ($n = 19$). Frequencies and percentages for survey question 11 responses are presented below in Table 5.

Table 5

Frequencies and Percentages for Survey Question 11 Responses

Question	<i>n</i>	%
Which of the following has had the greatest impact on the analysis of evidence?		
CSI effect	40	35
Daubert ruling	33	29
Both have had an equal effect	22	19
Neither has had an effect	19	17

Note. Due to rounding error, percentages may not sum to 100%.

To further evaluate research question two, a Wilcoxon signed rank test was conducted to determine statistically significant differences between the CSI specific response to survey question 21 (CSI specific) and the NAS report specific responses pertaining to analysis of evidence in survey questions 37, 40, and 44. Because Wilcoxon signed rank is a non-parametric test, no assumptions had to be tested.

Results of the Wilcoxon signed rank test indicated significant differences in the two scores ($Z = -7.50, p < .001$) and the null hypothesis could be rejected in favor of the alternative. Means were further evaluated to further examine differences. The CSI specific question had a mean response of 3.60 and the NAS specific questions had a mean value of 2.83. Higher means indicated a greater impact, suggesting that the CSI effect had a significantly greater impact on the analysis of evidence within the forensic science community than did the NAS report. Results of the Wilcoxon signed rank test are presented below in Table 6.

Table 6

Wilcoxon Signed Rank Test for CSI versus NAS Impact on Analysis of Evidence

Source	Z	p	Mean responses	
			CSI	NAS
Impact	-7.50	.001	3.60	2.83

Additionally, Question 21 responses were compared directly to question 44 responses via a Wilcoxon Signed Rank test. Results of the Wilcoxon signed rank test indicated significant differences in the two scores ($Z = -3.76, p < .001$) and the null hypothesis could be rejected in favor of the alternative. Means were further evaluated to

further examine differences. The CSI specific question had a mean response of 3.60 and the NAS specific questions had a mean value of 3.10. Higher means indicated a greater impact, suggesting that the CSI effect had a significantly greater impact on the analysis of evidence within the forensic science community than did the NAS report. Results of the Wilcoxon signed rank test are presented below in Table 6a.

Table 6a
Wilcoxon Signed Rank Test for CSI versus NAS Impact on Analysis of Evidence

Source	Z	p	Mean responses	
			CSI	NAS
Impact	-3.76	.001	3.60	3.10

Research Question 3

What influence does the Daubert Ruling, the CSI Effect, the NAS Report, or all three have on the testimony of expert witnesses at trial?

H₀2: There is no statistically significant difference in the effect of the Daubert ruling, the CSI effect, and or the NAS report on testimony of expert witnesses at trial.

H_a2: There is a statistically significant difference in the effect of the Daubert ruling, the CSI effect, and or the NAS report on testimony of expert witnesses at trial.

To assess research question three, first descriptive statistics were conducted to describe opinions on the Daubert ruling versus the CSI effect on testimony of expert witnesses. Frequencies and percentages were calculated for survey questions 12, 14, and 15. Survey question 12 asked, “Which of the following has had the greatest impact on expert witness testimony?” Options included the CSI effect, the Daubert ruling, both, or

neither. The most common response was the CSI effect, at 45% ($n = 51$). Nearly equal participants indicated the Daubert ruling (52, 25%) as did those who indicated both have an equal effect (30, 26%). Five participants indicated neither had an effect (4%). Survey question 14 asked, “Which of the following has had the greatest impact on the interaction between forensic scientists and prosecuting attorneys?”

As before, options included the CSI effect, the Daubert ruling, both, or neither. The majority indicated the CSI effect (61, 54%), while 26% indicated both had an equal effect ($n = 29$). Thirteen percent indicated the Daubert ruling ($n = 15$), and seven percent indicated neither had any effect ($n = 8$). Survey question 15 asked, “Which of the following has had the greatest impact on the interaction between forensic scientists and defense attorneys?” Options again included the CSI effect, the Daubert ruling, both, or neither. The most common response was the CSI effect, at 36% ($n = 41$), followed by both (34, 30%), followed by the Daubert ruling (27, 24%), and finally, the least indicated response was “neither” with a 10% response rate ($n = 11$). Frequencies and percentages for these responses are presented below in Table 7.

Table 7

Frequencies and Percentages for Responses to Survey Questions 12, 14, and 15

Question	<i>n</i>	%
Which of the following has had the greatest impact on expert witness testimony?		
CSI effect	51	45
Daubert ruling	28	25
Both have had an equal effect	30	26
Neither has had an effect	5	4
Which of the following has had the greatest impact on the interaction between forensic scientists and prosecuting attorneys?		
CSI effect	61	54
Daubert ruling	15	13
Both have had an equal effect	29	26
Neither has had an effect	8	7
Which of the following has had the greatest impact on the interaction between forensic scientists and defense attorneys?		
CSI effect	41	36
Daubert ruling	27	24
Both have had an equal effect	34	30
Neither has had an effect	11	10

Note. Due to rounding error, some percentages may not sum to 100%.

To further evaluate research question three, a one within analysis of variance (ANOVA) was conducted to determine statistically significant differences from CSI specific, Daubert ruling specific, and NAS report specific Likert type responses pertaining to impact on testimony of expert witnesses at trial. Prior to analysis, the assumptions of a one within ANOVA were assessed. To assess for normality, three Kolmogorov Smirnov (KS) tests were conducted and the CSI specific responses violated the assumption ($p < .001$). However, the F statistic is quite robust to violations of normality, and these violations should not dramatically shift results (Stevens, 2009). Sphericity was assessed using Mauchly's test and the assumption was not met ($p < .001$),

requiring use of the Greenhouse-Geisser degrees of freedom to examine statistical significance.

Results of the one within ANOVA indicated significant differences in the CSI, Daubert, and NAS scores ($F(1.50, 154.36) = 4.19, p = .027$) and further pairwise comparison was conducted. The difference between CSI specific responses and Daubert specific responses was statistically significant ($p = .001$), with higher mean scores in the Daubert specific responses. Higher scores indicate a greater impact, and it could be inferred that the Daubert ruling had a greater impact on the testimony of expert witnesses at trial than the CSI effect, and the null hypothesis could be rejected. No other pairwise comparisons were significant. The results of the one within ANOVA are presented below in Table 8.

Table 8

One Within ANOVA for CSI Effect, Daubert Ruling, and NAS Effect on Expert Witness Testimony

Source	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>p</i>	Partial η^2
Impact	1.50	4.39	2.93	4.19	.027	.04
Error	154.36	107.89	0.70			

Research Question 4

In the future will the Daubert Ruling, the CSI Effect, or the NAS Report have the greatest impact on the forensic science community?

H₀4: Participant responses will not indicate statistically significant differences in responses to the future impact of the CSI effect, the Daubert ruling, and the NAS report.

H_a4: Participant responses will indicate statistically significant differences in responses to the future impact of the CSI effect, the Daubert ruling, and the NAS report.

To examine research question four, a Friedman analysis of variance (ANOVA) was conducted to determine if statistically significant differences exist between responses to survey questions 23, 34, and 43. Survey question 23 gathered Likert-type responses to the level of agreement that the CSI effect will have a significant impact in the future. Survey question 34 gathered responses to the Daubert ruling's future impact, and survey question 43 gathered these responses for the NAS report. Because the Friedman ANOVA is a non-parametric analysis, it intrinsically overcomes the main assumptions of variance tests, and no assumptions had to be assessed.

Results of the Friedman ANOVA indicated statistically significant differences in the three responses ($\chi^2(2) = 36.41, p < .001$) and the null hypothesis could be rejected in favor of the alternative. Wilcoxon signed rank tests were then conducted to determine pairwise differences where they exist. Results of the Friedman ANOVA are presented below in Table 9.

Table 9

Friedman ANOVA for the CSI Effect, Daubert Ruling, and NAS Report's Future Impact

Source	$\chi^2(2)$	<i>p</i>
Future Impact	36.41	.001

Results of the Wilcoxon signed rank tests indicated significant differences between each pair of responses. The pairwise comparison of the Daubert ruling

responses with the CSI effect responses indicated CSI responses were significantly higher than Daubert responses ($p = .043$). The pairwise comparison of the NAS report responses with the CSI effect responses indicated CSI responses were significantly higher than NAS responses ($p < .001$). The pairwise comparison of the NAS report responses with the Daubert ruling responses indicated NAS responses were significantly higher than Daubert responses ($p < .001$). The resulting order of future impact from highest future impact to lowest was CSI effect, the Daubert ruling, and finally the NAS report. Results of the Wilcoxon signed rank tests are presented below in Table 10.

Table 10

Wilcoxon Signed Rank Tests for CSI vs. NAS vs. Daubert Impact on the Future

Source	Z	p	Mean difference*
CSI [†] vs. Daubert	-2.02	.043	0.26
Daubert [†] vs. NAS	-4.31	.001	0.46
CSI [†] vs. NAS	-5.32	.001	0.72

Note. *Mean differences expressed in absolute values, [†] indicates the higher of the two values.

Three Kruskal Wallis tests were also conducted to assess differences in how likely the Daubert Ruling, the CSI Effect and the NAS Report had on the future of the forensic science community by specialty. For the purposes of this analysis, controlled substance analysis and toxicology analysis were grouped in one specialty (34). Biology included DNA analysis, screening, and serology (32). Physical evidence analysis included firearm and tool mark examination, latent print analysis, footwear and tire track analysis, and questioned document analysis (27). The group labeled as other included, trace evidence

analysis, crime scene (investigation and processing), and other (31). The results of all three Kruskal Wallis tests were not significant, $p > .050$ for all three, suggesting there were no differences in how likely the Daubert Ruling, the CSI Effect and the NAS Report had on the future of the forensic science community by specialty. Results of the Kruskal Wallis tests are presented in Table 11.

Table 11

Results for Kruskal Wallis Tests for Future Impact by Specialty

Future impact	Controlled substance/toxicology mean rank	Biology mean rank	Physical mean rank	Other mean rank	χ^2 (3)	p
CSI effect	55.32	60.07	62.31	46.61	4.36	.225
Daubert ruling	50.13	59.98	47.27	58.43	4.06	.255
NAS report	50.08	51.88	57.53	52.23	1.19	.756

In addition, 12 Spearman correlations were conducted to assess the relationship between the likelihood the Daubert Ruling, the CSI Effect and the NAS Report had on the future of the forensic science community and the ordinal demographics (years in the field, years as a supervisor, age, and education). Results of all of the Spearman correlations returned non-significant results ($p > .050$ for all correlations). Results of the correlations are presented in Table 12.

Table 12

Spearman Correlations between Future Impact and Ordinal Demographics

Demographic	CSI effect	Daubert ruling	NAS report
Years in field	.10	-.04	.02
Years supervisor	.04	-.08	-.01
Age	.07	-.04	.07
Education	-.09	-.01	-.16

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

Summary

Although the conclusions will be discussed at length in the next chapter, certain vital findings can be summarized at this point. Of the four research questions analyzed in this survey, three allowed for the hypothesis to be supported. There were statistically significant differences in the effect the Daubert Ruling, the CSI Effect, and/or the NAS Report had on the analysis of evidence within the forensic science community, the testimony of expert witnesses at trial, and their future impact on the forensic science community as a whole. The level of influence for each element (Daubert Ruling, the CSI Effect, and the NAS Report) and what that influence may indicate to the forensic science community will be discussed in Chapter 5. The first question examined, “What influence does the Daubert Ruling, the CSI Effect, and/or the NAS Report have on the operation of the crime laboratory,” supported the null hypothesis and it was determined that there is no statistically significant difference in the effect of the Daubert Ruling, the CSI effect, or the NAS Report on operation of the crime laboratory. The lack of a statistically significant difference is a finding in itself and the importance of this finding will also be discussed in Chapter 5.

In summary, the data collected yielded significant results that assisted the researcher in reaching some conclusions. The conclusions may be utilized to promote positive social change, by allowing the researcher to better understand the role that the Daubert Ruling, CSI Effect, and NAS Report play within this vital aspect of the criminal justice system. Additionally, this data has allowed the researcher to make recommendations that may help shape the proper use of forensic science for years to

come. While open-ended questions were included in the survey, they were not considered for this study. Analysis of the open-ended questions will be completed at a later date.

Chapter 5: Conclusions

Introduction

As stated in Chapter 4, data was collected during the survey period that showed significant support for the hypothesis for three of the four research questions, which examined the degree of influence of Daubert Ruling, CSI Effect, and NAS Report on various aspects of forensic science. As a result of this support, evidence exists to suggest that members of ASCLD believe the analysis of evidence within the forensic science community, the testimony of expert witnesses at trial, and the future impact on the forensic science community as a whole are influenced in varying degrees by these factors. Although the null hypothesis was supported when asked how these factors influence operation of the crime laboratory, coupling those findings with the other data collected provides clear evidence of the problems facing forensic science today and into the future.

In this chapter, the data collected and analyzed in Chapter 4 was utilized to form conclusions, regarding the research questions and how members of ASCLD view the future of forensic science. Because each of the research questions covers specific topics (the analysis of evidence, testimony of expert witnesses, the future of the crime laboratory and the operation of the crime laboratory), each topic will be examined separately. Additionally, inferential statistics will be utilized to gain a better insight as to the nature of each factor on specific subsets of individuals. Lastly, the impact of this study will be discussed as it relates to social change and the finding's influence on the criminal justice community as a whole.

Interpretation of Findings

The Analysis of Evidence within the Forensic Science Community

In examining research question 2 (What influence does the Daubert Ruling, the CSI Effect, and/or the NAS Report have on the analysis of evidence within the forensic science community?) several survey questions were dedicated to the analysis of evidence.

In an effort to examine the influence of two of these factors, the Daubert Ruling and the CSI Effect, survey questions were developed that allowed participants to compare the effect of these two dynamics to one another on given topics. The direct comparison of these two factors is essential for understanding the impact of each on the analysis of evidence. When comparing the influence of the Daubert Ruling and the CSI Effect, one may speculate that crime laboratory administrators would say that the Daubert Ruling plays a greater role on the analysis of evidence.

In fact, this study demonstrated the opposite, with thirty-five percent of respondents indicating that the CSI Effect had the greater impact. In an effort to better understand the impact of this finding, each factor will be reviewed as it relates to the analysis of evidence.

As previously discussed, the Daubert Ruling created concreateed case law that plays a vital role in evaluating scientific evidence and its admissibility into court, through expert witness testimony. In addition to this ruling at the federal level, over forty states have adopted similar rulings at the state level. In fact, these states are commonly referred to as “Daubert States” as it relates to the admissibility of expert testimony (Hernandez,

2013). Following the guidelines established by the United States Supreme Court, a trial judge has the discretion to admit or exclude scientific evidence based several factors (Daubert v. Merrell Dow Pharmaceuticals, 1993). The actual verbiage of this ruling can be found in chapter two of this dissertation. However, listed in simple terms, the Daubert guidelines ask four questions of a scientific theory or technique, (a) can it be tested, (b) has it been subjected to peer review and publication, (c) is there a known or potential error rate, and (d) has it gained general acceptance in its field. Because these four factors focus on the methodology utilized, they play a significant role in how crime laboratories analyze evidence.

When looking at each question individually the effect on the analysis of evidence is even greater. By asking “can it be tested,” the trial judge is attempting to determine the scientific nature of any result or finding produced by the crime laboratory. By asking “has it been subjected to peer review and publication” the trial judge is attempting to determine if the analysis conducted by the crime laboratory is based on methodologies, studies, or case reviews, available in one of the many peer reviewed journals, texts, or publications utilized with a particular discipline or at an interdisciplinary level. By asking “is there a known or potential error rate,” the trial judge is attempting to determine the reliability of the analysis conducted by the laboratory. By asking “has it gained general acceptance in its field,” the trial judge is attempting to determine if the evidence was analyzed utilizing best practices in the given field. This last factor dates back to Frye v. United States (1923), was handed down in 1923.

Although the Daubert ruling focuses on the end result of laboratory analysis of evidence, being able to justify the scientific nature of the testing, examination, comparison, or analysis conducted within one's crime laboratory is an essential role for any laboratory administrator. It is noteworthy to find that 17% of respondents indicated that the Daubert ruling has no any influence within the laboratory (Figure 1).

Now that the Daubert Ruling has been examined as it relates to this research question, the influence of the CSI Effect can be reviewed. As previously stated, the CSI Effect is a debated theory focused on the possibility that jurors possess an unrealistic expectation of forensic evidence in criminal trials (Schweitzer & Saks, 2007; Thomas, 2005). Based on the research conducted in Chapter 2, the above premise has not been accepted by all who have studied the topic and no consensus has been formed as to the reality of the CSI Effect. The studies by Podlas (2006), Schweitzer and Saks (2007), and Shelton, Kim, and Barak (2006) and more recently Dioso-Villa (2014) appear to contradict one another significantly. Although a lack of empirical data exists, one can examine some reasons why crime laboratory administrators place such a heavy weight on the CSI Effect, as it relates to the analysis of evidence. Recently, Dioso-Villa authored an entire textbook chapter entitled "Is there Evidence of a CSI Effect" (2014). In this chapter, the Dioso-Villa expands upon her earlier work co-authored by Cole (Cole and Dioso-Villa, 2007; Dioso-Villa 2014), listing the various typologies of the CSI Effect. Although variations of the CSI Effect were presented in Chapter 2, the author modifies the typologies in this recent work. Additionally, the republication of this theory may stand as one reason why administrators believe that the CSI Effect influences the analysis

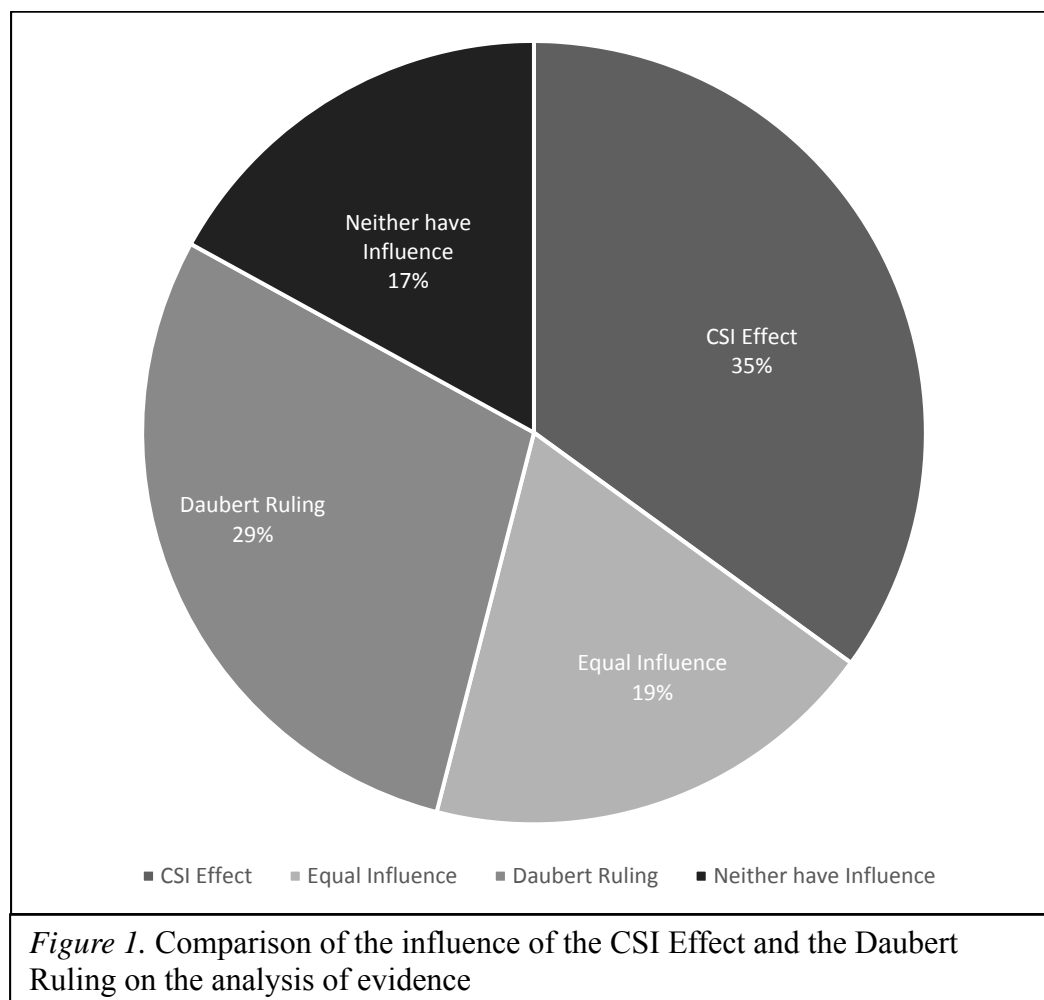
of evidence within their laboratories. For these reasons, Dioso-Villa's work will be reviewed briefly. In summary, the variations of the CSI Effect are as follows:

- *Strong prosecutor's effect*: Focuses on juror expectation's and the wrongful acquittal of defendants due to an unreasonable expectation of forensic science
- *Weak prosecutor's effect*: Focuses on the influence on prosecutors and their belief that peremptory measures should be taken prior to trial, during jury selection, and while the trial is in progress to explain a lack of forensic evidence.
- *Defendant's effect*: Focuses on juror expectation's; however, amounts to a reverse CSI Effect, where forensic evidence is given more weight and credibility, leading to wrongful convictions
- *Producer's effect*: Focuses on general public (potential jurors) now having a greater knowledge of forensic science, because they are educated by these fictional television shows
- *Educator/professor's effect*: Focuses on students and practitioners and an increase in forensic science programs and student interest at universities, leading to more educated practitioners
- *Police chief's effect*: Focuses on criminals now having a greater knowledge of forensic science and utilizing countermeasures to combat the use of physical evidence against them
- *Victim's effect*: Focuses on victims and the desire to have everything tested in their cases in order to catch the criminal
- *Tech effect*: Focuses on general public (potential jurors) now having higher expectations of forensic evidence due to actual advances in technology (Cole and Dioso-Villa, 2007; Dioso-Villa, 2014)

When viewed as a whole, this list of variations to the CSI Effect helps underscore the complexity of the issue. By reviewing historical publications, the CSI Effect can be blamed for wrongful acquittal, wrongful conviction, a lack of evidence due to criminal cover-up, higher expectations due to prosecutorial actions, and more. In closing Dioso-

Villa (2014) states that there is no evidence to support the existence of the traditional view of the CSI Effect, but asserts it may still have an influence. Additionally, Shelton, Kim, and Barak (2006), who are also cited by Dioso-Villa, theorize that television shows alone have not changed the manner in which jurors view evidence, but can be attributed to much broader cultural issues in modern society, the Tech Effect. As stated previously and summarized above, they believe that the increase in technology and the general availability of information has created a greater need for scientific and testimonial evidence by all jurors.

Based on the lack of empirical data supporting the CSI Effect and the significance of the Daubert Ruling, it is interesting to find that 35% of respondents believe that the CSI Effect has greater influence than the Daubert Ruling and 19% of respondents believe that CSI Effect has an equal influence (Figure 1). Because these are ASCLD members, who work as crime laboratory administrators and shape the policy for their laboratories, suggests that the CSI Effect influences laboratory policies and practices governing the analysis of evidence, even if there is no empirical proof of its existence.



In addition to comparing the influence of the CSI Effect and the Daubert Ruling, the influence of the CSI Effect was compared to the NAS Report with regards to the analysis of evidence. To accomplish this comparison, the results of survey questions 21, 37, 40, and 44 were examined. Utilizing a Wilcoxon signed rank to compare the responses for these Likert scale style questions, indicated that the CSI Effect had a significantly greater impact on the analysis of evidence within the forensic science community than the NAS Report. Keep in mind that the NAS Report and its

recommendations have spawned the creation of National Commission of Forensic Science (Commission), under The United States Department of Justice (Edwards, 2014). The purpose of the Commission as stated in its bylaws is "...to provide recommendations and advice to the Department of Justice (DOJ) concerning methods and strategies for strengthening the validity and reliability of forensic science..." (National Commission of Forensic Science, 2014). This is one of many outcomes associated with the NAS Report, but is the most demonstrative of its influence.

As stated earlier, the findings of the NAS Report are highly debated within the forensic science community and many disciplines have defended their practices against criticisms made within the report. Although the merits of its recommendations may be under debate, the influence of the NAS Report on the analysis of evidence is clearly prevalent. To endure that a direct comparison was made, two of the four questions were isolated and compared directly. Questions 21 and 44 were Likert scale questions that asked if "X (The CSI Effect or NAS Report, respectively) has forced the institution in which I work/supervise to alter its policies and procedures." Once again, the study revealed that members of ASCLD indicated that the CSI Effect has a greater influence than the NAS Report. Obviously, any altered policies or procedures would affect the analysis of evidence directly. Knowing the recent impact that the NAS Report has had on the forensic science community, further suggests the strong influence of the CSI Effect on laboratory policies and practices governing the analysis of evidence.

Based on a comparison of the CSI Effect with both the Daubert Ruling and the NAS Report as it relates to the their influence on the analysis of evidence within the

crime laboratory, it is clear that members of ASCLD believe that CSI Effect plays a greater role. Although both the Daubert Ruling and the NAS Report are well-established concrete outcomes that have led to the creation of both case law and federal oversight throughout the country, the CSI Effect, absent any empirical data of its actual influence on juries, has greater influence on analysts, supervisors, and policymakers as it relates to the analysis of evidence.

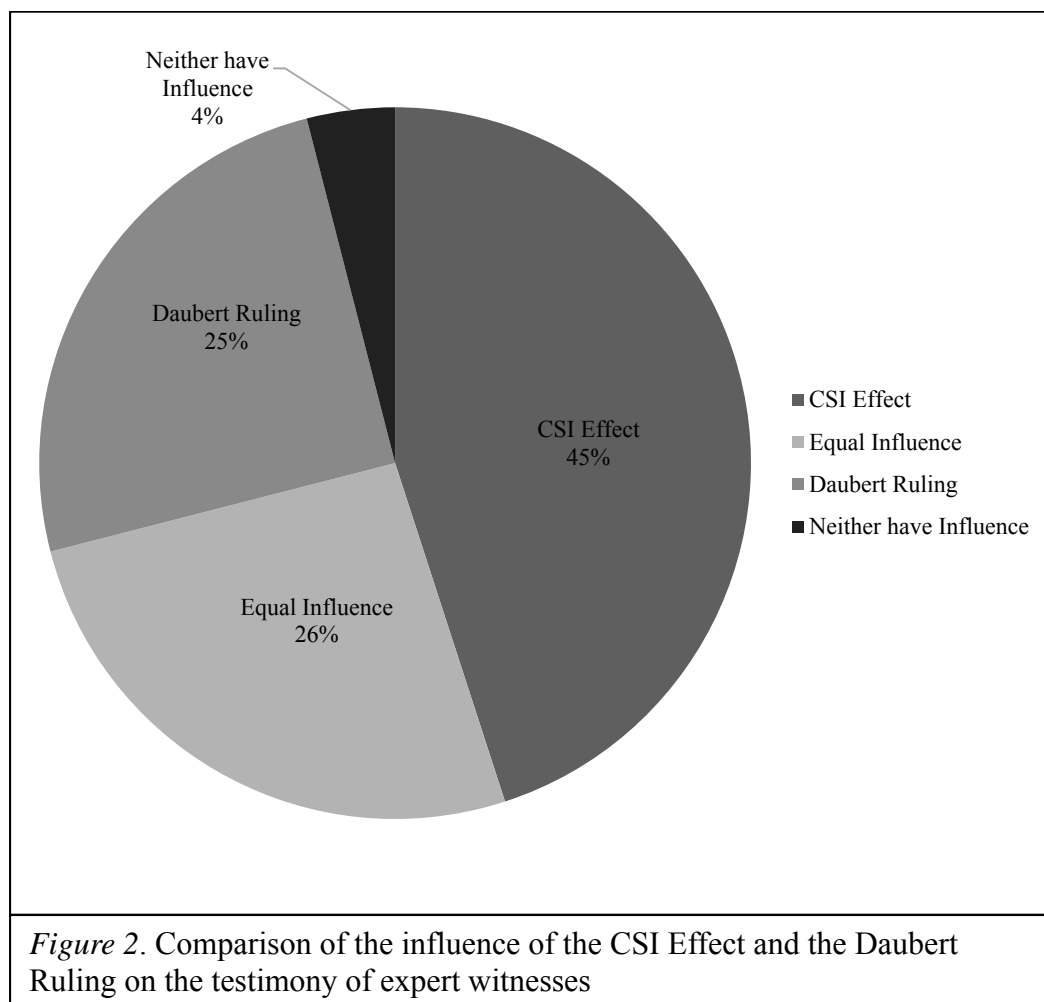
The Testimony of Expert Witnesses at Trial

In examining Research Question 3 (What influence does the Daubert Ruling, the CSI Effect, the NAS Report, or all three have on the testimony of expert witnesses at trial?), several survey questions were dedicated to influences on expert witness testimony. As with question 2, a direct comparison was made between the CSI Effect and the Daubert Ruling. The direct comparison of these two factors is essential for understanding the impact of each expert witness testimony. When comparing the influence of the Daubert Ruling and the CSI Effect with regard to expert testimony additional factors can be examined and were included in the survey. Not only was the impact on testimony examined, but also the interactions experts have with both prosecutors and defense attorneys. Because the Daubert Ruling focuses solely on expert testimony and is the current federal law, handed down by the United States Supreme Court, one may speculate that crime laboratory administrators would say that the Daubert Ruling plays a greater role. Once again, this study demonstrated the opposite.

First, a direct comparison was made between the impact of the Daubert Ruling and CSI Effect on expert witness testimony in general. Forty-five percent responded that

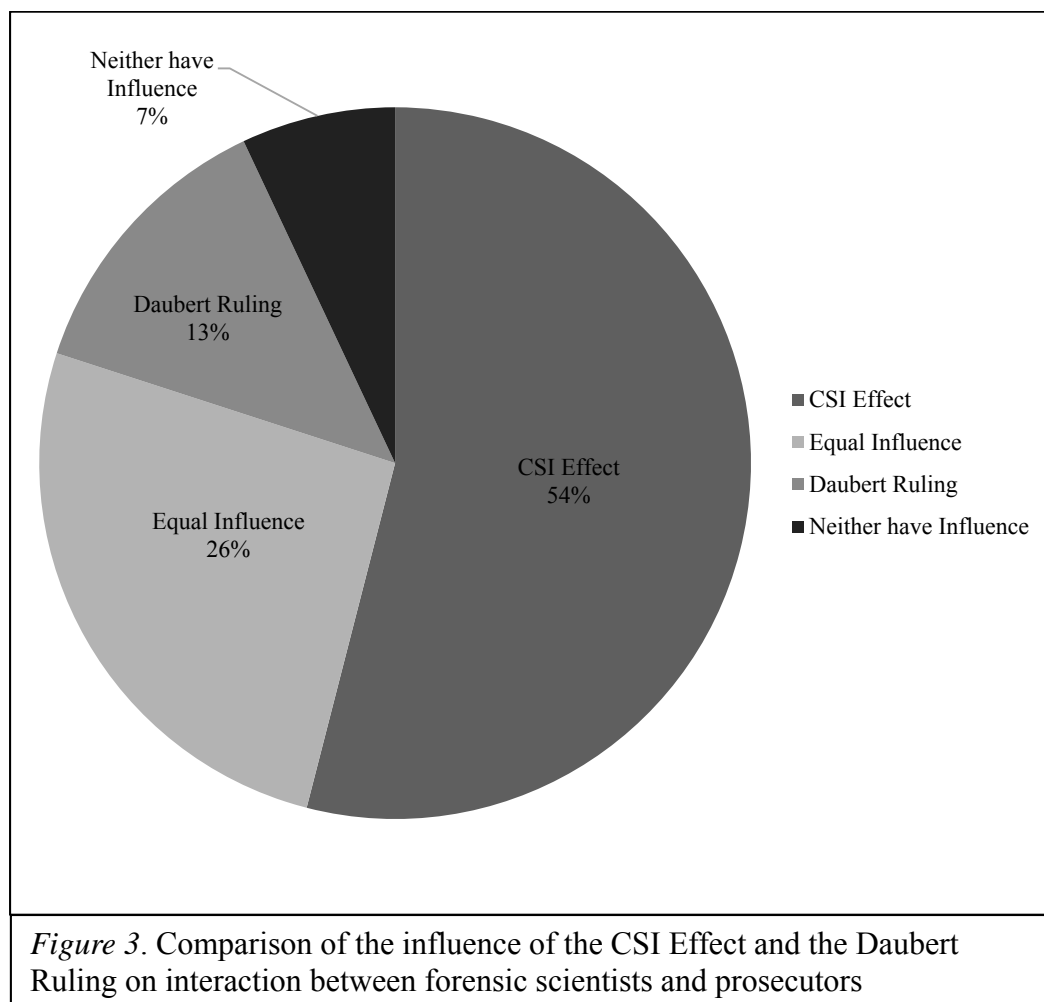
the CSI Effect had a greater influence and 26% responded that it had an equivalent impact as the Daubert Ruling (Figure 2). Combining the two further illustrates the influences of the CSI Effect with it playing a greater than or equal to influence in the minds of 71% of respondents. Again, these are not the answers of jurors, attorneys, or average citizens, but forensic science practitioners and supervisors, with 91% of the respondents having greater than ten years of employment within a crime laboratory system (Table 1 in Chapter 4).

In an effort to clarify which aspect of expert testimony was most influenced by the CSI Effect or Daubert Ruling respondents were asked how each impacted their interactions with both prosecutors and defense attorneys. When examining interactions with prosecutors the disparity grew significantly. With 54% of respondents indicating that the CSI Effect had a greater influence and 26% responded that it had an equivalent impact as the Daubert Ruling (Figure 3). Combining the two further illustrates the influences of the CSI Effect with it playing a greater than or equal to influence as the Daubert ruling in the minds of 80% of respondents. This dramatic increase lends credence to the existence of the weak prosecutor's effect. This study has demonstrated that the perception of a CSI Effect has permeated the minds of crime laboratory administrators, the same may be true of prosecutors.



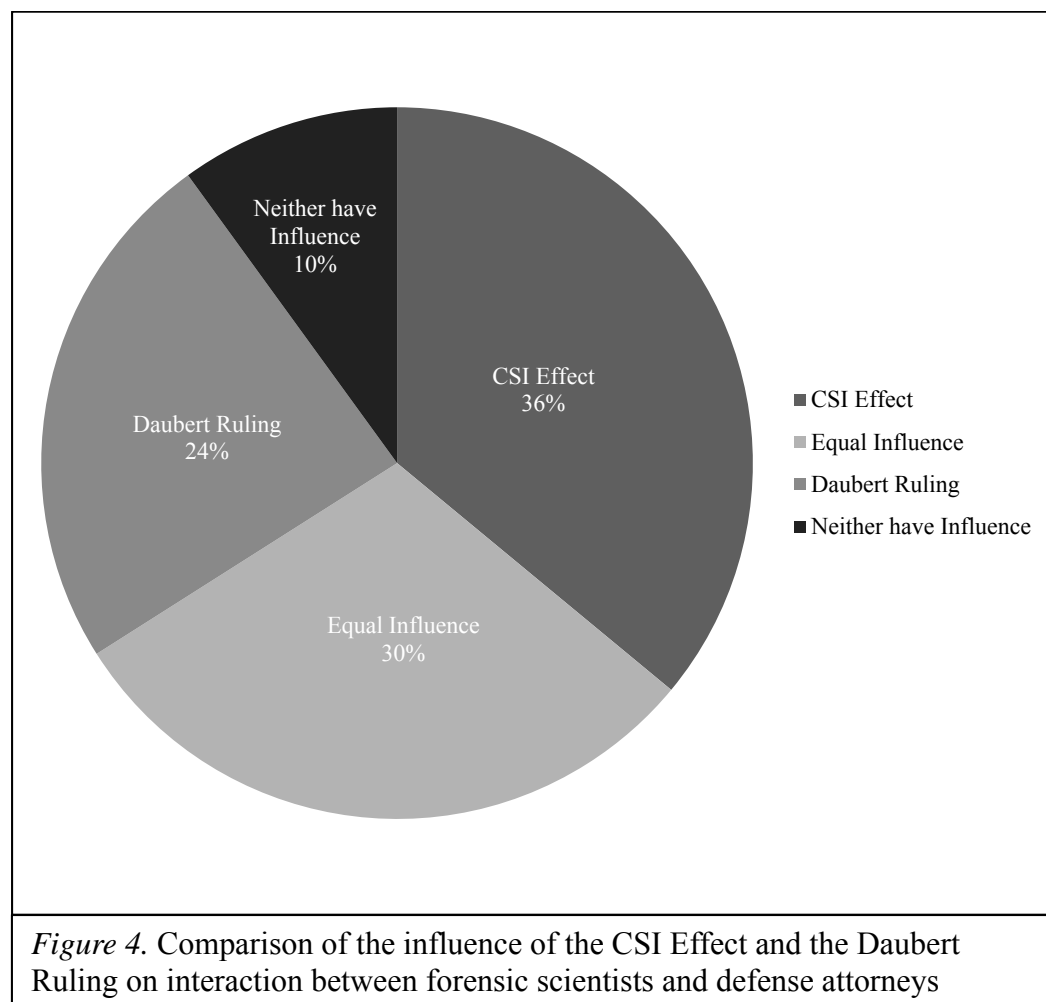
As discussed above and by Cole and Dioso-Villa (Cole & Dioso-Villa, 2007; Dioso-Villa 2014) the weak prosecutor's effect focuses on how CSI has changed the actions of prosecutors. Although there is no empirical data supporting its existence, this theory suggests that prosecutors often take preemptory measures to combat the possible influence of CSI. These measures include asking that unnecessary testing be conducted by the laboratory to make the case look more like CSI, and questioning jurors about their CSI viewing habits during voir dire, introducing the influence of CSI and other forensic

crime dramas prior to the trial. Once trial begins, the weak prosecutor's effect leads to changes in opening statements and closing arguments, adding specific language that injects the world of CSI. Additionally, weak prosecutors utilize experts during trial to explain many of the myths of CSI. In fact forensic experts from crime laboratory are often asked to discuss the unrealistic nature of CSI or to explain why CSI-type results were not found during their testing. In essence begin asked to discuss the CSI effect (State v. Jones, 2010). By changing their tactics prosecutors may also be altering their interactions with crime laboratory administrators. This may lead to a spillover from the misperceptions of a CSI Effect by prosecutors into the crime laboratory and explain why so many respondents indicated that CSI has the greatest influence on their interactions.



Most crime laboratories are government entities and conduct a majority, if not all of their casework in conjunction with law enforcement or prosecutorial efforts. For this reason, crime laboratory administrators often interact with defense attorneys in a different manner than with prosecutors. When examining interactions with defense attorneys, the disparity between the influence of the CSI Effect and Daubert Ruling shrank slightly, but was still statistically significant. Here, 36% of respondents indicated that the CSI Effect had a greater influence and 30% responded that it had an equivalent impact as the Daubert Ruling (Figure 4). Although combining the two showed that the CSI Effect has

a greater than or equal to influence as the Daubert ruling in the minds of 66% of respondents, this total is lower than when compared to interactions with prosecutors. One strong explanation for this variance is that defense attorneys are often the entity to conduct Daubert challenges in criminal cases (Martin, 2014). In addition to determining the admissibility of the scientific methodology, these challenges are often utilized to test experts and examine the significance of evidence that may exist against their clients. Because many forensics scientists only interact with the defense attorney during trial and at motion hearings, and these individuals do not typically request specific testing within the laboratory, crime laboratory administrators may perceive that CSI plays a less significant role in their interactions.



In addition to the above comparison, the CSI Effect, Daubert Ruling, and NAS Report were examined to weight if respondents felt if any influence of these factors had a negative effect on expert witness testimony. Questions 17, 24, and 35 were Likert scale questions and stated, “X (The CSI Effect the Daubert Ruling, or NAS Report, respectively) has had a negative effect on expert witness testimony.” Possible answers included, strongly agree, agree, neutral, disagree, and strongly disagree. As stated in

Chapter 4, the statistical results of this analysis was not as strong as the above comparison, however, the answers are provided in Table 13.

The only statistically significant finding of this research was that respondents viewed that the CSI Effect had a more negative influence on expert testimony than the Daubert Ruling. This finding is consistent with the direct comparison of the CSI Effect and the Daubert Ruling examined above. As depicted below in Table 13, forty percent of respondents either agreed or strongly agreed that the CSI Effect has had a negative effect on expert witness testimony, while only 10% of respondents agreed or strongly agreed that the Daubert Ruling has had a negative effect on expert witness testimony. No other comparisons were significant and the majority of respondents either agreed, were neutral, or disagreed with the negative influence of any of the factors, with few having formed a strong opinion either way.

Table 13

Direct comparison of “X has had a negative effect on expert witness testimony”*

Scale	CSI effect	Daubert Ruling	NAS Report
Strongly Agree	4.50%	1.87%	6.73%
Agree	36.04%	8.41%	28.85%
Neutral	27.03%	26.17%	18.27%
Disagree	30.63%	55.14%	42.31%
Strongly Disagree	1.80%	8.41%	3.85%

**X equals the CSI Effect, the Daubert Ruling, or NAS Report, respectively*

Impact on the Forensic Science Community

In examining Research Question 4 (In the future will the Daubert Ruling, the CSI Effect, or the NAS Report have the greatest impact on the forensic science community?)

survey questions were dedicated to the impact of these factors on the practice of forensic science for years to come. The results of this research differed slightly than the two research questions already examined; however, this question dealt with the future not the present. These findings may shed some light on how members of ASCLD view the longevity of the CSI Effect, the Daubert Ruling, and the NAS Report. Unlike research questions 2 and 3, the results of this question show that the NAS Report will have the strongest influence; however, a majority of respondents agreed that all three will play a significant role in shaping forensic science in the future.

When examining Table 14 below, it is clear that respondents felt strongly that the NAS Report will have a significant impact on forensic science, as a whole. Eighty-three percent of respondents agreed or strongly agreed that the NAS Report will have a significant impact on the practice of forensic science for years to come, with 26% of those strongly agreeing. This is consistent with a concern in the field and a reaction to the NAS Report, including the creation of National Commission of Forensic Science (Edwards, 2014). In conjunction with the Department of Justice, who will focus on broad policies, the National Institute of Science and Technology (2014) responded to the declared need for standardization by focusing on the practice of forensic science and its individual disciplines. To accomplish this goal National Institute of Science and Technology (NIST) has established the Organization of Scientific Area Committees (OSAC) and the Forensic Science Standards Board (FSSB), which will be subdivided by scientific area and discipline specific subcommittees (Stolorow, 2014).

To further demonstrate why members of ASCLD would feel strongly about the future impact of the NAS Report and its recommendation to develop additional oversight, two presentations at the ASCLD 2014 Symposium were dedicated solely to the proposed impact of the NCFS and the FSSB (Santos, 2014; Jones, 2014). Each presentation established the purpose, mission, and relationship of the respective entity to the development of policies and practices within forensic science. Clearly, the recent presentations conducted in 2014 by Santos, Jones, Stolorow, and NIST indicate that at least two tenets, of the NAS Report, standardization and oversight, will have a significant impact on the practice of forensic science for years to come, and this will be accomplished through the oversight of both the NCFS and the FSSB.

Although the NAS Report had the great percentage of respondents (83%) who agreed or strongly agreed, the second highest majority was recorded with the Daubert Ruling. Approximately 63% of respondents indicated that the Daubert Ruling will have a significant impact on the practice of forensic science for years to come. This demonstrates that it too will be a part of laboratory management in the future. The combined effect of the Daubert ruling and the Supreme Court's rulings in *General Electric Company v. Joiner* (1997) and *Kumho Tire Company v. Carmichael* (1999), commonly referred to as the Daubert Trilogy, has established strong guidelines for the admissibility of scientific evidence and has led to greater scrutiny by trial judges. This scrutiny and framework force forensic scientists and crime laboratory administrators to ensure that the policies and procedures meet or exceed the expectations of the court. As

the Court rules on additional cases, the Daubert Ruling will evolve and continue to influence actions with crime laboratories.

In conducting a review of the influence of the Daubert Ruling on its twentieth anniversary, Faigman (2013) refers to the Daubert Ruling as revolutionary and the foundation on which courts will build their decisions on admissibility of scientific evidence for years to come. Faigman also stresses that with this power comes the responsibility for the education of judges in statistics and science. As judges, prosecutors, and defense attorneys all seek greater knowledge in these fields, forensic science administrators must offer educational programs to fill this need. This component will ensure that these members of the forensic science community provide true insight, so that judges have a better understanding of the tenets of the Daubert Ruling. Although the Supreme Court believed the Daubert Ruling would have a modest effect, adding this level of validity testing to expert witness testimony will continue to influence forensic science. Faigman's review of the past two decades, demonstrates clearly that the Daubert Ruling is still a driving force within the criminal justice system and will be for years to come. This provides a sound explanation of why a majority of respondents believe the same.

Lastly, a smaller majority of respondents, 54%, believed that the CSI Effect will have a significant impact on the practice of forensic science for years to come. The fact that the majority is smaller than both the Daubert Ruling and the NAS Report may indicate that members of ASCLD believe that the influence of the CSI Effect may taper off in the future, while the influence of the Daubert Ruling and NAS Report will remain strong. However, it remains remarkable that respondents believe that the unproven

concept of the CSI Effect will have an impact for years to come. This indicates that the CSI Effect will have a guiding force in the long term planning within crime laboratories. As budgets, future policies, and thoughts of expansion, enter the minds of administrators, the CSI Effect will, at a minimum, continue to hover in the background.

In concluding the examination of research question 3, it is clear that all three factors, the CSI Effect, the Daubert Ruling, and the NAS Report, all will influence the future of forensic science, and do so significantly. Of the three it is clear, and the recent developments support, that the NAS Report will be the driving force. The fact that such a strong majority of respondents feel that the NAS Report will have an influence in the future, indicates that its impact may continue to grow. As administrators within the forensic science community, ASCLD members set policies that not only guide the actions within their individual laboratories, but set best practices as a professional organization. Because more than a quarter of all respondents feel strongly about this topic, further suggests that the NAS report and its findings will be on the agenda for years to come.

Table 14

Direct Comparison of “X will have a significant impact on the practice of forensic science for years to come.”*

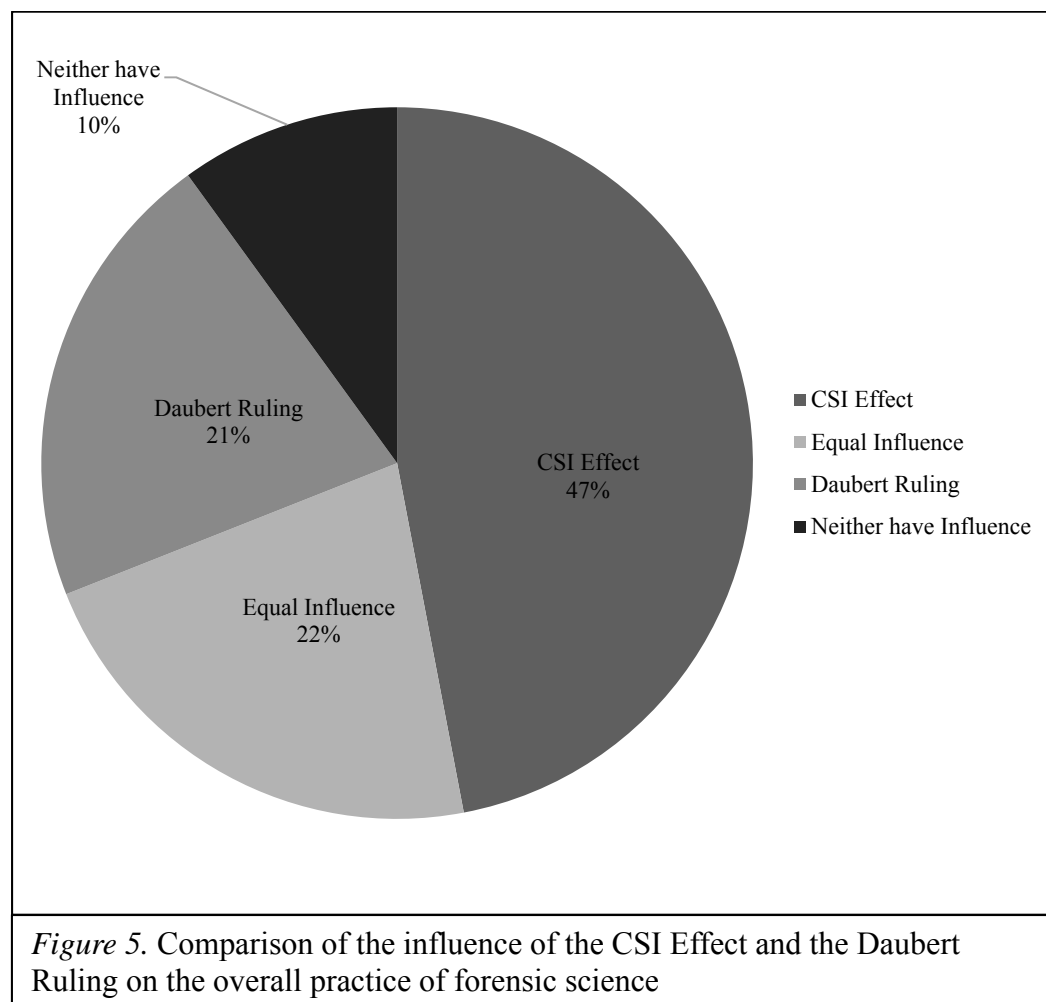
Scale	CSI effect	Daubert Ruling	NAS Report
Strongly Agree	8.11%	4.67%	25.71%
Agree	45.95%	57.94%	57.14%
Neutral	23.42%	28.04%	12.38%
Disagree	15.32%	8.41%	4.76%
Strongly Disagree	7.21%	0.93%	0.00%

**X equals the CSI Effect, the Daubert Ruling, or NAS Report, respectively*

The Operation of the Crime Laboratory

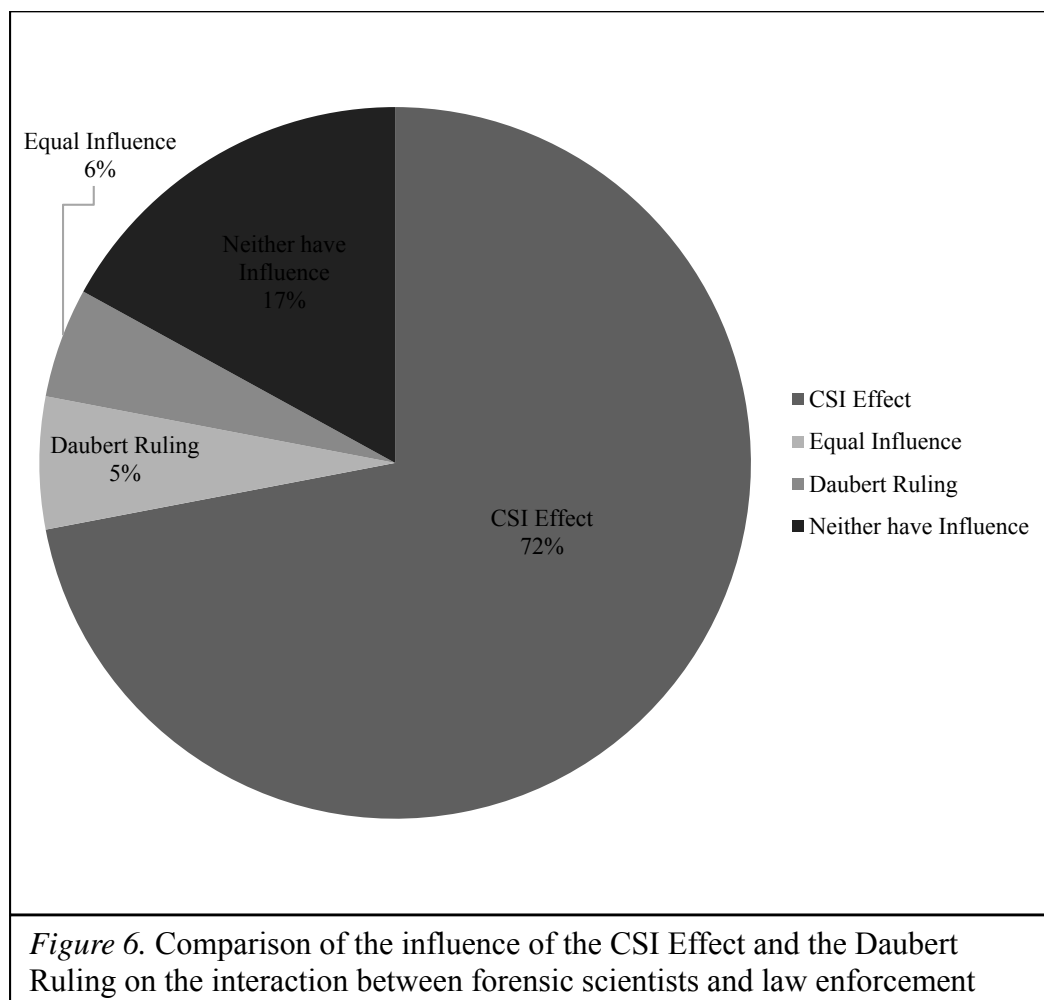
Of the research questions examined, only research question 1 revealed an overall null hypothesis. However, further examination of the survey questions utilized in rendering this conclusion yields more specific data. In order to examine research question 1 (What influence does the Daubert Ruling, the CSI Effect, the NAS Report, or all three have on the operation of the crime Laboratory?) several direct comparison and Likert scale questions were utilized. These questions were broad in scope and combined in an effort to look at the operation of a crime laboratory in general. The null hypothesis refers to the fact that there is no statistical difference in the amount of influence each will have in the future. However, a review of the individual direct comparison questions and the Likert scale questions, clearly demonstrates that all three factors, Daubert Ruling, the CSI Effect, and/or the NAS Report, have an influence on the operation of the crime laboratory.

As with the examination of Research Questions 2 and 3, a direct comparison was made between the impact of the Daubert Ruling and CSI Effect on the overall practice of forensic science. Forty-seven percent responded that the CSI Effect had a greater influence and 22% responded that it had an equivalent impact as the Daubert Ruling (Figure 5). Combining the two further illustrates the influences of the CSI Effect with it playing a greater than or equal to influence in the minds of 69% of respondents. Once again, these respondents are forensic science practitioners and supervisors, with 50% of the respondents indicating that they held the position of crime laboratory director (Table 1 in Chapter 4).



Because the interaction between crime laboratories and other members of the criminal justice system has an impact on the overall operation, a direct comparison was made between the impact of the Daubert Ruling and CSI Effect on the interaction between forensic scientists and law enforcement. Here, there was a substantial and notable disparity. Seventy-two percent responded that the CSI Effect had a greater influence and 6% responded that it had an equivalent impact as the Daubert Ruling (Figure 6). Combining the two further illustrates the influences of the CSI Effect on law

enforcement interactions, with it playing a greater than or equal to influence in the minds of 78% of respondents. This may be due to a combination of the police chief's, weak prosecutor's, and victim's effects (Dioso-Villa, 2014). Since law enforcement officers must answer to the victims they encounter and the prosecutors trying their cases, the perceived need for forensic evidence would alter their interaction with laboratory personnel. Additionally, the police chief's effect permeates all levels of law enforcement, as they combat against criminal, seemingly being educated by fictional crime shows.



In addition to this direct comparison several Likert scale questions were utilized to examine the overall impact of these individual factors on several aspects of forensic science. One of these aspects was the training programs utilized within crime laboratories. Contrary to what may be expected from the responses when asked about the future impact on forensic science (Table 14) to respondents were not as uniform in their opinions with regards to training. As seen in Table 15 below, many respondents either disagreed or strongly disagreed that the CSI Effect (55.56%), Daubert Ruling (42.06%), NAS Report (49.52%) has changed training programs. Since training programs are the backbone of most crime laboratories and set the foundation for future analysts, it seems that these factors should be addressed during this critical period of an individual's career.

With the responses to the prior three research questions, ASCLD members believe that the CSI Effect, Daubert Ruling, and NAS Report, play a significant impact on the various aspects of the criminal justice system and its interaction with forensic science. For this reason, it stands that each should be addressed at some degree during training. The lack of modification in training may stand as a reminder that organization changes occur slowly and that these factors may be added to training programs in the future. As a minimum, research on the CSI Effect should be presented to trainees, so that they understand the ongoing debate, and case law surrounding the Daubert ruling should be taught, so that these future experts know how to testify properly. Lastly, the NAS report and its recommendation should be presented, so that these analysts understand the

implications of the both the Organization of Scientific Area Committees (OSAC) and the Forensic Science Standards Board (FSSB).

Table 15

Direct Comparison of “X has forced the institution in which I work/supervise to alter its training practices.”*

Scale	CSI effect	Daubert Ruling	NAS Report
Strongly Agree	.90%	.93%	4.76%
Agree	23.42%	33.64%	24.76%
Neutral	17.12%	23.36%	20.95%
Disagree	36.04%	32.71%	41.90%
Strongly Disagree	22.52%	9.35%	7.62%

**X equals the CSI Effect, the Daubert Ruling, or NAS Report, respectively*

In addition to training programs, the impact of the CSI Effect, Daubert Ruling, and the NAS Report were examined with respect to their influence on the policy and procedures. Once again, respondents were not as uniform in their opinions with regards to policy and procedure changes. As seen in Table 16 below, many respondents either disagreed or strongly disagreed that the CSI Effect (59.63%), Daubert Ruling (49.53%), NAS Report (44.77%) have changed their policies and procedures. Based on their responses to other survey questions, this too goes against what is expected.

If respondents believe that the CSI Effect, Daubert Ruling, and NAS Report will play a significant impact on practice of forensic science for years to come, why are these issues not being addressed in policy making? As was seen with training programs, does a lack of modification to the policy and procedures within laboratories further demonstrate that organizational changes occur slowly and that these factors may be addressed in the future.

For example, policies limiting testing may combat the influence of the CSI Effect on backlogs. Ensuring that policies mimic the legal requirements and procedures emphasizing pretrial conferences may help address the influence of the Daubert Ruling. Reviewing the criticisms of the NAS Report that are being addressed at the federal level and ensuring that laboratory polices combat these issues, may limit the influence of future standards created by either the NCFS or the FSSB.

Typically, accredited laboratories must have document reviews every year. These document reviews should include topics influencing forensic science. Since a majority of respondents believed the CSI Effect (54.06%), the Daubert Ruling (62.61%), and the NAS Report (82.85%) will have a significant impact on the practice of forensic science for years to come, administrators must begin to incorporate policies and procedures addressing these factors. The alternative is to allow these factors to have an informal or uncontrolled influence on the practices of one's laboratory. If practitioners within a laboratory are not trained to address these issues during analysis or in court and no policies exist to govern their response, individuals will vary in their approach. This can lead to unregulated outcome that will be difficult to manage.

Table 16

Direct Comparison of "X has forced the institution in which I work/supervise to alter its policies and procedures."*

Scale	CSI effect	Daubert Ruling	NAS Report
Strongly Agree	.92%	.93%	5.71%
Agree	19.27%	23.64%	29.52%
Neutral	20.18%	26.17%	20.00%
Disagree	38.53%	41.12%	38.10%
Strongly Disagree	21.10%	8.41%	6.67%

**X equals the CSI Effect, the Daubert Ruling, or NAS Report, respectively*

Summary of Findings and Implications for Social Change

Creating positive social change within the criminal justice system, requires one to understand its workings. By studying how the Daubert Ruling, the CSI Effect, and the NAS Report influence the decisions of crime laboratory administrators and practitioners, it is possible to make recommendations that will help properly shape the use of forensic science. It is important to all parties involved, law enforcement, prosecutors, defendants, defense attorneys, and the triers of fact to utilize forensic science in its purest form, and the findings of this study will assist in accomplishing this task. Ultimately, the objective of our criminal justice system should be to ensure that the innocent are not wrongfully convicted and that guilty parties are imprisoned. Forensic science should assist in reaching that goal. To further establish the implication for positive social change each factor will be examined separately.

The CSI Effect

As previously addressed and discussed by Cole and Dioso-Villa (Cole and Dioso-Villa, 2007; Dioso-Villa 2014), the weak prosecutor's effect focuses on how the CSI Effect has changed the actions of prosecutors. These actions include asking that unnecessary testing be conducted by the laboratory to make the case look more like CSI. Absent any empirical data of its actual influence on juries, weak prosecutors believe that the jury needs forensic evidence in order to convict a defendant. This has influenced DNA testing, creating or expanding backlogs in many crime laboratories (Pratt et al., 2006). Additionally, many state backlogs have grown to such critical standards, when it comes to processing sexual assault kits, that legislation has been passed or is pending to

mandate backlog reporting (The National Center for Victims of Crime, 2014). Sexual assault kits are collected from victims of crimes that are sexual in nature. The likelihood of collecting suspect DNA is more probable in these cases, due to the nature of the crime and the significant contact between the victim and perpetrator. Because of the weak prosecutor effect and the “need” for DNA evidence in court, sexual assault kit backlogs grow, while trivial testing is conducted. This is one of the impacts associated with the CSI effect, as misguided attorneys request analysis that is not truly necessary to convict a defendant (Cooley, 2007). Victims of sexual assaults are victimized again by these backlogs and the lack of prosecution of cases, in which this valuable evidence could be put to the appropriate use and lead to the conviction of the perpetrators (The National Center for Victims of Crime, 2014).

One example is in Louisiana where mandatory reporting is in effect. Signed into law by Governor Jindal in 2014, Act 124 requires that all criminal justice agencies and crime laboratories within the state of Louisiana report the number of untested sexual assault kits in their custody and the date collected. Although this step is necessary to combat and highlight this issue, it adds another layer of bureaucracy to an overwhelmed system. A positive effect of this legislation is that it clearly provides crime laboratories with tangible reasons to fight the weak prosecutor effect and force law enforcement officials and district attorneys to reign in the requests of attorneys who continually request unnecessary testing.

Strom and Hickman (2014) indicated that backlogs are influencing more than just DNA sections. The unreasonable belief that forensic evidence is needed to prove a case,

extends to other fields such as latent prints, trace evidence, and firearm/tool mark examination. Strom and Hickman discuss three reasons for increased backlogs within crime laboratories. These sources are credited for “artificial backlogs,” because they artificially inflate the number of samples and cases waiting in the evidence vaults of crime laboratories and evidence rooms across the country. One of the three sources for artificial backlogs is symbolic evidence collection.

Symbolic evidence collection occurs when law enforcement personnel, such as detectives or crime scene technicians, collect samples merely to seem responsive to the victim and to portray the image that they care about the case. This clearly mirrors the Victim’s Effect discussed by Dioso-Villa, 2014, where victims desire to have everything tested in their cases in order to help catch the criminal. Even though detectives and technicians may know that there is no evidentiary value to what is being collected, it is done merely to appease the victim and artificially inflates backlogs.

The research conducted in this study further demonstrates this misuse of crime laboratory resources, as unnecessary crime scene evidence is submitted and needless testing is conducted. The influence of the CSI Effect is clear and crime laboratory administrators must begin to enact policies and procedures to limit the negative influence of the CSI Effect through clear and concise policies, limiting unnecessary testing. Additionally, crime laboratory administrators must work with other members of the criminal justice system to create training and educational programs for law enforcement, prosecutors, defense attorneys, and the judiciary to ensure that the perceived influence of

the CSI Effect does not cripple their ability to play an effective role in the pursuit of justice.

The Daubert Ruling

The Daubert Trilogy has established strong guidelines for the admissibility of scientific evidence and has led to greater scrutiny by trial judges. For this reason, forensic scientists and crime laboratory administrators should enact policies and procedures that meet or exceed the expectations of the court. As the Court rules on additional cases, the Daubert Ruling will evolve and continue to influence actions with crime laboratories. However, if no policies or training programs are in place laboratory personnel will be ill prepared to face these challenges in court and may ultimately harm their chosen discipline or the entire forensic science community.

As the Daubert Ruling evolves it spawns additional case law that influences forensic science and its use in court. Additionally, many states are utilizing the Daubert Ruling and its cousins at the state level, to enact new and more stringent requirements on crime laboratories and those testifying as experts. If crime laboratory administrators and professional organizations do not incorporate the Daubert Ruling and other legal requirements into their policies and training programs, they will be leaving their organization and those they are charged with preparing to testify falling short, negatively affecting the field of forensic science.

One good example of the need for policies and protocols can be found in the fields of forensic identification. There has been a significant increase in Daubert challenges as they relate to these fields, which include fingerprints, firearm and tool mark

analysis, document examination, and impression evidence examination (Page et al., 2011). The majority of the challenges have failed, but every one that succeeds weakens these important components of the criminal justice system. Imagine a criminal justice system in which fingerprint evidence, a form of forensic science that has been utilized as a method of identification consistently since the 1800s, would no longer be admissible (Herschel, 1916). Challenges to fingerprint evidence have been successful do to ill prepared examiners, not trained to testify in a manner that properly defends their knowledge, training, and methodology. Fingerprinting continues to be widely attacked, although it has been in use for identification in the United States, since the beginning of the 1900's and has had the backing of the federal government, through an act of Congress establishing its national repository of fingerprints within the Federal Bureau of Investigation (FBI, 2010). Although professional organizations, universities, agencies and the private sector have worked together to utilized proper research and testing to advance the field, fingerprint analysis is conducted within law enforcement agencies and crime laboratories. It is within these institutions where policies, procedures, and training is needed most.

Even the longstanding and excepted field of drug chemistry (analysis of controlled substances) has seen challenges in recent years. With the introduction of synthetic cannabinoids, a class of drugs fairly new to law enforcement in the United States that mimics the effect of marijuana, Daubert challenges have been utilized to attack the procedures and opinions reached by drug chemists (State of Nebraska v. Lundgren, 2011). Drug chemists, who are not typically apart of Daubert challenges, most

often testify to the analysis of controlled substances, such as cocaine and marijuana. Because of the nature of this analysis and the brevity of many drug reports, these analysts may not be cross examined to the same extent as members of the identification sciences and may be unequipped to face the strenuous cross examination associated with a Daubert challenge.

The research conducted in this study clearly demonstrates that crime laboratory administrators believe that the Daubert Ruling will continue to play an active presence in forensic science. In fact, 62.61% of respondents stated that the Daubert Ruling will have an effect of forensic science for years to come. However, less than a quarter of these same individuals stated that the Daubert Ruling has influenced their policies and procedures. Additionally, only one third of respondents have altered their training programs based on the Daubert Ruling. This lack of updating the policy, procedures, and training programs in response to the Daubert Ruling will have a negative effect on expert witness testimony and could have permanent consequences for the various fields of forensic science. At a time where the science utilized within the criminal justice system is under attack, it is imperative that crime laboratory administrators insure their personnel are utilizing practices that meet the Daubert Standard and are armed to defend these methodologies in court.

In addition to the Daubert Ruling, administrators need to insure that trainees and current employees receive training in new court rulings and statues that effect how their analysts will conduct examinations and testify in court. Based on the response to updating policies and training programs with regard to the Daubert Ruling, it would

appear that crime laboratory administrators are lagging behind on including legal updates within their programs. In an effort to keep up to date with legal matters that effect the crime laboratory, administrators should have a method for learning of and addressing these issues before they negatively impact services. There are several ways to accomplish this task. One method would be to reach out to their local prosecutors and receive updates and training through their continuing legal education requirements. Another method would be to work with local law enforcement to receive and review legislative updates. In either case training and education are key, followed by implementing what is learned. Doing so will help protect the analysts, the crime laboratory, and the field of forensic science from falling behind new legal obligations that are imposed. Updating policies, procedures, and training programs to address the Daubert Ruling and various other legal requirements will lead to positive social change, by ensuring that forensic science remains an accurate and useful entity within the criminal justice system.

The NAS Report

As it has been discussed previously, many of the recommendations made within the NAS Report have been taken seriously by the forensic science community and the various members of the criminal justice community. Conversely, some of the criticism made within the report still remain unproven and have been refuted by the professional organizations that were most attacked. This section will examine how respondents from ASCLD viewed the NAS Report and its influence on forensic science now and into the future. Once again, it is imperative for crime laboratory administrators to view the

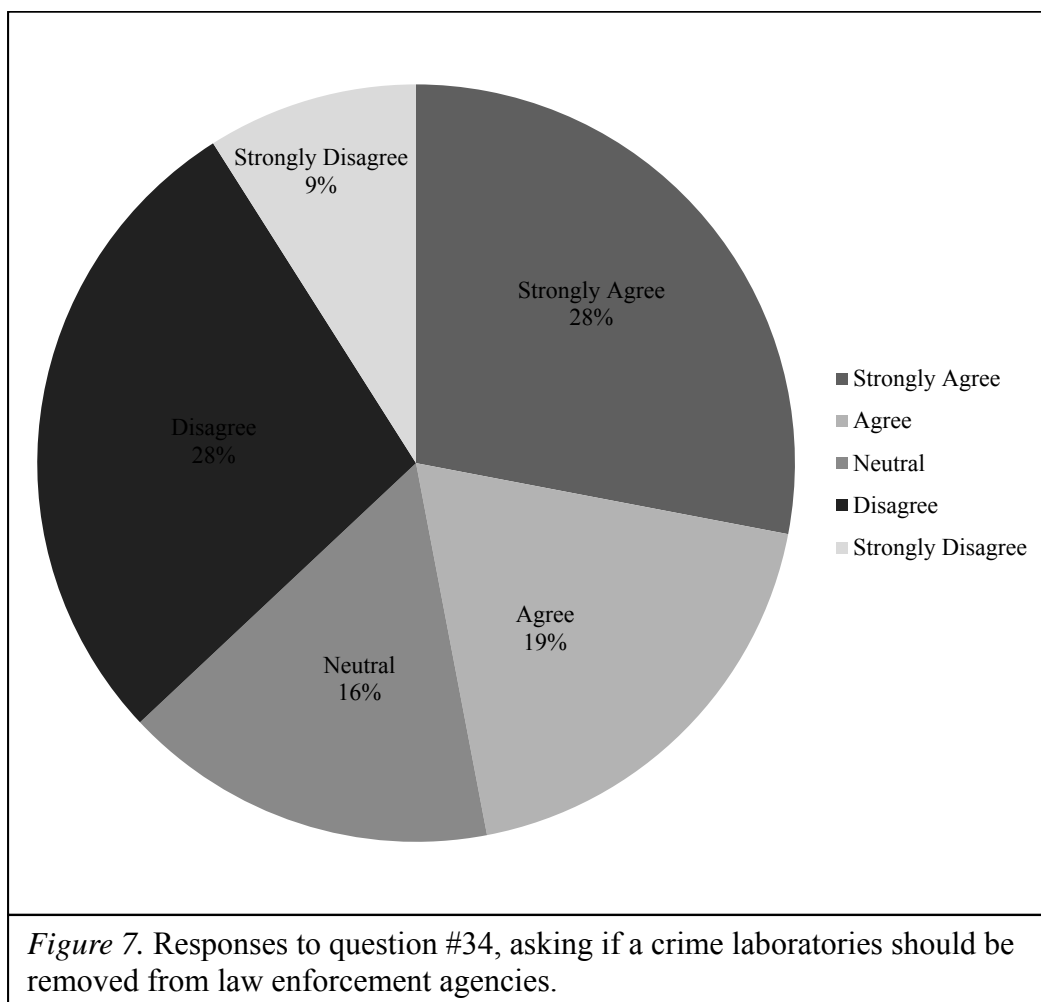
findings of this report, especially those that have gained traction, and implement changes to their policies, procedures, and training programs.

The research conducted in this study clearly demonstrates that crime laboratory administrators believe that the NAS Report will continue to play an active presence in forensic science. In fact 82.85% of respondents stated that the NAS Report will have an effect of forensic science for years to come. This was the highest percentage of all three factors studied, with over a quarter of respondents strongly agreeing. However, only 35% of these same individuals stated that the NAS Report has influenced their policies and procedures. Additionally, less than one third of respondents have altered their training programs based on the report. This lack of updating the policy, procedures, and training programs in response to the NAS Report, published in 2009, further demonstrates a slow reaction time to a major development in forensic science. A further look into how respondents answered more specific questions may shed light on to this disparity.

Congress has created the National Commission of Forensic Science (Commission), who will provide recommendations concerning methods and strategies for the practice of forensic science (National Commission of Forensic Science, 2014). The creation of such an entity was one of the chief recommendations of the NAS Report. However, the Commission will have less power than what was recommended originally. When respondents were asked if they believed if Congress should establish such a commission almost 35% disagreed or strongly disagreed, while 29% were neutral. Only 36% felt that the commission should be formed. With such a lack of enthusiasm toward

the formation of the Commission, it may be expected that any recommendations will be implemented at a slow pace.

Another aspect of the NAS report that has not gained widespread support from the members of ASCLD, who responded to the survey, was the idea that all crime laboratories should be removed from law enforcement entities. This recommendation has appeared to have lost any momentum, with many of the members of the Commission working for law enforcement laboratories. Respondents were fairly equally divided. Here, 37% disagreed or strongly disagreed, while 16% were neutral. Only 47% felt that the crime laboratories should be removed from law enforcement entities (Figure 7).



When asked about recommendations of the NAS Report that were already implemented by many accredited laboratories, prior to the recommendation being made, agreement was still inconsistent. The NAS Report recommended that laboratory accreditation and individual certification be mandatory and governed by a national commission. Many laboratories across the country are already accredited. In fact, 399 crime laboratories are accredited currently by the American Society of Crime Laboratory Directors/Laboratory Accreditation Board (ASCLD/LAB), the largest accrediting agency

(Accredited Laboratory Index, August 2014). Also, Forensic Quality Services (FQS) accredits over 50 laboratories (FQS, 2014). Some smaller laboratories remain unaccredited and independent analysts are not affiliated with accredited laboratories. Although accreditation is voluntary in the majority of jurisdictions, most laboratories choose to go through the process. This may explain why there was sharp division when asked if a national commission should make accreditation mandatory (Figure 8). Respondents were fairly equally divided. Here, 32% disagreed or strongly disagreed, while 28% were neutral, while 49% either agreed or strongly agreed.

Although smaller laboratories remain unaccredited and independent analysts are not affiliated with accredited laboratories, 94% of respondents indicated that they work for a crime laboratory. For this reason, these results may be skewed toward individuals who are associated with accredited laboratories. This is, in part, due to the respondents being members of ASCLD, which implies but does not require association with a crime laboratory. A survey of independent experts may change the responses, since they are not affiliated with accredited crime laboratories and are not held to the same quality assurance standards that are required of analysts working within an accredited body.

It should be noted that this was a two part question that focused on accreditation, which focuses on laboratory standards, and certification, which focuses on the individual analysts. Much like accreditation, certification is primarily voluntary and acts as a level of excellence within a particular field. To mandate certification, some widespread changes will be needed. Currently, the International Association for Identification certifies forensic scientists in many disciplines, including latent print analysis, bloodstain

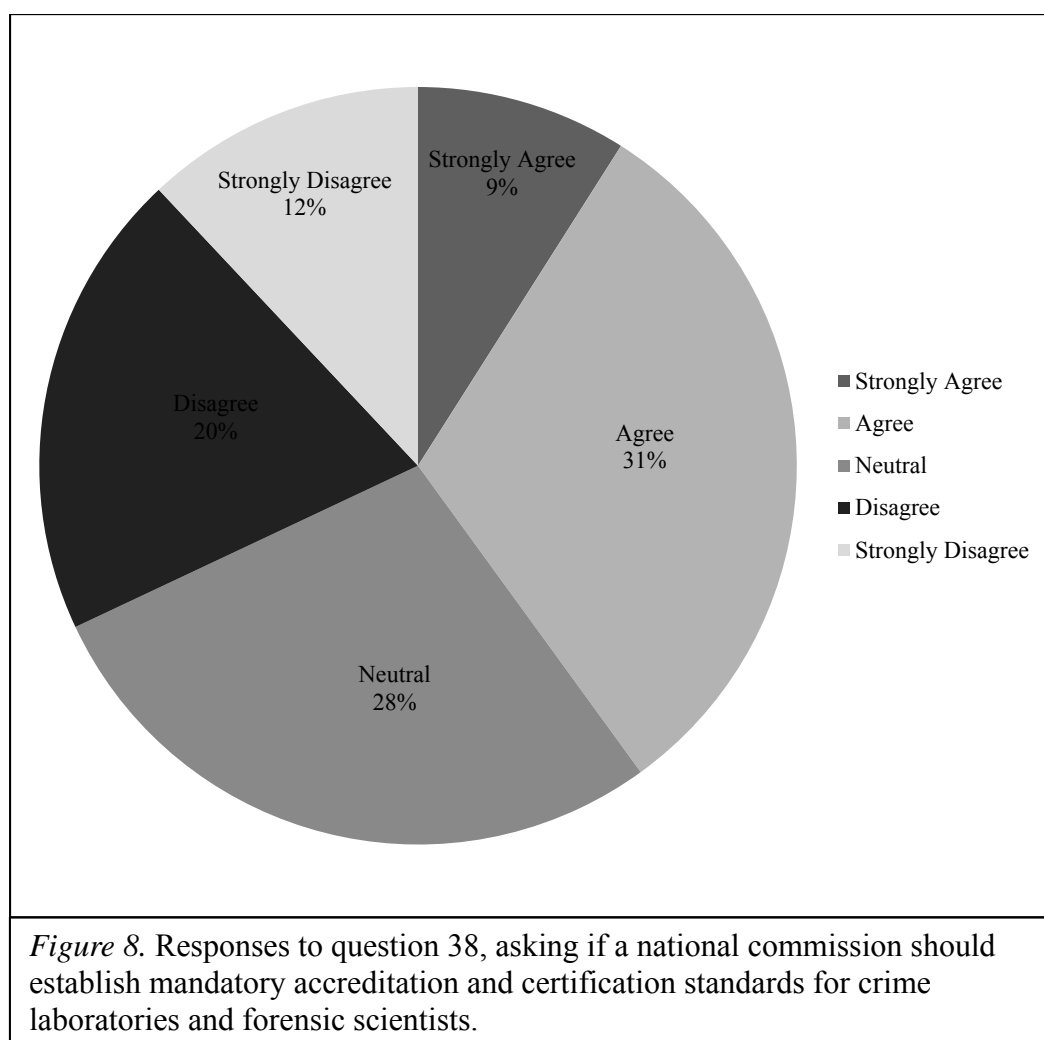
pattern analysis, and crime scene investigation (IAI Forensic Certification Home Page, 2014). Each of these certifications require a specific number of years as a practitioner in order to qualify. To implement mandatory certification, these requirements would be forced to changed, so that trainees, not practitioners, are eligible to go through the process. This would be a time consuming and costly endeavor that would actually reduce the skill level needed to pass the test. An individual just completing training will not have the same skill level as individuals with many years of practical experience, striving to attain a level of excellence in their field.

Additionally, the international standard utilized by all accrediting bodies to accredit crime laboratories within the United States, ISO/IEC 17025, requires laboratories to ensure that all of their analysts are competent in their respective fields (ISO/IEC 17025, 2005). In fact, ISO/IEC 17025 standard 5.2.1 states the following:

The laboratory management shall ensure the competence of all who operate specific equipment, perform tests and/or calibrations, evaluate results, and sign test reports and calibration certificates. When using staff who are undergoing training, appropriate supervision shall be provided. Personnel performing specific tasks shall be qualified on the basis of appropriate education, training, experience and/or demonstrated skills, as required (ISO/IEC 17025:5.2.1, 2005).

During the audit process, the accrediting body reviews, and must ultimately approve, the procedures and standards established by the crime laboratory to ensure that all of its analysts are competent to conduct casework and author reports. This typically requires a well-defined and completed training program, in addition to yearly proficiency

testing, administered by a third party. Proficiency tests are mock cases, typically submitted to several analysts or laboratories, containing the same samples and potential findings. The analysts are given the test and must submit their findings for review. Only after all tests have been submitted to the testing body are the results released. The results of this testing are also sent to the accrediting body. Typically, any analyst who fails this test is removed from casework and an audit is conducted on prior casework conducted.



Because mandatory competency is already coupled with the accreditation process, it may be overly burdensome and redundant to mandate certification for individual analysts, who already work within accredited laboratories. An alternative would be to require independent analysts, who are not associated with an accredited crime laboratory, to achieve certification. Analysts working for an accredited laboratory would fall under the umbrella of the laboratory accreditation and utilize the mandatory standards, training, and proficiency testing as proof of competency. Once again, the wide variety of potential solutions to the accreditation/certification mandate may account for the lack of consensus among respondents. In order to foster positive social change well-defined efficient methods of accreditation and certification should be addressed; however, these changes must be obtainable and actually improve the field of forensic science, not merely add a burden with no tangible results.

Recommendations for Future Study

Following the analysis and interpretations from this study, it is appropriate to discuss recommendations for future studies on these topics. This study focused on the influence of the CSI Effect, the Daubert Ruling, and the NAS Report on the field of forensic science and the management of crime laboratories. One specific population was focused upon when conducting this study, the members of ASCLD and the questions were limited to their perception of how these factors impact the criminal justice system. In an effort to gain a better understanding of the impact of the CSI Effect, the Daubert Ruling, and the NAS Report on the criminal justice system and effect positive social change, additional studies may be conducted involving other professional organizations

within forensic science and other members of the criminal justice system. Additionally, a future study may be conducted to determine if the predictions and assumptions made by members of ASCLD were accurate. Ultimately, any research can be expanded upon and extending this research can only help to better understand this dynamic aspect of the criminal justice system.

Additional Professional Organizations within Forensic Science

As it was previously established, ASCLD is only one of many professional organizations within the forensic science community. Other professional organizations include broad spectrum general enrollment or may be regional in nature, while the vast majority are discipline specific. Because the focus of this study was to evaluate the perceptions of administrators within the forensic science community, ASCLD was the logical choice. Surveying each of these other types of professional organizations would refine the overall impact of the CSI Effect, the Daubert Ruling, and the NAS Report on the forensic community in several ways. Studying and comparing the responses of general enrollment organizations, such as the American Academy of Forensic Sciences (AAFS), would include a broad base of respondents and would include the various sections within the organization. These sections include Anthropology, Criminalistics, Digital and Multimedia Sciences, Engineering Sciences, Odontology, Pathology/Biology, Psychiatry and Behavioral Sciences, Toxicology, Jurisprudence, and a General section. Each of these sections have specific requirements to join, which further distinguish differences between the members (American Academy of Forensic Sciences, 2014). A review of the responses from this organization and others like it would provide a general

view from many disciplines. Inferential statistics could be utilized to compare differences from with each section, providing even greater detail.

Additionally, studying the responses from regional organizations may demonstrate how the CSI Effect, the Daubert Ruling, and the NAS Report influence various areas of the country. Of the three, the greatest insight may gained from the examination of the court rulings that mirror Daubert. As previously stated, each state must adopt a standard to determine the admissibility of forensic evidence and determine if it will mirror Daubert, Frye, or some combination of the two. Examining state and regional organizations such as California Association of Criminalists (CAC), Louisiana Association of Forensic Scientists (LAFS), the New Jersey Association of Forensic Scientists (NJAFS), Midwestern Association of Forensic Scientists (MAFS), Southern Association of Forensic Scientists (SAFS), or Northwest Association of Forensic Scientists (NAAF), would provide valuable insight into how these factors effect each region and provide insight for community and government leaders to address specific concerns in these areas.

In addition to general admission organizations, there are many professional organizations that are discipline specific. Some examples of these include the Association of Firearms and Tool Mark Examiners (AFTE), International Association of Bloodstain Pattern Analysts (IABPA), National Association of Medical Examiners (NAME), Association of Forensic Quality Assurance Managers (AFQAM), The Association for Crime Scene Reconstruction (ACSR), Association of Forensic DNA Analysts and Administrators (AFDAA), and American Board of Forensic Document

Examiners (ABFDE). Although there are numerous others, this list demonstrates the wide spectrum of organizations that are currently available to study. By examining these discipline-specific organizations and possibly utilizing inferential statistics to compare the responses of more than one organization may allow the researcher to better understand how the CSI Effect, the Daubert Ruling, and the NAS Report are viewed within these disciplines.

Additional Members of the Criminal Justice System

In addition to further study utilizing other professional organizations within the forensic science community, other elements of the criminal justice system could be studied in a similar fashion. This would require slight alterations to the survey questions based on the particular element being studied; however, the responses of these individuals could be measured to determine the overall impact of the CSI Effect, the Daubert Ruling, and the NAS Report on the various aspects of the criminal justice system. Because of the nature of the survey and information to be obtained, it would be best to focus future research on prosecutors, defense attorneys, judges, and law enforcement personnel. These key players utilize or are in direct with forensic science practitioners and understanding their perceptions may further refine how this element of the criminal justice system is utilized.

Prosecutors could be surveyed by utilizing bar associations or through direct sampling of government entities, such as district attorney's offices or the United States Attorney's Office. In order to mirror the current research as closely as possible simple alterations to the survey questions would have to occur. These alterations would center

on the demographic questions. The content specific questions would remain the same; however, questions that are outside of the scope of a prosecutor could be replaced with questions that focus on case preparation, jury selection, plea bargaining, and other factors that influence their work. Utilizing inferential statistics and cross tabular analysis, the results obtained from the study of ASCLD members could be compared to the answers given by prosecutors. This comparison could be utilized to determine where misperceptions exist and address true differences in opinion, leading to a better understanding and development of education and training programs.

In a similar manner, defense attorneys could also be surveyed. These individuals could be reached by utilizing bar associations or through direct sampling of government entities, such as public defenders offices or statewide public defenders boards. Utilizing the same format as prosecutor surveys with slight alterations to the demographic questions, the responses of these individuals could also be measured to determine the overall impact of the CSI Effect, the Daubert Ruling, and the NAS Report on factors influencing the defense aspects of the criminal justice system. Once again, questions that are outside of the scope of a defense attorney could be replaced with questions that focus on case preparation, jury selection, plea bargaining, and other factors that influence their work. Comparing the responses of defense attorneys with those of prosecutors or forensic scientists could also be utilized to determine where misperceptions exist and address true differences in opinion.

The same could be said of conducting a survey of judges to determine the influence of the CSI Effect, the Daubert Ruling, and the NAS Report. In addition to the

survey format followed with prosecutors and defense attorneys, questions could be added that in place of the analyst specific questions that examined how these factors influence their rulings on such things as the admissibility of expert witness testimony, admissibility of scientific evidence, and their verdicts as judges. Since judges play such a large role in determining the admissibility of important evidence and qualifying forensic scientists as expert witnesses, a better understanding of their perception of these influences can lead positive social change through more legally sound rulings.

The last group that could be examined and ultimately have the findings compared to ASCLD members would be members of the law enforcement community. In a similar manner to the previous groups presented, law enforcement personnel utilize forensic science, as they perform their duties within the criminal justice system. Determining the influence of the CSI Effect, the Daubert Ruling, and the NAS Report on their perception of forensic science will benefit the process from crime scene through the court room, by creating a better understanding of the misconceptions held by these individuals. Creating educational and training programs that can start during the training academy and continue through the in service training they receive throughout their career. Since law enforcement personnel touch every case within the criminal justice system, educating these individuals will provide a significant opportunity for positive social change.

Future Study of ASCLD Members

In addition to expanding the study to other forensic science professional organizations, both regionally and nationally, a replication study can be conducted of ASCLD members. This study would ask the same questions as this study to allow for

longitudinal analysis. A period of several years should pass to ensure enough time has gone by to determine if perceptions have changed. As the CSI Effect, the Daubert Ruling, and the NAS Report continue to play a role within the forensic science community and the criminal justice system, as a whole. Because each of these factors may influence forensic science in different ways, perceptions may change overtime as to which has the greatest influence. Hopefully, the implementation of policies, procedures, and training programs may limit any negative effect from these factors.

No consensus has been formed as to the reality of the CSI Effect and there is a lack of empirical data indicating that it exists. For this reason, future study of ASCLD members would be coupled with research to determine if any proof has been generated supporting the existence of the CSI Effect. If studies remain to be inconclusive, administrators can be examined to determine if they have created policies and procedures to combat this perceived phenomenon.

Only by conducting a future study can one determine if the predictions of ASCLD members that, “the CSI Effect will have a significant impact on the practice of forensic science for years to come” can be examined. Again, 54% of respondents believed or strongly believed this to be true. By examining future respondent’s answers to the current influence of the CSI Effect on the operation of the crime laboratory, the analysis of evidence, and the testimony of expert witness at trial will determine the accuracy of this prediction. Because the CSI Effect is media based and intangible at the moment, future of study of ASCLD members may add valuable insight into its effect.

The Daubert Ruling is yet another factor that can be further studied through a replication study. Because court rulings are fluid and ever adapting to meet the needs of the criminal justice system and to protect the rights of the accused, there is a strong likelihood that additional case law will be established. This case law may refine the application of the Daubert Ruling at the federal level and change the way state courts admit expert witness testimony. As the Daubert ruling is refined in the future, ASCLD members may change their perception of its influence on the operation of the crime laboratory, the analysis of evidence, and the use of expert witnesses at trial. If so, a replication study will identify the effectiveness of these changes and determine if additional training, education, or policies are needed.

Lastly, the NAS Report is still in its infancy and the criminal justice community is just starting to react to its findings. The Organization of Scientific Area Committees (OSAC) and the Forensic Science Standards Board (FSSB) are being formed and have not yet implemented any recommendations (Stolorow, 2014). A future study of ASCLD members will determine if these organizations and the intense level of participation within the forensic science community yielded positive results. As the committees make recommendations and set best practices within the forensic science community, they should have a positive influence on the operation of the crime laboratory, the analysis of evidence, and the use of expert witnesses at trial. The effectiveness of these changes can be evaluated by the future responses of ASCLD members.

Conclusion

This study examined the degree of influence of the CSI Effect, Daubert Ruling, and NAS Report on various aspects of forensic science. As a result, it was determined that members of ASCLD believe the operation of the crime laboratory, the analysis of evidence within the forensic science community, the testimony of expert witnesses at trial, and the future of the forensic science community as a whole are influenced by these factors. Although they believe these factors play a role in the use of forensic science within the criminal justice system, few have implemented policies, procedures, or training programs to address these issues.

Crime laboratory administrators must begin to address the CSI Effect, Daubert Ruling, and NAS Report as they would any other issue they face. Research on the CSI Effect should be presented to trainees, and administrators should weigh the influence of the CSI Effect on their policy decisions, relative to the Daubert Ruling and NAS Report. Case law surrounding the Daubert ruling should be included within training programs and new court decisions presented at laboratory meetings. The NAS Report and its recommendations should be discussed and concrete changes implemented. The alternative to creating policies and training programs that address these issues is to allow these factors to influence each analyst individually with no guidance or direction. This is a recipe for disaster within the crime laboratory and the forensic science community.

Accreditation requires that crime laboratories have clear policies for both the managerial and technical aspects of the laboratory, and clearly defines these requirements; however, it does not mandate that laboratory directors address these factors

specifically (ISO/IEC 17025:5.2.1, 2005). By acting as leaders and insisting that forensic science remains an accurate and beneficial entity within the criminal justice system, laboratory administrators will encourage positive social change. To improve the use of forensic science, limit the time and money wasted on unnecessary testing, and increase the effectiveness of expert witnesses at trial, crime laboratory administrators must begin to address the CSI Effect, Daubert Ruling, and NAS Report within their policies, procedures, or training programs.

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Appendix A: Original Agreement

Scanlan, Timothy P.

From: Kevin Ardoin [KKArdoin@acadianacl.com]
Sent: Wednesday, January 05, 2011 5:47 PM
To: Scanlan, Timothy P.
Subject: RE: ASCLD Survey

Tim,

On behalf of the ASCLD Board of Directors, ASCLD is willing to participate in this survey. I understand that the survey is for a dissertation entitled "Major Challenges to Forensic Science: A Survey of Crime Laboratory Administrators". This survey may heighten awareness as to the challenges that we as crime laboratory directors face, and therefore may be of benefit in the future.

Sincerely,

Kevin Ardoin
ASCLD Board of Directors Member
Laboratory Director
Acadiana Criminalistics Laboratory
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Appendix B: Survey

Major Challenges to Forensic Science: A Survey of Crime Laboratory**1. Consent to Participate in Survey**

As a member of the American Society of Crime Laboratory Directors (ASCLD) you are invited to participate in a survey, regarding major challenges facing forensic science administrators. The purpose of this study is to test the theory that the United States Supreme Court ruling in Daubert v. Merrell Dow Pharmaceuticals (Daubert Ruling), the CSI Effect, and the National Academy of Sciences 2009 report on forensic science (NAS Report) have a significant impact on the field of forensic science, from the examination of evidence, through the reporting of results and the testimony by members of the forensic science community. Your input is valuable as this research may provide insight about the impact of Daubert, CSI effect and the NAS Report on U.S. crime laboratories.

This study is being conducted by Timothy Scanlan, a doctoral student at Walden University. Tim is a crime laboratory administrator. However, in this role he is serving as a researcher.

Please understand that your participation in this research study is voluntary. You certainly have the option to choose not to participate. If you decide to participate in this research survey, you may withdraw at any time. If you decide not to participate in this study or if you withdraw from participating at any time, you will not be penalized. Any information you provide will be kept anonymous. By completing and submitting the survey, you affirm that you give your consent for your answers to be utilized by Timothy Scanlan as he conducts this research. The results of this study may be presented and/or published academically or through professional organizations.

If you have questions you may contact the researcher via e-mail at timothy.scanlan@waldenu.edu. If you want to talk privately about your rights as a participant, you can call Dr. Lillian Endicott. She is the Walden University representative who can discuss this with you. Her phone number is 1-800-925-3368, extension 1210. Walden University's approval number for this study is IRB (06-12-13-0029355) and it expires on (June 11, 2014).

By clicking "Next", you consent that you are willing to answer the questions in this survey.

Major Challenges to Forensic Science: A Survey of Crime Laboratory**2. Demographic Questions****1. How many years have you worked in the field of Forensic Science?**

- 0-5
 5-10
 10-15
 15-20
 20-25
 greater than 25

2. How many years have you worked as a supervisor in the field of Forensic Science?

- 0-5
 5-10
 10-15
 15-20
 20-25
 greater than 25

3. Which category below includes your age?

- Under 21
 21-29
 30-39
 40-49
 50-59
 60 or Older

4. What is your level of education or the highest degree you have received?

- High school degree or equivalent (e.g., GED)
 Some college but no degree
 Associate degree
 Bachelor degree
 Graduate degree

Major Challenges to Forensic Science: A Survey of Crime Laboratory

5. In what region of the United States are you employed?

- Northeast (Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, Pennsylvania, New Jersey)
- Midwest (Wisconsin, Michigan, Illinois, Indiana, Ohio, Missouri, North Dakota, South Dakota, Nebraska, Kansas, Minnesota, Iowa)
- South (Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Kentucky, Tennessee, Mississippi, Alabama, Oklahoma, Texas, Arkansas, Louisiana)
- West (Idaho, Montana, Wyoming, Nevada, Utah, Colorado, Arizona, New Mexico, Alaska, Washington, Oregon, California, Hawaii)
- N/A

6. If you currently work for a crime laboratory, what jurisdiction does that crime laboratory serve?

- Federal
- State
- Local (county, parish, municipality, etc.)
- Private
- N/A

7. If you currently work for a crime laboratory, which position do you hold?

- Crime Laboratory Director
- Assistant Director
- QA/QC Manager
- Section Head
- Senior Analyst
- Other
- N/A

Major Challenges to Forensic Science: A Survey of Crime Laboratory**3. Demographic Questions****8. Which discipline of forensic science would you consider your primary specialty?**

- Controlled Substances Analysis
- Toxicology Analysis
- Biology (DNA Analysis, Screening, Serology)
- Trace Evidence Analysis (Paint, Fiber, Glass, Hair, Explosives, Fire, General)
- Firearm and Tool Mark Examination
- Latent Print Analysis
- Footwear and Tire Track Analysis
- Questioned Document Analysis
- Crime Scene (Investigation and Processing)
- Other

9. The state in which you most often testify or supervise those who testify has adopted which of the following:

- The Daubert Standard
- The Frye Standard
- A Combination of the Two
- Neither Ruling has been adopted
- I do not know

Major Challenges to Forensic Science: A Survey of Crime Laboratory**4. Topic Questions: Multiple Choice Questions**

10. Which of the following has had the greatest impact on the overall practice of forensic science?

- CSI Effect
- Daubert Ruling
- Both have had an equal effect
- Neither has had an effect

11. Which of the following has had the greatest impact on the analysis of evidence?

- CSI Effect
- Daubert Ruling
- Both have had an equal effect
- Neither has had an effect

12. Which of the following has had the greatest impact on expert witness testimony?

- CSI Effect
- Daubert Ruling
- Both have had an equal effect
- Neither has had an effect

13. Which of the following has had the greatest impact on the interaction between forensic scientists and law enforcement?

- CSI Effect
- Daubert Ruling
- Both have had an equal effect
- Neither has had an effect

14. Which of the following has had the greatest impact on the interaction between forensic scientists and prosecuting attorneys?

- CSI Effect
- Daubert Ruling
- Both have had an equal effect
- Neither has had an effect

Major Challenges to Forensic Science: A Survey of Crime Laboratory

15. Which of the following has had the greatest impact on the interaction between forensic scientists and defense attorneys?

- CSI Effect
- Daubert Ruling
- Both have had an equal effect
- Neither has had an effect

Major Challenges to Forensic Science: A Survey of Crime Laboratory

5. Topic Questions: CSI Effect

16. The "CSI Effect" is a myth and has no effect on the criminal justice system.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Select the Most Accurate Answer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

17. The "CSI Effect" has had a negative effect on expert witness testimony.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Select the Most Accurate Answer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

18. The "CSI Effect" has had a negative effect on the jury's perception of forensic science.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Select the Most Accurate Answer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

19. The "CSI Effect" has had a negative effect on the relationship between law enforcement and the forensic scientist.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Select the Most Accurate Answer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

20. The "CSI Effect" has had a negative effect on the relationship between attorneys and forensic scientists.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Select the Most Accurate Answer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

21. The "CSI Effect" has forced the institution in which I work/supervise to alter its policies and procedures.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Select the Most Accurate Answer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

22. The "CSI Effect" has forced the institution in which I work/supervise to alter its training practices.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Select the Most Accurate Answer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

23. The "CSI Effect" will have a significant impact on the practice of forensic science for years to come.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Select the Most Accurate Answer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Major Challenges to Forensic Science: A Survey of Crime Laboratory**6. The Daubert Ruling****24. The Daubert Ruling has had a negative effect on expert witness testimony.**

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Select the Most Accurate Answer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

25. The Daubert Ruling has improved the quality of forensic science presented in the courtroom.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Select the Most Accurate Answer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

26. The Daubert ruling has limited the amount of junk science presented in the courtroom.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Select the Most Accurate Answer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

27. Attorneys utilize Daubert hearings to determine the reliability of the science in question.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Select the Most Accurate Answer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

28. Attorneys utilize Daubert hearings to have an opportunity to cross-examine an expert witness prior to trial.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Select the Most Accurate Answer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Major Challenges to Forensic Science: A Survey of Crime Laboratory					
7. The Daubert Ruling Continued					
29. Attorneys who utilize expert witnesses understand the Daubert Ruling.					
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Select the Most Accurate Answer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
30. Attorneys properly prepare their experts for Daubert hearings.					
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Select the Most Accurate Answer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
31. Judges understand the Daubert Ruling and apply it properly.					
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Select the Most Accurate Answer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
32. The Daubert Ruling has forced the institution in which I work/supervise to alter its policies and procedures.					
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Select the Most Accurate Answer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
33. The Daubert Ruling has forced the institution in which I work/supervise to alter its training practices.					
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Select the Most Accurate Answer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
34. The Daubert Ruling will have a significant impact on the practice of forensic science for years to come.					
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Select the Most Accurate Answer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Major Challenges to Forensic Science: A Survey of Crime Laboratory

8. The NAS Report

NAS Report: Term used to describe the National Academy of Sciences 2009 report entitled "Strengthening forensic science in the United States: A path forward."

35. The NAS Report has had a negative effect on expert witness testimony.

Strongly Agree Agree Neutral Disagree Strongly Disagree

Select the Most Accurate Answer

36. Congress should establish a National Institute of Forensic Science (NIFS), comprised of a full-time administrator and an advisory board, to govern forensic science in the United States.

Strongly Agree Agree Neutral Disagree Strongly Disagree

Select the Most Accurate Answer

37. NIFS should establish and enforce best practices for forensic science professionals and laboratories.

Strongly Agree Agree Neutral Disagree Strongly Disagree

Select the Most Accurate Answer

38. NIFS should establish standards for the mandatory accreditation of forensic science laboratories and the mandatory certification of forensic scientists.

Strongly Agree Agree Neutral Disagree Strongly Disagree

Select the Most Accurate Answer

39. Laboratory accreditation and individual certification of forensic science professionals should be mandatory.

Strongly Agree Agree Neutral Disagree Strongly Disagree

Select the Most Accurate Answer

40. Forensic laboratories should establish routine quality assurance and quality control procedures to ensure the accuracy of forensic analyses and the work of forensic practitioners.

Strongly Agree Agree Neutral Disagree Strongly Disagree

Select the Most Accurate Answer

Major Challenges to Forensic Science: A Survey of Crime Laboratory

9. The NAS Report Continued

41. Crime laboratories and forensic scientists should be removed from law enforcement agencies.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Select the Most Accurate Answer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

42. Scientific assessment conducted in forensic investigations should be independent of law enforcement efforts.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Select the Most Accurate Answer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

43. The NAS Report will have a significant impact on the practice of forensic science for years to come.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Select the Most Accurate Answer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

44. The NAS Report has forced the institution in which I work/supervise to alter its policies and procedures.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Select the Most Accurate Answer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

45. The NAS Report has forced the institution in which I work/supervise to alter its training practices.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Select the Most Accurate Answer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Major Challenges to Forensic Science: A Survey of Crime Laboratory

10. Scientific Working Groups (SWG) and Professional Organizations

46. The current Scientific Working Groups (SWGs) have established standardization and best practice guidelines in their respective disciplines.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Select the Most Accurate Answer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

47. Forensic professional organizations have established best practices within their respective disciplines.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Select the Most Accurate Answer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

48. Forensic professional organizations have developed certification programs within their respective disciplines.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Select the Most Accurate Answer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

49. Forensic professional organizations have established methods for enforcing ethical behavior among their members.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Select the Most Accurate Answer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

50. Scientific Working Groups and forensic professional organizations are already accomplishing the tasks of the proposed National Institute of Forensic Science (NIFS).

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Select the Most Accurate Answer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Major Challenges to Forensic Science: A Survey of Crime Laboratory

11. Open Ended Questions

51. Describe the CSI Effect.

52. Describe the basic tenets of the United States Supreme Court Ruling in *Daubert v. Merrell Dow Pharmaceuticals*, 509 U.S. 579 (1993) (Daubert Ruling).

53. Describe the major findings of the National Academy of Sciences Report "Strengthening forensic science in the United States: A path forward" (NAS Report).

54. In addition to the Daubert Ruling, the CSI Effect, and the NAS Report, what other issues have the greatest impact on the forensic science community?

55. In your opinion, what will be the biggest challenge or challenges to forensic science over the next five years?