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Unintended Consequences of DNA Analysis Delays in North Carolina

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Abstract

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MS, Walden University, 2013

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Public Policy and Administration

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Abstract

The processing of DNA recovered from felony crime scenes often causes delays in trials of up to 3 years, calling into question defendants' rights to a speedy trial. Using Lewin's force field analysis as the theoretical framework, the purpose of this quantitative, comparative study was to compare the processing and reporting of results related to DNA testing in 4 states. Survey data were collected from state bar members (n=137), members of a professional law organization (n=149), and members of a state DNA laboratory (n=20). The purpose of this quantitative, comparative study was to determine whether these variables (interagency communications, staff retention, budget, legislative support, and changes in procedures and protocols) have an impact on outcome variables. Results indicated a major delaying factor was the delivery of evidence to process from law enforcement, as well as communication issues between agencies. The positive social change implications stemming from this study include recommendations to state decision makers. Recommendations include either administratively or legislatively engaging in efficiency improvements related to ensuring the timely delivery of DNA evidence. Timely delivery would allow for more speedily engagement in trials when appropriate.

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Dedication

First and foremost, I must thank God for without Him nothing would be possible. It has been a long journey and one that I thought would never happen for me. Going back to school after raising children was always a dream and one that I promised my mama and daddy before they passed away that I would finish. I want to give a very special thanks to the three most important men in my life who are my husband and my two sons. Melvin, Landon, and Wrenn have been my support system for years and I know they will be just as happy as I will be when I am finished with school-finally! I love you more than you will ever know and I hope you are proud of Mom. Also, thanks to my Chowan University family for their support and encouragement through this process. A special thanks to Dr. Danny Moore for having faith in me and giving me the opportunity to live out my dream daily. Another special thanks to Dr. Jennifer Place for always being my mentor and my "go to" for advice whenever I need it. I cannot leave out all the Chowan University students (Hawks) that supported, encouraged, and knew that while I was in class with them I was also working hard to complete my Ph.D. I love you all and I am blessed beyond measure to have each of you in my life..

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Chapter 1: Introduction to the Study

Introduction

The criminal justice system of the United States has seen advances in forensic science over the years. The introduction of genetic identification technology is by far the most significant to date (Calandro, Reeder, & Cormier, 2005). Deoxyribonucleic acid (DNA) is "the hereditary material found in all living organisms." (Starr & McMillan, 2014, p.404). In 1886, Jeffreys concluded DNA is unique and personalized in a person's "skin, body fluids, blood, nails and hair" (as cited in Black's Law Dictionary, 1910, p. 349). Before DNA analysis was introduced to law enforcement agencies and state investigation laboratories, the primary way to identify an offender without eyewitness accounts was through the use of fingerprints, shoe prints, blood, or any other form of evidence left behind at a crime scene (Black's Law Dictionary, 1910). DNA plays a crucial role in criminal investigations when a defendant is charged with crimes such as rape, murder, or sexual assault. It is used by law enforcement, defense attorneys, prosecutors, and courts throughout the United States (National Research Council, 1992).

In the United States, the first DNA-based conviction occurred in Florida in 1987. Two or three years after this case was concluded, courts witnessed increased use of DNA evidence for convictions and acquittals (Calandro, et al., 2005). The DNA that is considered forensically valuable can exist in evidence for decades (National Institute of Justice, 2015). The DNA technology has advanced through the years and has become a vital means of maintaining fairness in the criminal justice system (Summers & Yeung, 2014).

When a defendant is charged with a crime, collected DNA can be used in one of two ways. If a suspect has been identified, DNA samples from that suspect can be compared to any evidence that was found at the crime scene (National Research Council, 1992). If there is a match between the evidence and the suspect's DNA, then formal charges can be filed in the case (National Research Council, 1992). If there are no known suspects, evidence from the crime scene can be analyzed to determine if there is a matching profile in a DNA database (National Research Council, 1992). The DNA profiles are stored in a database system known as the Combined DNA Index System (CODIS; State Crime Laboratory Guide, 2015). The CODIS technology compares samples collected from a crime scene to DNA profiles contained in the database from convicted offenders (Reilly, 2001). As of this study, all 50 states and the federal government have passed laws requiring DNA samples be taken from offenders charged with certain offenses (State Crime Laboratory Guide, 2015).

For DNA to be admissible in a court of law it must meet defined standards. The DNA is considered scientific evidence and courts use either the *Frye standard* or the *Daubert standard* to determine if evidence is admissible in court (Calandro et al., 2005). In 1923, a case, *Frye V. United States*, the court ruled that in order for scientific evidence such as DNA to be used it must be "sufficiently established to have gained general acceptance in the particular field in which it belongs" (Frye v. United States, 1923, p. 3). The Daubert standard was adopted in 1993 in the Supreme Court case, *Daubert v. Merrell Dow Pharmaceuticals*. The court ruled that evidence "must have sufficient scientific validity and reliability to be admitted as relevant scientific knowledge that

would assist the trier of fact" (Daubert v. Merrell Dow Pharmaceuticals, 1993, p. 4). All federal court cases must adhere to the Daubert standard but individual states vary from using Daubert or Frye. All the states to be queried in this study adhere to the Daubert standard except Virginia, which developed its own code (see Hunt, 2015).

Current testing of DNA is presenting a significant challenge in some states. The costs and time needed to process DNA samples has become such an obstacle that the scientific approach is now used only in felony cases (Summers & Yeung, 2014). According to North Carolina criminal law the laboratories in North Carolina receive over 10,000 blood toxicology analyses each year (Denning, 2013). Some of the toxicology samples require forensic analysts to test, specifically those that are crucial in felony cases where drugs could have been involved (Denning, 2013). These tests require special testing procedures according to Winecker (Winecker & Kemp, 2012). Normally, toxicology reports are returned within 14-21 days but those sent to forensic analysts take much longer (Summers & Yeung, 2014). This adds to the backlog analysts are already experiencing. In rape, sexual assault, and murder cases, law enforcement submits the DNA evidence to the Raleigh laboratory which is the only full-service laboratory in the state of North Carolina (citation). To further complicate DNA analyses, *Crawford v. Washington* stated that an accused shall have the right to confront his or her accuser and the analyst who performed the DNA analysis must testify to such in court (Crawford v. Washington, 541 U.S. 36, 2004). Traveling to testify at times means going across the state and waiting for days or weeks before analysts are able to return to the laboratory to work.

The 6th Amendment to the Constitution of the United States guarantees an offender shall have the right to a speedy trial without unreasonable delays (U.S. Constitution; Amendment VI, Ratified December 15, 1791. Problems exist in determining what constitutes a speedy trial. As far as the defense is concerned, delay is used often as an adjudication mechanism (Swigert & Farrell, 1980). To speed up the judicial process, defense attorneys will have their offenders sign a waiver that potentially says they are waiving their right to a speedy trial (Denning, 2013). To avoid a long and drawn out trial, prosecutors may offer a plea bargain with a reduction of charges to the offender in exchange for a guilty plea (Denning, 2013). The prosecution is said to believe that this is the best tactic to save time and costs (Harris, 2014). In *Barker v. Wingo* (1972), the decision was made that certain factors must be considered when determining if a delay of trial is justified (Campbell, 2001). The four factors known as the *Barker factors* are (a) length of the delay, (b) reason for delay, (c) defendant's assertion of their right, and (d) prejudice to the defendant (Osnowitz, 2016). The state is burdened with justifying the length of the delay and the justifications could be backlogged dockets, plea negotiations, or request of defendant for more time to prepare (Osnowitz, 2016). If unexplained time frames or insufficient reasons exist a tendency to favor the defense is usually present (Osnowitz, 2016). It is not the defendant's obligation to bring him or herself to trial. The responsibility lies with the courts and the state and the right to a speedy trial cannot be used as the primary means for dismissal of charges (Little, 2016). Lastly, under the *Barker factors*, prejudice must be reviewed. It is the job of the courts and the state to minimize anxiety of defendants while not allowing

continuances simply because it may strengthen the defendant's case (Little, 2016). Circumstances such as the degradation of any physical evidence, disappearance or death of witnesses, and changes in testimony can occur over time and have a negative impact on the defendant's case (Little, 2016).

In most states, the statute of limitations for a driving under the influence case is 18 months from the date of offense for a first-time offender. If the case is a felony case the statute of limitations is usually 3 years from the date of offense (N.C. General Statute, 2015). State crime laboratories across the United States are responsible for many functions with the most common being that of testing blood-alcohol samples. *Barker v.Wingo* (1972) put the weight of the delay of trial heavily on the government (Osnowitz, 2016). Most states have statutes of limitations for the different crimes that offenders may commit, but the state of North Carolina does not follow suit (Denning, 2013). North Carolina has no statute of limitations for felonies or any crime that is considered a malicious misdemeanor (see North Carolina General Statutes).

Numerous complaints and controversies regarding the state crime laboratories have been prevalent over the last decade, particularly in North Carolina. In 2009, the CODIS Database in the United States experienced an end of year backlog of almost 1million profiles that needed to be uploaded (Harris, 2014). A nationwide program was put in place, the DNA Backlog Reduction Program, for the years 2004 through 2010 to help with uploads into the database (Harris, 2014). In the year 2009, North Carolina's Attorney General Cooper commissioned an audit of the state crime laboratories (see National Academy of Sciences, 2010). That audit found that the laboratory had

"withheld or distorted evidence in more than two hundred cases" (Locke, Neff & Curliss, 2009, p. 1). Three of the cases that were identified as having errors with the evidence involved the execution of those defendants (Locke, Neff & Curliss, 2009). Many cases exist that revealed evidence to exonerate a jailed and assumed guilty individual. The National Academy of Sciences, which is said to be the "most prestigious scientific organization in the United States" reported in 2009 again that laboratories lack "any form of peer review or validation" (Clarke, 2010, p. 3). In 2015, the North Carolina Commission on Actual Innocence announced that it would be re-examining 900 convictions that could reveal the laboratories used unreliable forensic evidence (Collins, 2015). North Carolina is still experiencing extensive delays in the return of DNA evidence. Reports from other states in reference to turn-around times for DNA evidence are much more rapid than those recorded in North Carolina (Collins, 2015). Various reports have been made that address the issues with the speed of the laboratories in North Carolina, but none signify the reason for the delays.

In this study, I focused on comparing the state of North Carolina to other states to verify and examine the problems causing the delays in DNA evidence processing. While DNA processing can be time consuming, other states do not have lengthy turn-around times and court proceedings are not delayed (Denning, 2013). Comparisons of the DNA analyzing process between North Carolina, South Carolina, Virginia, and Ohio was the focus of this study. The goal of the research was to compare North Carolina to other states to determine if there are similar factors that impact the delays on the judiciary system. Many offenders are encouraged by their defense attorneys to sign the waiver

giving up their rights to a speedy trial without understanding its implications and the legality of the document (see North Carolina Criminal Law Speedy Trial, 2010). Another goal is to help with the design of better training of analysts, law enforcement officials, and attorneys regarding the proper collection of data in order to decrease time delays in processing evidence. Finally, the study may lead to possible improvements in the DNA processing system that would create a positive impact on the North Carolina criminal justice system.

Problem Statement

Delays in the processing time for and reporting the results of DNA testing recovered from felony scenes in North Carolina frequently result in trial continuances from 78 days to 3 years. Defense attorneys in the state of North Carolina are quick to have a defendant sign a waiver giving up their right to a speedy trial (Welty, 2009). Due to the lengthy processing times for DNA to be analyzed in the state, months and years can pass before a defendant's trial is brought to court (Donovan & Ungvarsky, 2012). Continuances have been granted for time periods ranging from 2-5 years before a defendant's evidence is returned and trial dates can be scheduled (see North Carolina Center on Actual Innocence). In addition to the problem of returning DNA evidence in a timely manner, *Crawford v. Washington* (2004), set the precedent for analysts to physically testify in court (541 U.S. 36, 2004). Prosecutors and defense attorneys impatient with DNA analysis wait times frequently move for dismissals in court (Hansen, 2013). This results in potentially guilty individuals being set free. Potentially innocent individuals, who cannot qualify or afford bail, often remain incarcerated while they wait

for evidence to be returned that could establish their innocence. This study investigated the problem by examining and comparing DNA return times from four states to delineate factors contributing to the untimely delay of DNA evidence.

Purpose Statement

The purpose of this experimental, comparative, and time series analysis study was to test the hypothesis that the state of North Carolina labs are underfunded, understaffed, and lacking modern technology needed to expedite the processing of DNA evidence. The study investigated the time necessary to process DNA evidence and why the state of North Carolina is slower than other states. In addition, I investigated how the existing delays in processing are contributing to violating defendants' right to a speedy trial as guaranteed in the 6th Amendment to the U.S. Constitution. The study analyzed the impact of technological deficiencies on North Carolina's processing time delays. Data visualizations were incorporated to trace the steps in processing evidence from the time it is received at a laboratory until it is returned to the controlling legal jurisdiction. The actual steps in DNA testing for most states can be completed in several hours or days. For the state of North Carolina, the average turnaround time for testing DNA evidence according to North Carolina Crime Lab Director Byrd is around one year (Personal Communication, 2019).

Research Questions

1. Does the time frame for DNA analysis in North Carolina differ from other states?
2. Does the delay in the return of DNA evidence affect the outcome of a defendant's case?

3. What factors contribute to the amount of time it takes for each phase of the analysis of DNA evidence to be completed?
4. What effects will continuing delays in DNA processing have on the future of North Carolina's criminal justice system?

Terms and Definitions

Analyst: An employee who has successfully completed the laboratory's training requirements for casework sample analysis, completed and passed a test (see Federal Bureau of Investigation Quality Assurance Standards for DNA Databasing Laboratories). This person conducts and/or directs the processing and analysis of forensic samples as well as interpreting data to reach conclusions (see FBI Quality Assurance Standards for DNA Databasing Laboratories).

Casework sample: Biological material obtained from a known individual that is collected for purposes of running a DNA analysis (North Carolina Institute of Justice).

Cheek swab or Buccal Swab: A noninvasive way to collect DNA by a using a sterile cotton or gauze on the inside of a person's cheek (McKiernan & Danielson, 2017).

Combined Deoxyribonucleic Acid Index System (CODIS)*:* A database for the storage of DNA that has been collected and submitted into the system (National Institute of Justice). When a person is charged with certain felonies a DNA sample is taken and run through the CODIS system to see if there is a match (National Institute of Justice).

Daubert Standard or Frye Standard: Adopted in 1993 in the Supreme Court as the standard test to be used by trial judges to determine if an expert witness's scientific

testimony can be used and is considered relevant scientific knowledge that would assist the trier of the fact.

Deoxyribonucleic acid (DNA): The hereditary material that is unique in each individual and cannot be duplicated (Vocabulary.com).

Lead Time: The time from when the evidence is submitted to the state crime laboratory to when the report is published (citation). This includes time that the evidence waits in the laboratory vault waiting to be assigned to an analyst (North Carolina Dept. of Justice Annual Report, 2017-2018).

National Institute of Justice (NIJ): This is the research, development, and evaluating agency which is a part of the United States Department of Justice (North Carolina Department of Justice).

North Carolina State Crime Laboratory (NCSCL): This refers to the three crime laboratories currently in the state of North Carolina (North Carolina Department of Justice). The primary focus for this study was the Raleigh, North Carolina laboratory.

State Bureau of Investigation Crime Laboratory (SBI): This is a scientific laboratory operating in the state that is responsible for the analysis of evidence for criminal proceedings (North Carolina Department of Justice).

Turnaround time: The time from when the analyst receives the evidence until the report is published at the completion of their analysis (North Carolina Dept. of Justice Annual Report, 2017-2018).

Waiver: A formal statement giving up a right (N.C. General Statutes).

Significance of Study

A comparative and time analysis study is significant for several reasons, including introducing findings to promote positive social change. I investigated the amount of time needed to complete each step in the processing of DNA according to the NIJ and the Federal Bureau of Investigation (FBI). Those established times were compared to the length of time the state of North Carolina takes to process and return DNA samples. Delays in processing DNA evidence leaves suspects free to commit heinous crimes as well as causing leads in a case to grow cold (Summers & Yeung, 2014).

Scrutiny and controversy that has surrounded the courts in North Carolina for years puts doubt and fear in the minds of those citizens charged with crimes (Denning, 2013). Scandals within the laboratory in North Carolina also influenced the courts and the citizens' perception of the criminal justice system (Denning, 2013). Numerous exonerations costing the state money and backlogs in the courts still plague the justice system and citizens do not see improvements on the horizon. The state crime laboratory remains understaffed and my investigation revealed efforts are not recognized as priorities in the state of North Carolina. Currently, there are discouraged forensic analysts as well as disgruntled citizens in the state (Denning, 2013).

Chapter 2: Literature Review

Introduction

The literature review included articles, concluded court cases, pending court cases, and other works related to DNA and the process of analysis. I examined the time frames for DNA analysis in North Carolina as opposed to South Carolina, Ohio, and Virginia. The review is presented in four sections

Time Frame: Days or Months

For the last decade the criminal justice system in North Carolina has been the topic of much controversy. Resources and manpower at the one full service SBI laboratory in the state lag behind the continually growing case load. This section of the review will focus on the time it takes for DNA, once collected, to be submitted to the crime laboratory, the process it undergoes once received at the laboratory, and then the length of time that passes before it is returned to the submitting agency. The only study I found that has been conducted regarding turn-around times for state laboratories in the United States was completed in 2009. A reason is because the times vary so widely between the laboratories (Hayes, 2010). In 2009 the NIJ funded a method to look at the turn-around times and named it the Foresight Project (Houck, 2009). Only 14 laboratories adopted this project and they chose to remain anonymous. That project did reveal that DNA analysis generally takes 152 days to process once received in the lab (Houck, 2009). In addition, the project found that a 73% increase in full time forensic analysis was needed for a 30 -day turnaround as shown in Table 1 below (Houck, 2009).

Table 1

Days to Complete Cases for Reporting Local and State Forensic Laboratories

Test	Average	Median
Forensic Biology	123	68
DNA	152	114
Trace	56	50
Fingerprints	169	123
Firearms	136	58
Average Overall	**127.2**	**68**

With over 600 law enforcement agencies in North Carolina submitting DNA evidence to be analyzed, it must be noted that there is only one laboratory in the state that is equipped to analyze DNA (N.C. Crime Lab, 2018). Table 2 shows that in order to analyze DNA and have a 30-day turnaround the number of full-time forensic science analysts must be increased by 73%.

Table 2

Percentages of backlogs

Type of Request	Percent of forensic Requests backlogged at end of 2005	Percent increase in Full time Examiners Needed for a 30-day turnaround
Biology	33%	57%

DNA	40%	73%
Latent Prints	24%	33%
Firearms/Toolmarks	30%	46%

In October of 2015, the North Carolina state crime laboratory released an update on their laboratories with updated information. If a law enforcement agency needs to have DNA evidence processed as a rush job a specific form must be completed (N.C. Crime Lab, 2018). However, the form clearly states that a 90-day notice is requested (N.C. Crime Lab 2018). There is no guarantee that the department submitting the evidence will have the results in 90 days but without the request it is usually placed in the backlog of cases. One of the problems that the forensic analysts encounter is their court and travel time away from the laboratory. The Supreme Court ruling in *Melendez-Diaz v. Massachusetts* requires forensic analysts to testify in cases where they personally performed the test on specific DNA (N.C. Crime Lab, 2015). The travel and wait times have increased over the last few years and adds to the constant backlog of cases where DNA evidence is waiting to be analyzed (Denning, 2013).

Analysts must travel across the state and wait to testify in court. This process can take anywhere from a few days to weeks and even a month according to Director Byrd (Personal Communication, 2019). Crucial time that is needed in the laboratory to work on the backlog of DNA cases is postponed until the analyst can return. According to the North Carolina Crime Laboratory Annual Reports, forensic biology court and travel/wait times have increased from 9.7% in 2013 to 22.17% in 2015 (N.C. Crime Lab, 2015). The

average turn-around time (TAT) from the time the evidence is submitted to completion for DNA evidence is 550 calendar days as of June 15, 2015 (N.C. Crime Lab, 2015).

Currently, a public resource to provide specific turnaround times in laboratories across the United States is not available. Due to the crucial impact DNA can have on criminal cases this information should be made available and provides a gap in research that should be addressed. In 2009, Office of Legislative Research Report published results from a survey that was mailed to 201 state and local laboratories in the United States that processed forensic tests (Hayes, 2010). The survey was seeking answers on the average turnaround times for processing forensic biology, DNA, trace, and identification (Hayes, 2010). Thirty-four laboratories responded, and according to Hayes (2010), they represented "a geographically diverse sample" (p. 1). The turnaround times varied but for the purpose of this research only a few states will be examined. A project called FORESIGHT was funded by the National Institute of Justice in 2009 for the University of West Virginia (Houck, et al., 2009). This project provided a "standard method for laboratories to calculate turnaround times" (Houck, et al., 2009, p. 86). Of the 14 laboratories that participated in this project the mean and median times for processing DNA were similar with the average time being 152 days (Houck, et al., 2009). Overall, each laboratory's percentage of backlogged cases revealed a 40% backlog of cases at the end of fiscal year 2005 (Houck, et al., 2009).

In North Carolina, State Trooper Richardson reported that his office has over 150 cases that have been waiting for DNA evidence to be returned for over 2 years (S. Richardson, personal communication, November 10, 2016). In addition, District Court

Judge Moody explained that cases are being continued on a regular basis due to DNA evidence not being returned in a timely manner (V. Moody, personal communication, Dec. 12, 2016). Superior Court Judge Hinton reported that murder, rape and sexual assault cases are usually continued for years waiting on evidence or waiting on the accused to accept a plea without DNA evidence (A. Hinton, personal communication, Jan. 3, 2017). DNA analysis is a long process and some accused persons leave behind more DNA than others at a crime scene depending on the oil on the skin (citation). DNA that has been exposed to sunlight, heat, humidity and has not been analyzed in a decade can be damaged (North Carolina Department of Justice, 2015). State District Attorney Asbell said "one of the worst enemies of a prosecutor is time and we simply do not have the turn-around time on lab results that we need in the state of North Carolina" (V. Asbell, personal communication, Dec. 1, 2016). The personal communication with these crucial members of the North Carolina Justice system brought to light the main reason I chose to focus on DNA delays for the purpose of this study.

In South Carolina, the state law enforcement division reported that 290 new DNA cases arrive each month in addition to their laboratory still trying to process the backlog of over 3,000 cases (Smith, 2009). According to the sheriff of York County, South Carolina, the state budget does not allow them to hire crucial lab analysts to help with the backlog (Smith, 2009). A researcher at Human Rights Watch who monitors DNA backlogs said "crime labs all over the country are overwhelmed by the amount of DNA testing being requested and federal grants cannot help or fix the problem" (Smith, 2009, p. 2). York County, South Carolina has processed in only a very limited amount of cases

a DNA analysis in a few weeks because it was given priority due to the extreme violence of the criminal case (Smith, 2009). South Carolina, just like North Carolina, only has one full-service laboratory in the state (Smith, 209). Major Hughey, director of the state law enforcement division forensic lab stressed that he believes the problem lies in homicide cases. In South Carolina, all homicide cases that include DNA have at least 40 samples that arrive in the laboratory to be tested (Smith, 2009). The time it takes an analyst to process 40 samples for one case is lengthy and in turn, takes time away from conducting tests on other cases.

The state of Ohio has advanced their DNA analysis to maximize efficiency and decrease turnaround time. The attorney general of the state of Ohio reported in 2011 that an event named the Kaizen Effect would be tested with the hope of finding ways to expedite DNA processing (Lean Ohio, 2011). Kaizen is a Japanese term meaning "change for the better" (Lean Ohio, 2011). The event was a part of the Lean Ohio Network that is comprised of hundreds of state employees that at some point in time been involved in testing and implementing new projects (Lean Ohio, 2011). According to Attorney General Dewine, the new procedure included 103 fewer steps and reduced the time from when DNA evidence is received to completion and return by up to 83% (Lean Ohio, 2011). The Kaizen Event was developed by the Bureau of Criminal Identification and Investigation (Lean Ohio, 2011). The event features a single streamlined process with "55 fewer steps and 50% fewer handoffs (Lean Ohio, April, 2011, p. 3). Ohio's attorney general reported in 2016 that they do not experience backlogs at the laboratories and after the Kaizen Event turnaround time for DNA evidence was reduced to 14 days

(Lean Ohio, 2011). Converting to faster methods has increased turnaround times in other states who are not experiencing backlogs. With the actual steps involved in processing one string of DNA evidence eliminating any step or revolutionizing the process with updated equipment or methods is shown to prove beneficial in many states. North Carolina does not incorporate the Kaizen Event (Denning, 2013).

Actual Processing Time

Once DNA evidence is collected at the crime scene it is carefully packaged, labeled, and then forwarded to the crime laboratory (citation). According to the NIJ and FBI, once a DNA sample is received it is logged in and given to an analyst. (NIJ, 2018) At this stage it can wait for a varying length of time, depending on the work load of the particular analyst (NIJ, 2018). Once the DNA package is opened, the item of evidence must be evaluated for any presence of biological fluid (NIJ, 2018). It is possible that multiple tests will have to be completed in order to detect any saliva, semen, or blood (NIJ, 2018). This step is completed on several cases and then those are batched together for the next steps. Anywhere from one to two weeks can pass until a batch of cases is formed and ready for the next step (NIJ, 2018). This would rely solely on how much casework the lab conducting the DNA analysis normally processes.

When the suspected biological fluid has been found it is detached from the rest of the evidence and placed into a test tube (NIJ, 2018). Chemical treatments are then performed and the DNA separates from the rest of the cells (NIJ, 2018). Chemical treatments can take from 5 minutes to over 2 hours unless an overnight test is warranted

(NIJ, 2018). Organic extraction is the recommended method due to biological fluids found existing on everyday surroundings can be complicated (NIJ, 2018).

Next, the DNA that was placed in the test tube must be purified. It is put through a filter to clean out any salts or dyes that may be present (NIJ, 2018). A neutral buffer is used that pushes the DNA sample to the top (NIJ, 2018). This process takes over 2 hours to complete (NIJ, 2018). Once the purification is complete the analyst must then determine how much DNA exist and if the sample is large enough to proceed (NIJ, 2018). Setting up for the next step can take over 5 hours (NIJ, 2018).

The next step is referred to as amplification and it is where polymerase chain reactions are determined (NIJ, 2018). A small cell of DNA can be amplified into millions of copies of the DNA sample that needs to be analyzed and examined (NIJ, 2018). A process is then initiated and many pieces of the DNA sample that were just amplified are copied through heat and cool cycles to activate enzymes (NIJ, 2018). The FBI has determined and created a mandate that 13 identifiable pieces of the DNA must be used (NIJ, 2018). This stage of the process takes over 4 hours (NIJ, 2018). The next step is the detection stage where the DNA samples must be read. To a normal person "it would look like the page of a book with words superimposed on top of each other" (Intrinsic Forensics, 2009, p. 3). The samples are run through a sieving polymer to separate each piece of DNA and place the small fragments together and the large fragments together (Intrinsic Forensics, 2009, p. 3). At this point the analyst can study the DNA samples and fragments and create a DNA profile (Intrinsic Forensics, 2009, p.

3). If modern equipment is used it can be completed in 6 hours, but most laboratories have equipment that takes over 48 hours.

Lastly, the analyst must study and examine with the use of specialized software the DNA. The software establishes a baseline that is consistent with the DNA showing up as peaks on the scale. However, some peaks can be false readings and it is the job of the analyst to identify any anomalies and disregard them (Intrinsic Forensics, 2009, p. 2). This process can take up to 1 hour for one piece of evidence that was collected and the preceding steps must be completed for every piece of DNA that was collected (Intrinsic Forensics, 2009, p. 2). In some criminal cases there can be up to 100 pieces of evidence collected at the crime scene (Intrinsic Forensics, 2009). Now the analyst can compare the DNA evidence samples to any samples in the CODIS system to see if there are any matches. If there is a match then more calculations must be conducted. If results are "mixed (i.e. a door know is likely to contain DNA from more than one person), the analyst must then see if a major donor can be discerned" (Intrinsic Forensics, 2009, p. 3). This stage can take the longest and may even require several analysts to come together and study the DNA sample. Once a definitive verdict is made that a good DNA sample has been found whether it be a match or not an analyst who has not seen the evidence before must then go through the same test to review all the work previously performed (Intrinsic Forensics, 2009, p. 2). Depending on the workload this could take days or weeks or even months but in a well-equipped and well-staffed laboratory a few hours should suffice. After the second analyst has completed the review a supervisor or the crime lab director will sign the report. Not taking into account the reprocessing by the

second analyst the steps total around 24 to 48 hours to complete. This is not the case in North Carolina. Samples are taking months and even years to go through all the steps of DNA analysis.

Impact DNA Delays have on Cases

In the state of North Carolina once an accused person has been charged there is no statute of limitations that puts a time frame on the conclusion of their case (N.C. General Statues). In many cases the accused will either take a plea agreement and avoid the wait or tie the courts up for years with continuances. According to Chief Rowe of Murfreesboro, North Carolina, Police Department, the laboratories are so far behind that many times they will not accept DNA evidence (Personal Communication, 2017). Chief Rowe also explained that most of the felony murders and rape cases that he has been involved in over his career of 20 years take 3 to 5 years to conclude because of the wait for DNA evidence (D. Rowe, personal communication, 2017). Defendants waiting for trial or those remaining incarcerated are costing the state of North Carolina $83 per day per inmate which equates to $30,400.00 per year. (NCDOJ, 2016). Mothers Against Drunk Driving (MADD) reported in 2013 that North Carolina should not only be concerned with DNA cases but the 13,000 un processed blood-alcohol analysis cases that sit dormant in the Raleigh lab (MADD, 2013).

Blood Alcohol DWI Delays

In North Carolina, DWI, murder, rape, and sexual assault cases solely rely on testing to be conducted by analysts at the laboratory (Abernathy, 2014). The time spent

waiting for results stalls court dockets, investigations, and possibly takes away from vivid memories of the traumatic event that created the need for DNA testing. According to Attorney John Cox he said that "he probably wouldn't be as inclined to take a plea if those results are not available" (J. Cox, personal communication, October 20, 2016). Cox also added that "defense attorneys have for a long time been skeptical about evidence prepared for law enforcement that was presented by analysts who are sworn officers and work for the state" (J. Cox, personal communication, October 20, 2016).

On December 24, 2012, 41 year old Michael David Holland was killed while crossing the street in Graham County, North Carolina. He was struck by an automobile being driven by Nelson Keith Stanford whose blood alcohol content registered at .11. The legal limit for blood alcohol is .08. The blood sample was sent to the laboratory with an attachment that read "please expedite". Stanford had two prior DWI (driving while intoxicated) convictions: one in 1996 and another in 2008 (Abernathy, 2014). In July of 2014 Stanford plead guilty to felony death by motor vehicle without having the blood results returned from the lab. According to a report submitted to the North Carolina General Assembly on February 26, 2016 over 16,500 blood samples for DWI cases were submitted to the laboratory in 2015. Of those 16,500 the laboratory only processed 11,562 (N.C. General Assembly, 2016).

Rape Kits and their Delay

The State of North Carolina has a full time agency that investigates post-conviction claims that a person is innocent. It is called the North Carolina Innocence Inquiry Commission and is said to be "the only one of its kind in the nation" (Ford,

2015). The Commission was founded in 2006 for help wrongfully convicted citizens. In 2015, prosecutors in the state of North Carolina said "the state is still processing rape kits submitted to the laboratory from 2 and a half years ago" (McAdams, 2015, p. 1). Rape Crisis Center Supervisor Jessica Green explained in a report to CBS News that victims tire of fighting after waiting for two or three years (McAdams, 2015). Many times the evidence for a conviction is present but due to the lenghty wait the victim decides they no longer want to proceed to trial. When this occurs, the prosecutor must dismiss the case. In other cases, a rape victim may wait two years only to hear from the defense attorney that there is not sufficient evidence to proceed (McAdams, 2015).

Exonerations due to DNA

In 1976 Joseph Sledge was arrested in eastern North Carolina and charged with the murder of Josephine Davis and her daughter, Aileen. Investigators took fingerprints at the scene but none matched Sledge. However, a "pubic hair of Negroid origin" was found on one of the victim's. After a microscopic analysis was conducted by the FBI the report said that the hair resembled Sledge's but it was not conclusive. Sledge received a life sentence in 1978 but adamantly maintained he was innocent (Ford, 2015). For many years members of the North Carolina Innocence Commission tried to fight for his appeal with no success. Oddly, in 2012, a county clerk found an envelope that contained hairs from the crime scene that was originally reported "missing" . After DNA testing from the hairs Sledge was completely and unequivocably ruled out as the murderer (Ford, 2015). On January 23, 2015 Sledge was released with the apologies of the state for imprisoning him for almost four decades for a crime he did not commit (Ford, 2015).

Edward McInnis who could only read somewhere near that of a fourth grader, admitted to raping and robbing an 81 year old woman in Laurinburg, North Carolina (National Registry of Exonerations, 2015). McInnis was sentenced in Superior Court and given life plus 20 years. Members of the Innocence Commission reported that for over a decade they were informed no physical evidence existed (National Registry of Exonerations, 2015). An independent search was conducted and swaps from the rape kit were found in a storage room at the Lurinburg Police Department. McInnis submitted a DNA sample and after being tested, was told he could not have possibly committed the rape. On August 10, 2015, Superior Court Judge released Edward McInnis after he had spent 27 years in prison for a crime he did not commit (National Registry of Exonerations, 2015). The question of his competence was never addressed or the fact that a DNA sample from McInnis was never tested to see if it matched the DNA sample from the Rape Kit (National Registry of Exonerations, 2015).

In 1984 Deborah Sykes, 25 year old copy editor from Winston Salem, N.C., was sexually assaulted and stabbed to death (N.C. Innocence Commission, 2015). A 911 call came from a man who said he was Sammy Mitchell and that an attack had occurred. Law enforcement questioned Mitchell and his friend, Darryl Hunt (N.C. Innocence Commission, 2015). Investigation revealed that Mitchell was not the caller and instead Johnny Gray, another male, placed the call. A man who lived in the area reported that he had seen Sykes with an African-American the day of the crime and later identified that man as Darry Hunt (N.C. Innocence Comission, 2015). Hunt's girlfriend testifed that she was with him when the crime occurred and it was not possible that he commited the

murder (N.C. Innocence Commission, 2015). Later, she was said to tell law enforcement that Hunt confessed to her that he was the murderer. Before trial she recanted her statement but the prosecutors presented it in trial anyway (N.C. Innocence Commission, 2015). Even though Darryl Hunt testified he did not even know the deceased he was convicted and sentenced to life in prison. This case was appealed and Hunt was offerd a plea bargain which he rejected (N.C. Innocence Commission, 2015). A second trial was held and Hunt was for the second time convicted and sentenced to life in prison. Hunt's attorney, Mark Rabil, had been working on his case for over 20 years, filed for DNA testing as Hunt's DNA had never been tested for samples found on the victim's body (N.C. Innocence Commission, 2015). Requests were turned down until 2004 when the DNA from the crime scene was analyzed and a match was made to another man already imprisoned for another murder. Hunt was set free in 2005 and exonerated (N.C. Innocence Commission, 2005).

In 1991 Gregory Taylor was driving his Nissan Pathfinder when he got stuck in the mud near a cul-de-sac in Wake County, North Carolina (CNN, 2012). The body of a young woman that had been brutally mudered was found near the spot where Taylor got stuck. Taylor was arrested and convicted of the murder two years later without any evidence being introduced that substantiated his guilt (CNN, 2012). When the case went to trial the testimony of two known criminals and "false alert" on Taylor's SUV by a bloodhound (CNN, 2012). The prosecution claimed that one single small drop of the victim's blood was spotted on the "wheel well" of Taylor's Nissan Pathfinder. Gregory Taylor maintained his innocence throughout the entire trial but was sentenced to life in

prison. Years later new evidence surfaced and the lab analysts notes from the original test revealed that the blood was not that of a human. Those notes were never given to Taylor's defense attorney. In 2010, Gregory Taylor became the first inmate to be exonerated and was released after serving 17 years in prison for a murder he did not commit (CNN, 2012). In 2013, the State Bureau of Investigation agreed to pay Taylor $4.6 million dollars for his wrongful conviction (SBI, 2013)

Factors Contributing to Time Frame Analysis Process

According to the National Institute of Justice the process of analyzing DNA has been a crucial factor in investigating and resolving crimes for decades. The need for DNA testing as well as the need for appropriate tools and equipment is at a point where it currently surpasses the capabilities of the field (Nat. Institute of Justice, 2016). In order to examine the time constraints the definition of a backlog of cases must be considered. The Institute of Justice explains that "there is no industrywide definition of a backlog" (Nat. Institute of Justice, 2016, p. 2). The backlog could exist if a laboratory has held the DNA evidence for 90 days without processing or the backlog could mean that the final steps of the process have not been completed and reports have not been generated. The National Institute of Justice explains that a backlog to them means that a DNA sample of evidence has not been analyzed, processed and reports returned to submitter with 30 days of receipt. There are two types of backlogs according to the Institute of Justice: casework backlogs and convicted offender and arrestee DNA backlogs (Nat. Institute of Justice, 2016).

When law enforcement collects forensic evidence from a crime scene, victim or a suspect precautions must be taken. The law enforcement officer must wear gloves and place each piece of evidence in individual bags which are then sealed and inititaled. Lt. Joe Burgess, Murfreesboro, North Carolina, Police Department explains that evidence must be collected, sealed and mailed to the laboratory in Raleigh, North Carolina within 24 hours (Personal Communication, 2017). All evidence that is sent to the laboratory may not contain traces of DNA and each piece of evidence must be processed to determine first if any biological matter is present (Kourtsounis, 2009). If biological matter is found then the determination must be made as to what kind of biological matter it is. The preservation of biological evidence is crucial as exposure to heat or humidity can degrade it (Kourtsounis, 2009). It is at that point that the DNA testing process can begin. This scenario constitutes the casework backlog as evidence can sit in the laboratory for weeks and months before the need for a DNA test is determined (Lt. Burgess, personal communication, 2017). In many states convicted offenders and arrestees are required to give a DNA sample which is processed through the CODIS system. When evidence is submitted, processed and determined that DNA exists then the sample can be checked with any that resides in the CODIS system (Nat. Institute of Justice, 2017). The National Institute of Justice reported in 2017 that many law enforcement agencies retain evidence from crime scenes and store it in evidence rooms which leads to the evidence being forgotten and never submitted to the crime laboratory for analysis (Nat. Institute of Justice, 2017). Backlogs in laboratories are continuing to grow as the demand for DNA testing far exceeds the capacity of the laboratories and the

analysts. Currently, North Carolina's crime laboratories have six departments that process and analyze evidence. They are: Toxicology, Digital Evidence, DNA, Firearms and Tool Marks, Latent Evidence, and Trace Evidence (Kourtsounis, 2009).

A flow chart (Appendix B) shows the chain of command that evidence follows from the time it is submitted until it is returned to the submitter. After the evidence has been properly packaged as described above, it is mailed to the forensic laboratory in Raleigh, North Carolina. Upon receipt, preliminary tests are performed to determine if the presence of a biological sample (blood), salivia, or semen is found. If the tests reveal that there is no biological evidence then all the evidence is returned to the submitter. The evidence can sit in the laboratory for an indefinite period of time before the preliminary tests are even conducted.

Resources and Qualifications

Typically an analyst in the crime laboratory has a bachelor's degree in biology, chemistry or any field related to forensic science. Along with that degree there should be an additional completion of graduate level courses consisting of biochemistry, genetics, molecular biology and some training in statistics (N.C. Dept. of Justice, 2016). Analysts can be referred to as Laboratory Analysts, Forensic Examiner, Forensic Scientist or Forensic Laboratory Analyst. The tests performed on DNA must be completed at a laboratory with equipment that meets standards set by the Federal Bureau of Investigation (N.C. Dept. of Justice, 2016).

The majority of DNA samples sent to the state crime laboratory are submitted to the following process:

a. Extraction which is the process of "releasing the DNA from the cell" (N.C. Dept. of Justice, 2016, p. 4).
b. Quantitation means actually examining the DNA to determine how much exists.
c. Amplification which is the process of making many copies of the DNA so it can be characterized.
d. Separation of the amplified DNA in order to obtain subsequent identification.
e. Analysis & Interpretation involves quantitatively and qualitatively looking at the DNA samples to see if there is a profile that already exists in the CODIS system.
f. Quality Assurance which is the last step and it involves the review of analysts reports for any technical errors.

Research indicates that forensic analysts in North Carolina are paid at a beginning entry level $32,411 annually. The State of Virginia reports an entry level annual salary of $47,000 (Indeed.com). A major problem in finding and employing analysts is due to the more qualified and experienced technicans or analysts work for the government. Friedersdorf wrote in *The Atlantic's Politics & Policy Daily* in 2015 that the state "has a monopoly on experts and they are viewed as working for the prosecution's team" (Friedersdoft, 2015, p. 5). In addition, *Business Insider* reported that a study conducted in 2013 revealed money being paid for each conviction. North Carolina is one of the states listed that has a mandate that "judges provide labs with renumeration 'upon conviction'" (Friedersdoft, 2015, p.

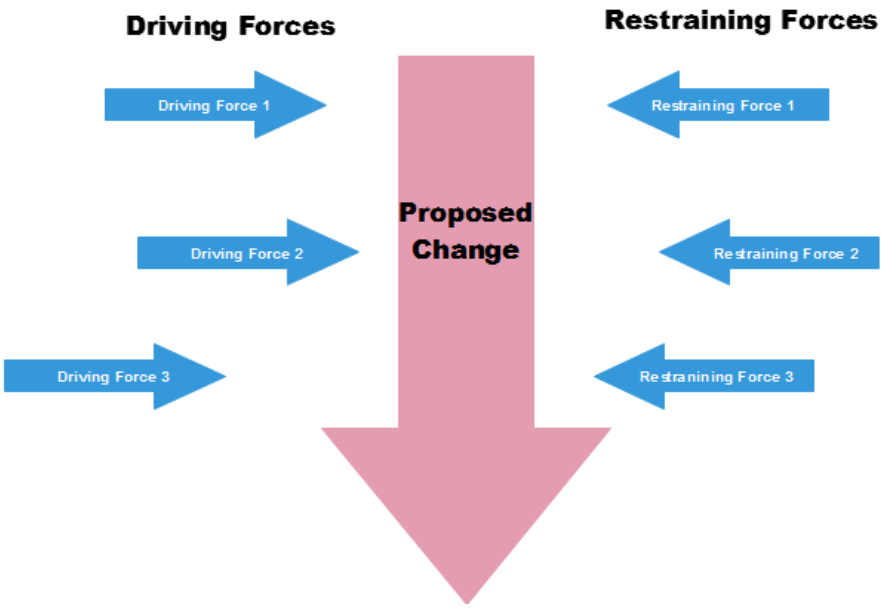
6). One study reported faulty forensics or shoddy testimony that contributed to over 60% of wrongful convictions (Kourtsounis, 2009). Within labs across the United States professionals that work in the forensic labs come from varying backgrounds which is a problem. This creates a large spectrum of many educational levels and experience in turn, creating a problem with interpreting DNA evidence and individual bias (Kourtsounis, 2009).

Funding and Resources

The lack of funding for public forensic laboratories is an on-going problem, particularly in North Carolina. The director of the North Carolina Laboratories made this statement in regard to the budget and equipment: "We're averaging about $64,000 equipment budget each year and we do not have the money to maintain the equipment" (NCDOJ, 2015). In the 2015-2016 Fiscal report from the North Carolina Department of Justice the labs are facing a very important drop in dedicated receipts that come from court fees. Included in the report was the 36% drop of fees with emphasis on the point that 40% of those receipts provides the funding for eight forensic scientists (NCDOJ, 2015). There are constant budget challenges and restraints that prevent the laboratories from hiring or maintaining up to date equipment. Another complication stems from *Melendez- Diaz v. Massachusetts* requiring forensic scientists to provide live, in-court testimony. Court testimony hours have increased 923 hours or 28% from 2014-2015 when the Department of Justice filed their fiscal report in 2016. The

only way to cut down on travel and wait time for analysts is to ask all criminal justice stakeholders to help minimize their time away from the lab.

Kurt Lewin's Force Field Analysis (See Figure 1 below) will be introducted to explain why the government, upper management and parties involved in the process of DNA analysis are reluctant to implement changes in the state of North Carolina. The entire process of DNA analysis could be streamlined and labor-intensive methods could be eliminated. Crime laboratories today should include automated systems, like robotic DNA extraction units. If the state of North Carolina wants to avoid delays and possible 6th amendment violations to its citizens the driving forces that prohibit change must be addressed (Swanson, 2014).



Chapter 3: Research Method

Introduction

In this study, I used a survey format to evaluate how attorneys, law enforcement, and professionals involved with DNA analysis perceive the effects of the backlog and delays the state of North Carolina is experiencing. The topics examined are the time frames of processing DNA, impact DNA delays have on outcome of cases, and factors contributing to the extended time frame in each step of the analysis process. Ultimately, the goal of this study is to determine how all three of these topics play a role in the reason why North Carolina citizens are not being afforded their constitutional rights to a speedy trial and why the state laboratories maintain such a backlog in DNA cases. A review of the research design, collection of data, targeted population, instruments of research, presentation and explanation of results will be conducted. The research questions below are addressed:

1. Does the time frame for DNA analysis in North Carolina differ from other states?
2. Does the delay in the return of DNA evidence affect the outcome of a defendant's case?
3. What factors contribute to the amount of time it takes for each phase of the analysis of DNA evidence?
4. What impacts will continued delays in DNA processing have on the future of North Carolina's criminal justice system?

Research Design

There are several approaches that could be used when conducting research. Three basic research designs are quantitative, qualitative, and mixed methods. Studies that incorporate quantitative research design makes field observations more explicit (Maxfield & Babbie, 2015). Summarizing data, using aggregates, and statistics become part of a quantitative design allowing more complicated testing of relationships between different variables (Maxfield & Babbie, 2015). Qualitative research design does not incorporate numbers and only explains and interprets observations to bring meaning and patterns of relationships (Creswell, 2008; Hagan, 2006; Maxfield & Babbie, 2009). A mixed methods approach could combine elements of both quantitative and qualitative. The goal of this study is to interpret details while evaluating variables of many different aspects of a process designed for DNA analysis. Experimental research designs allows for the investigation of "possible cause-and-effect relationships" (Dantzker & Hunter, 2012, p. 88). Comparative research allowed me to examine relationships between other states and North Carolina with focus on variables such as time, equipment, and budget. A time-series analysis also allowed me to examine the time frames for DNA processing in other states as opposed to North Carolina. An experimental, comparative, and time-series analysis was found to be the most logical tool for this study. By using experimental and comparative design, the researcher can observe existing consequences and search for plausible causal factors (Dantzker & Hunter, 2012).

Once the most logical research design was chosen, then a specific research method needed to be selected for gathering data. A survey research method was chosen

as it can be designed to elicit important data for analysis. According to Maxfield and Babbie (2015), survey research is the most frequently used method of observation in sociology, political science, and criminal justice. Many surveys exist in the American criminal justice system today such as the National Crime Victimization Survey (NCVS), Uniform Crime Report (UCR), and Self-report Surveys (Maxfield & Babbie, 2015). Surveys are useful tools in research due to the ability to customize them. The researcher can use open-ended questions or closed-ended questions. Formats of surveys are important, and questions should be short, clear, unbiased and negativity should be avoided. Maxfield and Babbie recommend that researchers avoid any questions that begin with "Do you agree" (Maxfield & Babbie, 2015, p. 239). Surveys can include questions that require the participant to rank their answer in levels of importance. The survey could use a scale of 1 to 5 with five being most important or strongly agree.

Because I decided that a survey research method was to be used, I evaluated whether electronic surveys versus paper surveys would prove most beneficial in this study. The most common and useful type would be the computer based self-administered survey where respondents simply click on a link that takes them directly to the page where questions are answered. The ease of this tool is that responses are automatically recorded and much time is saved on the part of the researcher. Because several states are included in the research, face-to-face interviews were not an appropriate option for this study. Today, emails, paying bills electronically, and other on-line applications are replacing paper methods and will eventually become obsolete (Maxfield & Babbie,

2015). Like the NCVS and its large sample size, survey methods have the potential to accumulate large responses as well.

A major concern about the decision to incorporate the survey research method was the time frame needed to generate a survey and then the time needed for results. Research by Flaherty, Pearce, and Rubin (1998); Matheson (1991); Nonnecke, Preece, Andrews, and Voutour (2004); Preece (1999); Preece and Ghozati (2001); Walther (1996); Walther and Boys (2002); Wood and Smith (2002); and Wright, (2002a, 2002b, 2004) all revealed that computer-mediated communication is the current trend. Unique populations can be reached, costs stay minimal, and less time is needed. Google Forms is a widely used tool in many institutions and was used in this study.

Data Collection

I explored how the delay in processing of DNA evidence in the state of North Carolina creates a potential 6th amendment violation. Processing times can years in North Carolina whereas other states, such as Ohio report, no significant backlogs (Lean Ohio, 2011). Academic journals, law review journals, and other sources outlined in Chapter 2 have been examined and a survey was distributed to collect data.

Three surveys were developed to collect specific data. One survey was distributed to randomly selected members of the North Carolina Bar Association (NCBA), Ohio Bar Association (OBA), Virginia Bar Association (VSBA), and South Carolina Bar (SCBA). Another survey was developed and emailed to randomly selected members of the North Carolina Law Enforcement Association (NCLEA). The NCBA is a mandatory organization that was created by the general assembly and currently has over

27,000 licensed attorneys (NCSB, 2016). The goal of the NCSB is the protection of the public and protection of our system of justice (NCSB, 2016). Because their mission directly relates to justice for all defendants and because attorneys are responsible for presenting cases involving DNA evidence, this organization was deemed crucial for this study. The survey was distributed to all existing members of the NCSB. The NCLEA was also deemed important in this study as the law enforcement agencies are ultimately responsible for DNA collection and submission to the crime laboratories. Its mission is to "educate, serve and protect the officers of the organization in a similar manner as the officers educate, serve and protect all citizens of North Carolina" (NCLEA, 2016, p. 1). The last survey or questionnaire was emailed to all the currently employed forensic analysts at the crime laboratory in Raleigh, North Carolina.

Limitations

One weakness of this study involved tracking down cases in each of the three states that involved lengthy wait times for DNA as well as cases that had been overturned due to errors found in DNA evidence that was collected over a decade ago. Law enforcement officials, analysts, and attorneys in the study may not want to admit that they are not properly trained or have the proper equipment to perform their duties. When using surveys in research there is always the concern of validity and reliability.

The surveys were administered using email addresses provided to researcher. The forensic analysts' emails were provided by the crime laboratory director. Legal questionnaire email addresses were obtained from the secretary of each state's bar association. Possible incorrect or email addresses no longer in use created a limitation

for the study. Also, when conducting a survey via the internet there can be incomplete answers, unanswered surveys, and more than one submission from the same attorney.

According to Baruch and Holtom (2008), electronic data collection yields more response rates than traditional mail methodology. Findings suggest that a universally acceptable time for survey responses is not available (Fowler, 2002). However, a response of 30% to 40% is the usual internet-based result found by Dykema, Elver, Schaeffer, Stevenson, and Thayer-Hart (2010). The goal for this study was a 22% response rate. In order to compile data with significant findings I did not anticipate more than 30% response and would accept as low as 22%. I received 100% participation from all twenty-one forensic analysts employed at the Raleigh laboratory. 137 participants responded to the legal questionnaire. 149 of 300 participants responded to the law enforcement questionnaire. The survey questions were directed at the cause of delays, the time-frame usually experienced, factors that contributed to wait time, and their interaction with each organization involved in the process of DNA analysis.

To receive guidance and cooperation for administering the online surveys, permission was requested from the NCSB and the NCLEA. I received permission was received from the executive director of both organizations. The survey was then distributed by using the email addresses as listed in the directory provided. A link was provided for direct submission of the survey directly to me. The director did grant permission and a statement was provided in the survey proclaiming the legitimacy of such. Both organizations use email as their primary means of communication and members are encouraged to check their accounts daily. Because of their constant support

of internet forms and surveys, an acceptable response rate for this study was anticipated. The targeted response rate was met by the NCB but not by the NCLEA. A second email was then generated to allow more participation.

Factor Analysis/Cause and Effect

In addition to examining the answers for each separate question on the survey, SPSS software was used. SPSS software allows for a factor analysis to be conducted. Factor analysis attempts to find underlying variables, or factors, that shed light on patterns of correlations within a set of observed variables (Meyers, Gamst, & Guarino, 2013). Factor analysis can also be used to come up with possible hypotheses, as well as create time-frame analysis (Meyers, Gamst, & Guarino, 2013). For SPSS purposes, coding was used with survey responses. Using SPSS software allowed commonalities to be grouped and factor matrixes to be established. Variables such as budget, political, outdated equipment, lack of adequate staff, and late submissions were coded and responses were grouped into categories. For example, 5% of attorneys answered a particular question and contributed delays to outdated equipment, while 5% of law enforcement officers' responses revealed politics was the reason. Careful attention was paid to the cause and effect relationship of the variables to the question. For instance, whether the budget restraint or lack of adequate staff contribute to the process of DNA analysis. Participants were relatively quick to respond and the response rate met requirements for this study.

In addition, the survey will incorporate a question as to the number of years an attorney has been practicing or the number of years an officer has served in law

enforcement. With such high numbers of licensed attorneys in North Carolina as well as having over 600 law enforcement agencies, some grouping will need to be examined. New attorneys and new officers may not have had time to experience the problem with processing times in DNA analysis. This grouping will alleviate any flaws or bias in the study.

Instrumentation

As stated previously, survey research was chosen as the methodology for this study. The survey was sent to practicing and licensed members of the North Carolina State Bar, as well as current employed officers in the North Carolina Law Enforcement Association. The survey consisted of open-ended, multiple choice, and Likert scale questions. The survey was emailed to all participants which included a link leading them directly to the survey. In order to explain the purpose of the survey, a description of the study and an informed consent was posted in addition to the guarantee of anonymity. In order to further ensure validity and reliability, the survey asked for their agreed participation before answering the first question.

When conducting research, validity and reliability are important and there are measures to take to ensure each (Dantzker & Hunter, 2012). Since the survey was developed solely for the purpose of this study a pilot test was conducted within a small group of attorneys and law enforcement in Hertford County. All steps were taken to avoid any language or terminology that could be considered biased or prejudiced. Questions were kept simple, and no questions were used that required multiple answers. The sample population chosen for the pilot study was agreeable and voluntarily

consented to take part in the study. The pilot or test study was given to gain a clearer picture of how the questions and the survey itself would be perceived and if any questions needed to be re-worded.

Target population

The target population for this study was practicing attorneys, judges, and working law enforcement officers in the state of North Carolina. As stated previously, the survey was e-mailed to licensed attorneys within the State Bar (NCSB) and to employed law employment officers in the State Law Enforcement Officers Association (NCSLEA). The most important target population was the current analysts working on DNA processing in Raleigh, North Carolina. Each population consisted of different age groups and differing years of experience. Some officers were Captains or Lieutenants while others were drug or investigative officers and some judges were currently on the bench while others were retired. To better clarify the data collected in the survey, see the following:

- Years practicing law
- Years worked in law enforcement
- Current title or position within agency or organization
- Defense or prosecutorial role
- Current involvement with DNA submission, collection or receipt
- Problems experienced with DNA delays in court proceedings

The results of the study used for the purpose of this dissertation should not be generalized beyond the two organizations involved.

Threats to Validity and Reliability

The question of validity must be addressed in this study in order for the data collected to generate results that are sound. Dantzker and Hunter (2012) wrote that validity "refers to whether the questionnaire is in fact measuring what is claims to measure" (Dantzker & Hunter, 2012, p. 95). There are four types of validity: face, content, construct, and criterion. Face is the simplest measure and requires the researcher to accept that the questionnaire is measuring exactly what it is intended to (Dantzker & hunter, 2012, p. 95). Content validity focuses on each question and the ability to measure what is being studied while construct validity serves the purpose of showing that each question measures what it needs to in relation to all others. The last type of validity is criterion which represents the relationship between the entire questionnaire and the results (Dantzker & Hunter, 2012). The study must also consider any threats to internal or external validity. Internal validity looks at whether the results can be attributed to the independent variable and not something else while external ascertains that the results can be generalized (Rubin & Babbie, 2010). Threats can arise in a study internally or externally. Nine threats to internal validity were taken into consideration in this survey and study. Those threats are as follows:

- History- can be a threat when other external factors occur during the study. The time frame for this survey was limited and the data collected focused on factors that existed in the past relating to DNA analysis. Had such an external factor generated itself, it would have been noted (Rubin & Babbie, 2010).

- Maturation- When a participant began the survey, it was completed in one sitting and there were no threats of being informed on the survey and its content during or before the participant answered the questions (Rubin & Babbie, 2010).
- Testing- No controversial questions relating to race, ethics, prejudice, or religion were included. It was not necessary to conduct pre-tests and post-tests and all questions were answered in a single instrument (Rubin & Babbie, 2010).
- Instrumentation- No changes were made in the way the study was conducted. A single instrument (survey) was given and data from such was then collected and analyzed (Rubin & Babbie, 2010).
- Regression- Participants were not selected and a wide and random population was used. Certain attorneys or particular law enforcement officers were not used, and no group was chosen because of any prior testing (Rubin & Babbie, 2010).
- Differential selection- All surveys were sent to the listed members of both professional organizations. Results will pertain only to those two organizations, and further testing may be needed to generalize the results (Rubin & Babbie, 2010).
- Experimental mortality- This experiment was conducted with one survey and once started, it was completed. Therefore, the experiment was not one that lasted for a long period of time and

the participants gave consent. This eliminated the need for protection of participants once the survey began (Rubin & Babbie, 2010).

- Casual time order – The survey included questions that required participants to answer about past problems or encounters with the legal system or the crime laboratories. The chronology and flow-chart was established before the survey was administered (Rubin & Babbie, 2010)
- Compensation – No contact with the researcher was included and there was no need for compensation of participants. The survey was sent electronically and all responses were anonymous (Rubin & Babbie, 2010).

Presentation and Results

In the next two chapters the results will be discussed. The survey has been produced and analyzed and the results will be presented. In the presentation, graphical data, flow charts, and text will explain the results. Results will center on all responses to the surveys but specifically the multiple choice and Likert scale questions. Efforts will be taken to make sure that all prejudice and bias is limited and results will be presented clearly, concisely, ethically, and in an academically sound manner.

Conclusions

Stated previously, the purpose of this research study was to find unintended causes or factors that create a delay in the processing of DNA in the laboratories in North

Carolina. Little research had been conducted prior to this study regarding potential sixth amendment violations for defendants. By conducting research and surveying practicing attorneys and employed law enforcement, this researcher ascertained a deeper understanding of how crucial the process of DNA analysis is and why there are such backlogs in the legal system. Analyzing this data can be important to the future of the state, as well as the citizens of North Carolina. Citizens can be made to understand their rights and possible legislative changes can be made. One such change could be the requirement of the collection of DNA from all newborn babies. This would create an instant DNA sample in the database if that individual ever committed a crime in the years ahead. The criminal justice system may take such recommendations and insight provided in this study to implement positive changes for citizens in North Carolina.

Chapter 4: Results

Introduction

This research was conducted to determine if a delay in DNA processing was a problem in states other than North Carolina and what variables contribute to processing delays. A survey regarding delays of DNA processing in the criminal justice system was developed and sent to active members of the bar associations in the states of North Carolina, Virginia, South Carolina, and Ohio. The survey allowed for a respondent to be active in the legal field as a judge, district attorney, or prosecutor.

In addition, a questionnaire was developed and distributed to current employed forensic analysts at the state crime laboratory in Raleigh, North Carolina who work processing DNA evidence. The purpose of the questionnaire was to gain more insight and knowledge about the steps involved in the process of analyzing DNA from beginning to end. Also, the researcher included questions only analysts at the Raleigh, North Carolina laboratory would be able to answer. With just one laboratory in the state that affords law enforcement the service of analyzing DNA evidence, it was crucial to distribute questionnaires to the analysts employed there. Ultimately, I sought to determine what factors contribute to the backlog of processed DNA evidence prevalent in the North Carolina justice system for felony cases.

For this study, there was a definite gap in the literature and a lack of information as to what has been done to alleviate another crime laboratory scandal in North Carolina like the one that occurred in 2010. The study examined costs of DNA analysis per item, cost for one inmate annually in North Carolina, cost to hire additional analysts, and the

cost of delays on the criminal justice system as a whole. Since the crime laboratory scandal, there has been a significant change in leadership, and yet backlogs still exist despite the claim from former Governor McCrory that he fixed all the problems at the laboratory.

Data Collection

The data collected can be partitioned into several categories. First, demographics, years of experience, knowledge of the criminal justice system, and lastly common responses from analysts. Each of the categories were examined individually before cross tabulation to determine if group specific data exists pertaining to the research questions. As stated, the data were collected using an internet survey tool distributed by e-mail using lists obtained from the bar associations of North Carolina, Ohio, South Carolina, and Virginia. The primary focus was all active and practicing criminal justice attorneys in each state who deal with felony cases by defending accused offenders, prosecuting accused offenders, or sitting on the bench to decide the outcome of the case. A multiple-choice format was used for the questions that were e-mailed. Another group addressed in the study was the forensic analysts currently employed at the state crime laboratory in Raleigh, North Carolina. Multiple choice questions were e-mailed to each analyst for completion. The list of currently employed forensic analysts was obtained from the director of the crime Lab when he provided the letter of cooperation. The delivery system and the data collection tool used for the questionnaires was SurveyMonkey.com and the following datum were reviewed for the purpose of this study.

Questionnaires were sent to current judges, current criminal defense attorneys, and current prosecutors or district attorneys. After receiving the complete list of attorneys in good standing with the North Carolina Bar Association, I had to eliminate those attorneys who were not in the aforementioned category. A complete list of active members in the South Carolina, Ohio, and Virginia State Bar Associations was also received. A population had to be gathered of just those that were judges, criminal defense attorneys, and prosecutors. When that population was produced, random sampling was then conducted for those that fit the criteria. Once a list was formulated of only those fitting the criteria, a random sampling was conducted and 600 questionnaires were emailed. Of the 600 questionnaires emailed, responses were received by 137 participants or 22% of the targeted population. The NCBA, the SCBA, VBA, and OBA provided email addresses and the questionnaire was sent with an internet link attached that took participants directly to the consent form and the questionnaire itself. In the text of the e-mail, a full description of the study was included as well as the consent form. A guarantee of anonymity was included, and if the participant wanted a copy of their results, they were offered the option by simply replying with a "Yes, I would like to receive a copy".

Forensic analysts at the North Carolina crime laboratory were emailed the questionnaire after the letter of cooperation was received from director. The consent was given after he reviewed the questions to be e-mailed to analysts at the Raleigh laboratory. SurveyMonkey was chosen for this research. The online consent and questionnaires that were emailed made for easy distribution, limited bias, and gave participants flexibility. A

100% participation rate was gained from the forensic analysts at the North Carolina crime laboratory. All 21 analysts currently employed at the laboratory who process DNA evidence responded to the questionnaire.

Another questionnaire was emailed to law enforcement officers who are current members of the NCSLEA. This is a nonprofit organization that has several hundred law enforcement professionals throughout the state. There are 10 local chapters across North Carolina, and an email was sent to the president of each chapter. Once the chapter president received the email, it was forwarded with a link to all the members of each chapter. The link provided consent and a description of the study that was being conducted for this research. SurveyMonkey was again used to collect data and questions were answered by participants on a five-point Likert scale. One hundred forty-nine law enforcement professionals responded to the questionnaire.

Results

Descriptive Statistics

Data was collected from 137 participants of different ages, different states, position in the criminal justice system, and years of experience. The largest group of participants were from the state of North Carolina at 78%, Ohio at 2.7%, South Carolina at 3.4%, and Virginia at 15.9%. Twenty-one analysts at the Raleigh, North Carolina Crime Laboratory were e-mailed the questionnaire and there was 100% participation from them. Sixty-seven point six percent were criminal defense attorneys, 18.9% were prosecutors or assistant prosecutors, and 13.5 % were judges. Table 3 represents results from the questionnaire that was distributed by email to participants from North Carolina,

Ohio, South Carolina, and Virginia. These participants were either judges, criminal defense attorneys, or prosecutors. Also included in Table 3 are the results from the 100% participation by forensic analysts employed at the Raleigh, North Carolina laboratory.

Table 3

Frequencies and Percentages for Demographic Information

Variable	*n*	*%*
Ohio	3.89	2.7
Virginia	22.1	15.9
South Carolina	4.9	3.4
North Carolina	106	78
Years of experience in the criminal justice system		
1-5	14.3	10.4
6-10	11.9	8.7
11-15	19.0	13.9
Over 15 years	91.7	67.0
Years of experience as a Forensic Analyst at Raleigh laboratory		
1-5	.19	4
6-10	.38	8
11-15	.095	2
Over 15 years	.33	7
Years of experience in Law Enforcement		
1-5	.275	41
6-10	.30	45

11-15	.255	38
Over 15 years	.16	25

Note. Percentages may not sum to 100% due to rounding error.

All forensic analysts currently employed at the Raleigh, North Carolina laboratory answered seven questions on the questionnaire that was emailed to them. Questions and responses will be discussed later in this chapter but Table 4 (below) is a summary of responses.

Table 4

Forensic Analysts Questionnaire

1	2	3	4	5	6	7	8
Analyst 1	Less than 10	Less than 10	100 Miles	1 to 6 Weeks	Less than 1 hour	0-5 years	Being on call for a full week
Analyst 2	Less than 10	Less than 10	100 Miles	1 to 6 Weeks	Less than 1 hour	0-5 years	Interpretation of DNA mixtures
Analyst 4	Less than 10	Less than 10	100 Miles	1 to 6 Weeks	Less than 1 hour	0-5 years	Keeping up with changing demands
Analyst 5	Less than 10	Less than 10	100 Miles	1 to 6 Weeks	Less than 1 hour	0-5 years	Communication with judicial system
Analyst 6	Less than 10	Less than 10	100 Miles	1 to 6 Weeks	Less than 1 hour	0-5 years	Not having faster TAT for results
Analyst 7	Less than 10	Less than 10	100 Miles	1 to 6 Weeks	Less than 1 hour	0-5 years	Unpredictability of court

Analyst 8	Less than 10	Less than 10	100 Miles	1 to 6 Weeks	Less than 1 hour	0-5 years	Unpredictability of court
Analyst 9	Less than 10	Less than 10	100 Miles	1 to 6 Weeks	Less than 1 hour	0-5 years	Unpredictability of court
Analyst 10	Less than 10	Less than 10	200 Miles	1 to 6 Weeks	Less than 1 hour	0-5 years	implementing technological changes
Analyst 11	Less than 10	Less than 10	200 Miles	1 to 6 Weeks	Less than 1 hour	10+ years	Communication with judicial system
Analyst 12	Less than 10	Less than 10	200 Miles	1 to 6 Weeks	Less than 1 hour	10+ years	Not having faster TAT for results
Analyst 13	Less than 10	Less than 10	200 Miles	1 to 6 Weeks	1-3 hours	10+ years	Law Enforcement taking time to deliver evidence to process
Analyst 14	Less than 10	Less than 10	Less than 100	1 to 6 Weeks	1-3 hours	10+ years	Law Enforcement taking time to deliver evidence to process
Analyst 15	Less than 10	Less than 10	Less than 100	1 to 6 Weeks	1-3 hours	10+ years	Law Enforcement taking time to

							deliver evidence to process
Analyst 16	Less than 10	Less than 10	Less than 100	1 to 6 Weeks	1-3 hours	10+ years	Law Enforcement taking time to deliver evidence to process
Analyst 17	Less than 10	Less than 10	Less than 100	1 to 6 Weeks	1-3 hours	5-10 years	Unpredictability of court
Analyst 18	Less than 10	Less than 10	Less than 100	1 to 6 Weeks	1-3 hours	5-10 years	Law Enforcement taking time to deliver evidence to process
Analyst 19	Less than 10	Less than 10	Over 200 Miles	1 to 6 Weeks	1-3 hours	5-10 years	Law Enforcement taking time to deliver evidence to process
Analyst 20	Less than 10	Less than 10	Over 200 Miles	Other	More than 3 hours	5-10 years	Communication with judicial system
Analyst 21	Less than 10	Less than 10	200 Miles	Other	More than 3 hours	0-5 years	protocols constantly changing to keep

up with new technology

Table 5 shows the results of the 5-point Likert scale that was emailed to the president of each of the 10 local chapters of the NCSLEA to distribute among the members. Of the 300 emails that were sent, 149 participants responded to the Likert scale representing 49% response rate.

Table 5

Five Point Likert Scale Responses

LEP Responses	Total	Strongly Agree	Agree	Disagree	Strongly Disagree	Undecided
Question 1	149	67%	31%	0%	0%	0%
Question 2	147	0%	94%	0%	0%	0%
Question 3	145	31%	62%	0%	0%	0%
Question 4	146	0%	93%	0%	0%	0%
Question 5	138	0%	0%	61%	27%	0%
Question 6	148	63%	31%	0%	0%	0%
Question 7	149	92%	0%	0%	0%	0%
Question 8	149	0%	95%	0%	0%	0%

Research Question 1

The following was the first research question for the study: Does the time frame for DNA analysis in North Carolina differ from other states? The processing of DNA is a

time consuming, lengthy process that requires up to date technology and software. In addition, many state crime laboratories are facing budget crises, analysts are leaving for better paying jobs, and backlogs are growing daily according to former crime lab director John (Engel, 2013). Law enforcement agencies in each state package evidence from crime scenes and personally transport it to the crime lab designated to handle such processing (Balko, 2010). One crime scene can have multiple pieces of evidence that needs testing and each piece must be packaged individually. Some crime laboratories, like those in North Carolina, will only accept 10 pieces of evidence for submission per discipline (N.C. Crime Laboratory annual report, 2018). The captain of the ACSO criminal investigations division reported that "If you get 15 pieces of evidence, the lab wants you to pick the six best, and they will test; but, you know that seventh piece of evidence could be what gets you a conviction" (Groves, 2016, p. 1). In 2010, the Attorney General of North Carolina, Roy Cooper, was blamed and condemned for problems that existed at the North Carolina State Crime Laboratory (Leslie, 2013). Cooper acted immediately and ordered an audit be conducted (Intrinsic Forensics, 2009). The audit revealed that the SBI indeed had serious problems (Intrinsic Forensics, 2009). Two-hundred and thirty cases involving forensic evidence were found to be erroneous due to withheld or distorted evidence (Swecker & Wolf, 2010). This meant that some of the individuals accused of a crime could be potentially innocent (Swecker & Wolf, 2010). Forty cases revealed no suspect had been charged in the case (). Other cases highlighted 80 individuals are currently still serving sentences, five died while in prison, and three have been executed (citation). After this audit was conducted, recommendations were

made to the SBI (citation). Yet. North Carolina is still suffering from backlogs and DNA processing times are still an issue. According to a report in 2010, "the relationships between SBI crime lab researchers and North Carolina prosecutors aren't just cozy, they're downright cuddly" (Balko, 2010, p. 1). Currently, the North Carolina crime laboratory receives on average 38,119 case submissions annually (N.C. Crime Laboratory, Annual Report, 2018). Unfortunately, processing turnaround times are still a problem. In 2017-2018, over 52,000 pieces of evidence were received at the crime laboratory which represented a 15.25% increase when compared to 2016-2017 (N.C. Crime Laboratory, Annual Report, 2018). This represents a 28.57% increase over the last 3 years. The crime laboratory in Raleigh, North Carolina received 18,503 case submissions in 2018 and 26,000 DNA database submissions (N.C. Laboratory Annual Report, 2018). In 2018, there were 15,160 untested sexual assault evidence collection kits based on a mandatory inventory by local law enforcement agencies. The cost to test each kit is $700.00 and how many kits are tested relies on funding (N.C. Crime Laboratory, Annual Report, 2018). If legislature does not allocate funds for testing, then the kits sit on shelves while victims wait to find out who their potential offender may be (Summers & Young, 2014). Some vendor labs are called on to assist, but a vendor lab can only process an estimate of 3,000 kits per year (Summers & Young, 2014). The crime laboratory receives new evidence on a daily basis. This evidence could be additional rape-kits or evidence pertaining to a murder, rape, or assault case. The additional evidence only adds to the backlog and with turnaround times still slow the

crime laboratory analysts report morale is low and at times, unfavorable working conditions exist (Personal Communication, 2018).

In regard to turnaround times, North Carolina still reports 180 to 240 days on average, but some cases take as long as 2 to 3 years. According to the 2018 annual report of the North Carolina crime laboratory lead time which means the time that the laboratory receives it until it is processed is averaging 8 months. According to the Forensic analysts currently employed at the laboratory, some evidence packages from law enforcement are already months old when they are delivered to the crime laboratory. The questionnaire allowed for analysts to write in any comments they wanted to share, and all twenty analyst added comments that ranged from suggestions and concerns to frustrating aspects of their job.

Ohio, South Carolina, and Virginia report minimum backlogs but all are far from the backlogs reported in North Carolina (Nelson, 2010). According to the Virginia Department of Forensic Science in February of 2019, the average turnaround time for forensic evidence such as DNA is approximately 150 days. Virginia currently has four laboratories, one in Richmond, Manassas, Roanoke, and Norfolk. Detective John Bragg with Lynchburg Police Department's Crime Scene Unit reported in 2017 that the majority of the backlog in Virginia can be attributed to drug cases (Walter, 2017). He also said the Virginia Department of Forensics usually puts murder or violent crime cases as priority and those cases are moved to the front of the line (Walter, 2017). Detective Bragg reported that the 2009 verdict from the Supreme Court case *Melendez-Diaz v. Massachusetts* case made a major impact on the processing of drug cases because the

analyst is now required to provide court testimony in person (Walter, 2017). Also, Virginia state laws require that nearly all rape kits are tested (Walter, 2017). In 2014, a brand new state of the art building was constructed in Ohio to serve as the Ohio Bureau of Criminal Investigation (BCI) laboratory. A challenge of the laboratory was creating convenient space for forensic analysts that would accommodate the entire process of DNA analysis. This was completed by arranging the laboratories in a design that allowed one phase of the process to follow on to the next sequence with ease. It eliminated the analyst from having to walk or carry evidence out in a hallway to another part of the building (Lean Ohio, 2011). The new facility was designed to be able to handle future technological advances as well as provide ample storage for all evidence. According to the Ohio Attorney General the building is the most advanced of its kind and is located on a university campus (Pickerel, 2015). Ohio's turnaround times have been cut from 120 days to 20 days and for high priority or multiple murder cases the DNA tests are said to possibly be completed in as little as 72 hours (Pickerel, 2015). Attorney General Mike DeWine made turnaround times his priority when he took office in 2011 and has been successful with finding funds to increase from 99 employees to 148 today, as well as being able to double the robot processing equipment to 12. The Superintendent at the Ohio laboratory managed to cut the steps in DNA crime-scene evidence processing from 187 steps down to 84 (Johnson, 2015).

Charleston, South Carolina announced in May of 2018 that a 22,000 square foot $12.4 million dollar facility will be built to complete DNA testing for law enforcement in the state (Majchrowicz, 2018). The forensic service division has currently been working in

four rented spaces. The State Law Enforcement Division claims that they are able to expedite and prioritize violent crimes such as murder and accommodate law enforcement and courts with a timely return (Majchrowicz, 2018). Some law enforcement in South Carolina reportedly use outside agencies on an occasional basis if the defendant is willing to pay a fee because results can be done in a matter of hours (Majchrowicz). This new facility is set to be built and open by 2021 at the latest. Laboratory Director Major Todd Hughey reported, "What's going to happen for law enforcement is it's going to improve their ability to go out and arrest that individual, bring that person to justice. It's also going to help exonerate folks, you know" (Majchrowicz, 2018, p. 4). At the end of 2017, the General Assembly required every law enforcement agency in the state of North Carolina to report how many untested rape kits were in their possession. The total number of un-tested rape kids in North Carolina was 15,160 (NCDOJ, 2018). The average cost to test one kit is $700 which would bring the total to test all 15,160 kits to $10.6 million. Turnaround times (TAT) in 2017-2018 per state for DNA (See Figure 2 below).

North Carolina	Ohio	South Carolina	Virginia
280-680 days	20 -45 days	180 days until new facility opens 2021	31-108 days

Research Question 2

The following was the second research question for the study: Does the delay in the return of DNA evidence affect the outcome of a defendant's case?

When DNA evidence is not returned in a timely manner, it can create problems for the district attorney and the state will not want to proceed with the case until the evidence has been analyzed and returned. This can have an impact on DWI, rape, and murder cases. Burlington, North Carolina Police Chief Jeffrey Smythe said "the biggest impact on us first and foremost, maybe two years ago the district attorney's office started dropping DWI charges that were three years old" (Groves, 2016). Another problem with DNA delay is the fact that some innocent individuals may not be able to afford bail and may have to sit in prison while they await trial. According to the U.S. Bureau of Justice Statistics, 86% of people sitting in North Carolina jails have not been convicted of a crime. While these potentially innocent individuals are awaiting trial, the state is incurring the costs. Because the process of analyzing DNA is time consuming and the state may not push for a rush job at the laboratory, innocent individuals must remain in prison until the DNA has been tested. Many offenders in North Carolina have been falsely incarcerated, only to be exonerated when DNA was finally tested or the demand for re-testing was persistent enough (Ford, 2015). When an innocent individual is exonerated, they can sue the state of incarceration for damages. This happened in the State of North Carolina when Greg Taylor was falsely convicted and served 17 years in prison (Ford, 2015). A settlement was reached for $4.6 million. Other high-profile exonerations in the state of North Carolina include Ronald Cotton, Darryl Hunt, Dwayne Dail, Joseph Sledge, Willie Grimes, Henry McCollum, and Leon Brown. The common factor among all of these exonerations was new DNA tests (http://innocencecommission-nc.gov/). Not only is the state of North Carolina paying when a civil suit is awarded to a

wrongfully convicted individual, but the costs of housing an inmate in the state is considerably higher than other states (N.C. Department of Justice, 2015).

When courts set dockets for felony cases in North Carolina, the scheduling is completed by the District Attorney's office. In an edition of North Carolina Criminal law, the topic of court calendars was addressed due to complaints that the prosecutors were using the calendars to their advantage. North Carolina G.S. 7A-61 states that "the district attorney shall prepare the trial dockets". The customary procedure requires that a case not scheduled for trial within a 120 day period from the day of indictment must have a trial date set. This still does not mean that all parties will be ready to proceed to trial or if all the evidence will be returned and ready for presentation. Superior Court is only once a quarter, and it is next to impossible to get through all the cases that need to be concluded in the one week that is allotted to Superior Court. District Attorney Valerie Asbell, the chief prosecutor for District 6B in North Carolina reported that she sees numerous continuances accumulate per case because DNA evidence has not been processed and returned. In addition, Asbell reported that she allows and requests continuances herself in the pursuit of justice and that the ultimate goal is to find out whether a defendant is guilty or not. A prosecutor or district attorney rarely presumes innocence even though many states are seeing post-conviction exonerations. Again, a major problem in North Carolina courts because there is no speedy trial statute. The 6th amendment to the United States Constitution guarantees a defendant the right to a speedy trial. Many defendants want this to be enforced, especially if they are waiting in jail until a trial can be scheduled. Defense attorneys will frequently advise their clients to "waive

their right to a speedy trial," telling them that it would be in their best interest. Defense attorneys are simply using this as a stalling technique in order to give them time to prepare a defense and many times wait for evidence to be returned that could prove their innocence. Defendants waiving their right to a speedy trial are in essence saying to the court that it is permissible to take several months or even years until their case can be concluded. Speedy trial rights usually are in question when a case has been pending for over one year. In the Supreme Court case *Barker v. Wingo* the issue of a speedy trial was addressed. Four factors were outlined: length of the delay, reason for the delay, time and manner in which the defendant asserted his right to a speedy trial, and the degree of prejudice to the defendant which the delay caused. This means that the defendant must prove that the delay is causing harm. If a defendant is in jail waiting for a trial, emotional and physical harm could be occurring. A North Carolina case involving a law enforcement officer took three years to conclude. In 2014, Christopher Buffaloe, age 30, was charged with six counts of statutory rape, one count of indecent liberties with a child, one count of felony second-degree exploitation of a minor, one count of felony solicitation of a child by computer, and one count of disseminating obscene material. Buffaloe, if convicted of all counts, could have been facing life in prison without parole. Special Prosecutor, Adren Harris of the North Carolina Department of Justice reported that the State would have no problem proving Buffaloe's guilt "beyond a reasonable doubt" in this case. Continuances each time the case showed up on the docket went on for two years. Delays were attributed to DNA evidence not being returned from the crime laboratory in Raleigh. The defendant was released during this time on a $500,000

bond. Even out on bail the defendant, defendants family, victim, and victim's family were all ready to resolve this case and find some form of closure. The defense attorney and State Prosecutor worked out a plea agreement that they felt was in the defendant's best interest. On April 11, 2017, Buffaloe pled guilty to one count of felony statutory rape. Buffaloe was immediately sentenced to serve a minimum of 12 years in a state prison (Bryant, 2017). This case is just one more example of how slow the criminal justice process works in North Carolina and how a speedy trial does not happen.

Research Question 3

The following was the third research question for the study: What factors contribute to the amount of time it takes for each phase of the analysis of DNA evidence? Several factors were found to contribute to the delay in processing DNA at the North Carolina crime laboratory. Once law enforcement has collected all evidence from a crime scene and packaged it for delivery to the crime laboratory, there is no stipulation on how soon or how long it can be held before that trip to the crime laboratory takes place (N.C. Department of Justice, 2018). In addition, when it is accepted at the crime laboratory, it is logged in and then may wait days or weeks before it is assigned to an analyst for processing (Giannelli, 2012). The crime laboratory has policies and procedures for Evidence Submission that will be discussed in further detail in the next Chapter. There are certain limitations and stipulations put on the submission of evidence that can hinder the acceptance and processing stages (Leslie, 2015). Budget restraints are a major problem in the state of North Carolina as in most other states. It comes down to a matter of the state prioritizing what needs take precedence. Along with those budget

restraints, competitive salaries are hard to maintain and many analysts leave for better pay (Personal Communication, Director Byrd, 2018). When salaries of crime laboratories in Southeastern states were examined, the state of North Carolina was found to be "below the board on any and every scale of measurement" according to Joseph John. John is a former judge that ran the crime laboratory until 2014. John further revealed that when an analyst is hired and trained on a two year scale and then they leave, an estimated $114,625 has already been spent on them and is lost. When comparing salaries to neighboring Virginia, an analyst could make an additional $20,000 if they were to work in a Virginia laboratory. When a forensic analyst is hired at the state crime laboratory in Raleigh, he or she must go through training that lasts up to eighteen months before they are released to conduct testing on their own (Personal Communication, 2018). The training process alone is a problem that adds to the delay in processing when cases are already backlogged. Since 2010, the crime laboratory lost over seventy scientists (Leslie, L. 2015). Communication between the District Attorney and the crime laboratory was found to be a problem as well. Another factor found to be an issue that aids in processing delay is the fact that analysts must travel to testify in court and hours of wait times have been logged in. In the annual report from the North Carolina State Crime Laboratory, it was stated that in 2017 and 2018, the laboratory is still suffering from the Supreme Court Case ruling in *Melendez-Diaz v. Massachusetts*. Analysts are spending more hours traveling to court and waiting to testify than ever before and it continues to be a problem. All of these factors play a role in the processing delays that

the state of North Carolina continues to experience and will be further explained in the next chapter.

Research Question 4

The following was the final research question for the study: What impact will continued delays in DNA processing have on the future of North Carolina's criminal justice system? Continued delays in DNA processing and continuances in the courts throughout the criminal justice system of North Carolina will have an impact on all North Carolina citizens. Legislators will be forced to try and allocate funds to help with the processing delays and court delays which will mean taking the funds from one area and moving them to another. Potential tax rates could go up to help with mounting costs of maintaining prisons to house defendants waiting trial and those who cannot make bail. The cost to house an inmate in North Carolina is much higher than the other states in this study (See Table 6 below).

Table 6

2017 State Prison Cost per inmate (annually)

North Carolina	$30,180
Ohio	$26,509
South Carolina	$20,053
Virginia	$21,229

Currently, there are 152 inmates on death row in North Carolina and there are 56 correctional institutions that house approximately 38,000 offenders (N.C. Department of Justice, 2019). More exonerations are likely to occur in the state of North Carolina due to DNA processing errors or DNA re-testing proving a defendant's innocence. Untested rape kits remain continue to accumulate in the crime laboratory while more crimes continue to occur. At the end of 2018, there were over 15,000 untested rape kits in North Carolina. Additional rape kits that are sent to the crime laboratory will be added to the already large stack. The crime laboratory in Raleigh reported that once a forensic analyst is hired, they must go through training and are not released to sign any paperwork or conduct tests on their own for twelve to eighteen months. Also, the forensic analysts who took part in this research reported that the job is challenging due to backlogs as well as other factors. Many analysts do not stay at the laboratories in North Carolina because they are not paid competitive salaries compared to other states. Director John Byrd confirmed this, stating that he loses good analysts because they can go to other states and make $15,000 to $20,000 more a year (Personal Communication, Director Byrd, 2019). Forensic analysts reported that they may only spend a few hours in the lab to process one piece of DNA, however they must then spend 10 to 20 days after the tests are run to analyze and compare results. One crime scene can have multiple pieces of evidence but when law enforcement delivers the evidence to the lab, only a few pieces (ten) can be accepted and processed per case at the time. The analyst report that the evidence that is logged in may remain in the vault for months until it is assigned to an analyst.

The forensic analyst also report that communication is a major problem between the laboratory and the attorneys and prosecutors. Many states have expanded their DNA Database and now take DNA from individuals who have been convicted of misdemeanors. There are 8 states that take part in the database: Utah, Oklahoma, Minnesota, Wisconsin, New York, New Jersey, Iowa, and Virginia. There are currently thirty-one states that take DNA from felony arrestees: California, Nevada, Utah, Arizona, New Mexico, Texas, Louisiana, North Dakota, South Dakota, Arkansas, Mississippi, Alabama, Maryland, New Jersey, Virginia, North Carolina, Ohio, Michigan, Wisconsin, Colorado, Kansas, Rhode Island, South Carolina, Florida, Indiana, Alaska, Oklahoma, Illinois, and Minnesota (National Institute of Justice, 2019). If DNA is taken from those convicted of misdemeanors and felony arrestees, then it would be part of the National Database, CODIS. This could expedite processing and matches of an offender's DNA. If the delays continue, the citizens of North Carolina will still be suffering from injustice. Those waiting for trial who cannot make bail, and those who are innocent waiting for DNA to prove such are simply losing precious time. More crimes can occur when guilty offenders make bail and citizens could be victims of a crime before their guilt is established in court. Citizens may have to ultimately pay more taxes to compensate for shortcomings in the budget because of overcrowded prisons and the amount of money it takes to house inmates.

Summary

The state of North Carolina is experiencing problems with the processing of DNA and in fact has the longest turnaround times of the states that were studied for the purpose

of this research. North Carolina also has the highest annual cost for the incarceration of an inmate. The scandal that evolved at the crime laboratory in 2010 did indeed create a black cloud concerning DNA that was processed at the Raleigh laboratory. Even with updates and the crime laboratory using Lean Six Sigma there are still issues with the crime laboratory being able to process quick and efficient results (Personal Communication, Director Byrd, 2019. Several factors were found that contribute to the delays as the study revealed from the questionnaire distributed to the forensic analysts and law enforcement. Funding, lack of communication, and timeliness of delivery from law enforcement were among some of the variables that will be discussed in further detail in Chapter 5.

In summary, the data collected did yield significant results that helped the researcher in making some conclusions. The data demonstrates that there are significant unintended factors causing significant delays. The data can be used to promote social change by eliminating taxpayer money being spent on housing inmates that are potentially innocent. Additionally, one of the variables found was the delivery of the evidence to the laboratory and the fact that law enforcement had no time frame for submitting after the DNA was collected. While courts are still backlogged and felony cases are only heard every quarter, there still remains the potential for suspects to be free to commit crimes if they are out on bail. Court wait times are adding to the backlog of cases when forensic analysts are required to travel to testify in a case. Another major problem is the fact that North Carolina has a substantial amount of rape kits that have yet

to be tested. The data collected has allowed for recommendations that are detailed in Chapter 5. The recommendations may lead to changes regarding the processing of DNA.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The purpose of this comparative research study was to identify factors that contribute to the delay in processing for North Carolina felons. Data was successfully collected providing information that the State of North Carolina is behind others with regard to DNA testing and processing and there are multiple contributing factors. The state of North Carolina only had one full-service laboratory for DNA processing until just recently. The Raleigh full-service laboratory has faced a great deal of controversy since the 2010 scandal. The scandal came about when Attorney General Cooper ordered an audit of the SBI (Giannelli, 2012)). It was reported that Cooper and the North Carolina Department of Justice had delayed any reporting on the way the crime laboratory operated for 6 years (Dillon, 2018). As stated previously, the audit found significant problems. Results showed final laboratory reports missing from 230 cases (Dillon, 2018). Those reports contained evidence that contradicted previously run tests (Dillon, 2018). Of those 230 cases, three ended up with exonerations and several others that had been convicted were still on death row when the audit was done (Dillon, 2018). Additionally, 40 cases were present with no suspect having been charged (Dillon, 2018). The public's perception and the mistrust at the Raleigh crime laboratory never faded and was again top news when Cooper began his election campaign for governor of North Carolina in 2016 (Dillon, 2018). One of the biggest campaign stands involved the scandal at the crime laboratory. Cooper claimed that he had fixed the problems at the crime lab while the Governor of the state, Pat McCrory, claimed otherwise (Dillon,

2018). The politics surrounding this election and the resurfacing of the crime laboratory scandal did not shed favorable light on the processing of DNA and the backlog problem in the courts of North Carolina (Dillon, 2018). This study is one of the first to address all the factors surrounding the delay of evidence and what impact it has on the state, offenders, and victims of felony crimes. Information obtained during this study from law enforcement officers, attorneys, judges, prosecutors, and forensic analysts employed at the crime laboratory in Raleigh provided enough data for definitive conclusions and recommendations for positive social change.

Interpretation of the Findings

Research was conducted to find factors that contribute to the delay in processing DNA in the state of North Carolina. Based on these findings, there are some alternatives and possible solutions for each research question presented in this study.

Research Question 1

Research Question 1 focused on the time that it takes to process a piece of DNA evidence. The study revealed that while several states do experience some type of backlog, North Carolina has held the longest turnaround times for years. There is a gap in literature and there are no findings prior to 2009 that reveal turnaround times for each state. The average turnaround time was reported to be 152 days in the states used for this research study, but North Carolina only had a few cases that were completed in that time frame. Several cases that were presented in earlier chapters revealed that some cases have waited two to three years for DNA evidence to be returned. According to the NIJ (2015), the turnaround time for DNA testing has remained almost the same from 2008 to

2014, but the number of cases submitted to the laboratory for processing has increased by 60%. In this study, currently employed forensic analysts in Raleigh identified several factors that contribute to the delay of processing. The major factor was the delivery of evidence to process from law enforcement. Again, the state of North Carolina has over 600 law enforcement agencies that submit evidence for processing at the crime laboratory in Raleigh. According to the data received from the analysts in Raleigh, some evidence is not delivered to the crime laboratory for days and even months. There is currently no policy or statute in the state of North Carolina about the delivery time frame from law enforcement to the crime laboratory. This alone is a crucial factor in the delay of processing.

Also reported from the analysts was the lack of communication with the prosecutors and the court system. The analysts reported that they are never notified of any changes that have taken place in the case on which they are working. The analysts track every case where the DNA they processed is needed. When the laboratory is not notified that a case was completed with a plea or even a dismissal, they continue to work on processing evidence that may not be needed anymore. Analysts need to be informed about court dates and continuances before they travel and realize that their trip was a waste of time. The evidence kits that DNA is placed in for processing is provided to law enforcement agencies by the crime laboratory at a cost of $5.00 per kit. The forensic analysts have no way of detecting duplicate samples until they have gone through the first few stages of processing. In 2017-2018, duplicates that were submitted to the crime laboratory totaled $36,000.00 (NCSCL Annual Report, 2017-2018). This is a cost that

the laboratory had to record as a loss and taxpayers shoulder the financial burden. The crime laboratory reported that the way to maximize money from taxpayers would be to train in more efficient evidence collection (NCSCL Annual Report 2017-2018). There was 100% participation from the forensic analysts at the Raleigh laboratory and each reported that courts in the state were unpredictable and traveling to provide testimony was a challenging aspect of the job. This was mandated in the *Melendez-Diaz v. Massachusetts* Supreme Court case. The crime laboratory needs to receive a disposition notice confirming that the case is complete, and no further laboratory work is needed (NCSCL Annual Report, 2017-2018).

Another important factor revealed by the data was that the analysts are constantly dealing with changing science and the way it affects current and previously worked cases. It was found that the North Carolina laboratory struggles with implementing technology that can keep up with the case load they experience daily. The Raleigh laboratory reported in their annual report that they had worked for the last 4 years on trying to improve the turnaround times by using Lean Six Sigma efficiency methodology (N.C. Crime Laboratory Annual Report, 2018). The laboratory was completely renovated so the analysts could walk from one lab directly to the next lab where the next step of the processing could take place (N.C. Crime Laboratory Annual Report, 2018). In the past, an analyst may have to walk down a long hallway or even to another floor which took time away from actual processing. In the relocation of analysts to two fully self-sufficient floors, the travel waste time went from 2.06 miles to 1.66 miles per day (Personal Communication, 2018). Before the renovation was complete, there was a great

deal of transportation waste as analysts were located among four separate floors while instruments and supplies were located on other floors. In the annual report for 2017-2018, the state crime laboratory stated that they were at a point where any more renovations or progress were halted until additional resources could be obtained.

Research Question 2

Research Question 2 was a follow-up to Research Question 1, questioning whether the delay in processing of DNA affects the outcome of a defendant's case. This study has presented several cases in earlier chapters that took years to conclude. Several cases in North Carolina were brought to light after years for further testing of DNA, and results were found sufficient to exonerate or pardon the defendants. My research reported earlier that over 15,000 untested rape kits were found in North Carolina (N.C. Department of Justice, 2018). According to the nonprofit Joyful Heart Foundation this number is the highest in all 50 states. Attorney General Stein reported North Carolina budgeted the money for testing those rape kits but did not receive the resources to complete tests (N.C. Crime Laboratory Annual Report, 2018). Stein was reported saying that he felt it was a matter of public safety because "it brings offenders to justice, it secures justice for victims, it closes cases and it prevents future crime" (N.C. Crime Laboratory Annual Report, p. 10). When kits sit in a vault untested and courts are constantly continuing felony cases, justice to North Carolina citizens is not being served.

Research in this study revealed that prosecutors are responsible for creating the superior court dockets and which cases are placed on them. Prosecutors, themselves, can delay trials if they so choose. There is no statutory right to award defendants a speedy

trial (Dillon, 2018). Not one single state in the United States has a specific law addressing the speedy criminal trial process so there is no time frame specified (Dillon, 2018). *Barker v. Wingo* is a 1972 Supreme Court case that is used when addressing questions about speedy trials in North Carolina. According to this Supreme Court case, there are four factors to be considered when deciding whether a criminal defendant's case should be dismissed for failure to provide a speedy trial. These factors are(a) the length of the delay, (b) the reason for the delay, (c) the defendant's assertion of his right, and (d) the prejudice to the defendant (Cecil, 2018). In 2017-2018, according to the Annual Report of the North Carolina Judicial Branch the Superior Courts, North Carolina accepted 77,754 pleas on cases and only conducted 2,260 trials. In addition, 1,789 cases were dismissed with leave (N.C. Department of Justice, 2018). Other criminal nontraffic cases totaled 65,471 (N.C. Department of Justice, 2018). The courts are seeing more and more plea negotiations and bargains due to DNA processing not being returned and rape kits not being tested in felony cases (Cecil, 2018). With the state only having 2,260 superior court trials, many defendants are still sitting in prison waiting for their trial date to come up or their case could be dismissed, and guilty offenders could be free and on the streets. Law enforcement officials frequently rely upon the results of DNA tests as the basis for probable cause of arrest and indictments (Personal Communication, 2016). Continued delays in the court system of North Carolina only contribute more to the growing budgetary problems for the laboratory. Defendants who cannot make bail wait in jail for an undetermined amount of days until a court date is set. Some defendants who made bail are later found guilty at trial but enjoyed freedom for years until their trial date.

Some defendants, according to several prosecutors in the state, end up taking a plea agreement because they are tired of waiting for evidence to be returned or for a court date to be set (Personal Communication, 2018).

Research Question 3

Research Question 3 centered on the factors contributing to the amount of time it takes for each phase of the analysis of DNA. At the laboratory, forensic analysts are responsible for examining evidence to see if body fluids are present. Those fluids could be blood, semen, or saliva. According to reports published by the attorney general many felony cases in North Carolina must go through a testing prior to the analysis of DNA (N.C. Department of Justice, 2018). This process involves a serologist examining the piece of evidence to determine if there are any body fluids that can be processed (N.C. Department of Justice, 2018). After this step, the forensic analyst has a process to follow to analyze any items that may have been found to contain even the smallest amount of DNA (N.C. Department of Justice, 2018). This process uses a technique called polymerase chain reaction and it allows the analyst to pinpoint certain areas of the DNA for testing and then make copies of those areas (N.C. Department of Justice, 2018). The equipment used in the process of DNA analysis is large and usually only one machine that does one specific task is in a room (N.C. Department of Justice, 2018). This means that the analyst must complete one phase of the process and then physically walk to the next piece of equipment to start the second stage of the analysis. If, at any point during the process, there is not enough to test or it comes back inconclusive the report will be generated and returned to the submitting agency (N.C. Department of Justice, 2018). The

forensic analysts who answered the questionnaire about the Raleigh laboratory all agreed that after work is completed in the actual laboratories completing the testing stage, then subsequent hours on the computer are stressful and time consuming. One analyst reported that they spent 2 weeks in the laboratory and then another 30 days just comparing results and looking at a computer screen every day for 8 hours. This extended work time on the computer contributes to the delay.

Most of the equipment at the Raleigh, North Carolina laboratory is outdated or secondhand purchases (Personal Communication, 2018). The analysts reported that it is very frustrating, but they understand that the laboratory is not the state's major priority as far as the budget is concerned. Analysts reported that the lack of communication with district attorneys and the court system is one of the largest problems but keeping up and implementing technology changes in conjunction with keeping caseloads down is by far the most significant problem.

The highest volume of cases that are sent to the Raleigh crime laboratory are sent for toxicology and drug chemistry reports. In 2016, the crime laboratory received 16,500 blood draws resulting from DWI cases (N.C. Crime Laboratory Annual Report, 2018). Drug and toxicology reports are those that experience lengthy delays and the outcome of the case relies solely on the report being returned to the prosecutor (citation). A report generated from the 2016 Conference of District Attorneys reported the following information as usual outcomes:

- Cases tried without lab results – defendant subsequently found guilty.

- Cases tried with lab results-defendant subsequently found not guilty.
- Cases dismissed but will refile when State Crime Lab finishes analysis.
- Cases plead to a lesser sentence- defendants are sentenced.
- Cases dismissed and then laboratory results are obtained.
- Cases dismissed but from an earlier time period.
- Cases dismissed but not full disclosure of the circumstances or time period.
- Cases reported dismissed but state crimelLab never received case requests.

In the questionnaire that was distributed to the forensic analysts at the Raleigh crime laboratory, every analyst said that by the time they receive evidence to process, the log-in date from when it was actually received could be weeks or months prior. This problem is due to lack of enough personnel to log in all evidence that is personally delivered to the lab. Therefore, it remains in the vault until it can be assigned to an analyst. Currently, the Raleigh crime laboratory has 30 analyst position vacancies.

Another concern from the questionnaire answered by the forensic analysts in Raleigh was the policy and procedure for evidence submissions. Below are excerpts from the Policy and Procedure Manuel for Evidence Submissions at the North Carolina State Crime Laboratory:

Policy 3.1. The State Crime Laboratory accepts evidence based on the following criteria:

3.1.1. The evidence has been obtained as the result of an official criminal investigation (e.g. found property, suicide and murder/suicide are not criminal investigations).

3.1.2. The submitting agency is a law enforcement agency or company/campus police agency certified or commissioned through the North Carolina Criminal Justice Education and Training Standards Commission, The North Carolina Sheriffs' Education and Training Standards Commission or the North Carolina Company and Campus Police Program.

3.1.3. The investigating officer intends to pursue a criminal case pending the results of evidence analysis and/or the related investigation.

3.1.4. The evidence has not been previously examined by another analyst, the submitting agency, or another independent testing laboratory, unless prior approval has been requested and received from the Crime Laboratory Director. (e.g., items of evidence which have been tested for the presence of semen will not be accepted for examination by the Forensic Biology Section) (Note: A phenolphthalein test shall not be considered a prior examination for the purposes of submitting evidence.)

3.1.5. The customer acknowledges and approves Laboratory personnel use of the most appropriate and up to date methods authorized by the Laboratory.

3.2. Initial and subsequent submissions shall be limited in the quantities set out herein so as to prioritize items of evidence and facilitate timely analysis. Subsequent submissions for the same type of examination will not be accepted until the prior report(s) are completed. Laboratory representatives in each forensic discipline will be available to discuss potential submissions with local law enforcement officials.

3.3. The type and number of items accepted per submission is based on case type. An item is defined as one article of evidence or a maximum of two swabbings/cuttings that have been collected from the same area where the intent is to combine these swabbings/cuttings. In those instances where multiple swabbings have been taken from an item of evidence, each swabbing shall be treated as an item of evidence (ex.: 15 swabbings from a firearm would be treated as 15 items of evidence).

3.4. For all case types, known standards from victim(s) or subject(s) will not be counted against the number of items that may be submitted.

3.5. Evidence will be limited per submission to the following:

3.5.1. Homicides

- 10 items for the first submission
- 5 items for subsequent submissions

3.5.2. Sexual Assault Cases

- For the first submission, the sexual assault kit, one pair of underwear (If not contained in kit), and a condom if applicable

- For subsequent submissions, up to 3 items of clothing and/or bed linens

3.5.3. Crimes against the Person

- 5 items for the first submission
- 5 items for subsequent submissions

3.5.4. Other Crimes

- 5 items for the first submission
- 5 items for subsequent submissions

3.6. The item number limitation shall be per type of examination requested (e.g., 10 items for the first DNA analysis submission, 10 items for the first latent evidence submission does not exceed the 10 item limitation in a homicide case).

The forensic analysts complained that many other agencies that are not law enforcement often try to submit evidence to the laboratory for testing (Personal Communication, 2018). In addition, evidence submitted for testing must be used in a criminal proceeding. The main problem expressed by the analysts was the number of submissions per discipline. For instance, the limit of only 10 items for the first DNA analysis submission can create a problem when a crime scene produces a large quantity of evidence to be tested. A crime scene can have hundreds of pieces of evidence to be analyzed, and only 10 can be submitted at the time. Examples of evidence that could be left at a crime scene might include "bottles, cans, straws, cigarette butts, hats, ski masks, gloves, etc". In a homicide case, tests are only performed if "the victim is female, the

alleged offender or offenders is male and all DNA standards from the alleged perpetrator and any male elimination standards are available". This process contributes greatly to the delay of DNA processing.

Rapid DNA technology is a new method of technology that was signed into law in 2017 with the Rapid DNA Act. This technology is said to be able to quickly identify offenders, saving time and taxpayer money (Augenstein, 2017). Rapid DNA is a hands free, totally automated way of processing DNA. A sample "swab in-profile out" process means that technology can extract, amplify, separate and detect DNA without any analyst involved in the process (Augenstein, 2017). These are all steps that forensic analysts must currently go through in the processing of DNA. Paul Cates, a spokesman for the Innocence Project, expressed his concerns stating that "As with any forensic science technique, its application should be limited to those conditions for which it has been validated and the technology must first meet all the scientific rigor expected of a new innovation" (Augenstein, 2017). DNA is only required by law in North Carolina to be collected from individuals convicted of a felony or misdemeanor sex crime. The sample that is collected is a simple cheek swab unless there is a court order in place that mandates the collection of a blood sample. Rapid DNA technology as of August 24, 2017 has yet to be approved to be used by the Director of the Federal Bureau of Investigation for performing Rapid DNA Analysis.

Currently, the North Carolina State Crime Laboratory has no plans of implementing Rapid DNA Analysis. According to John Byrd, Director at the Raleigh laboratory, the FBI does not have plans to even allow crime scene sample DNA profiles

received from Rapid DNA technology to be submitted into the CODIS data bank. Unless there is an amendment to the North Carolina General Statute the new technology will not be used in North Carolina crime laboratories. There are technicalities that must be in place which would be costly to law enforcement agencies and new policies and procedures would have to be adopted. Rapid DNA equipment would first have to be purchased for the law enforcement agencies and then proper training of personnel would have to be conducted. Before any of this can take place there must be a National DNA Index System (NDIS) that has been approved by the FBI, the Department of Justice and other law governing bodies in the United States.

Research Question 4

The final research question asks what potential impact would continuing delays in DNA processing have on the future of North Carolina's criminal justice system. The researcher concluded that DNA processing is a scientific process that relies heavily in each state on a collaboration between the courts, law enforcement, and the state crime laboratory. With analysts continuing to travel across the state to provide expert testimony and no remedy in sight, this will continue to be a problem and a contributing factor for backlogs. Some video teleconferencing has been tested, but it has not been approved to date. The major impact was shown in the costly exonerations that took place in the state of North Carolina over the years. Science does keep changing, and those involved in the DNA processing aspect of the criminal justice system need to keep up with evolving and new technological advances. When it takes months and even years to conclude a felony case, there is a chance innocent people remain incarcerated while

guilty individuals make bail and go free. The researcher also found that plea bargains and dismissals happen in the criminal justice system when the defense and prosecution tire of multiple continuances. In the survey completed by law enforcement in North Carolina, over 75% strongly agreed that communication is an issue between the laboratory, court, and their office. One of the complaints expressed by the forensic analysts was the lack of communication between the laboratory and the courts. There is also the chance of errors and misinterpretations of evidence. Clear, concise terminology does not exist to aid in the scientific process of DNA because "consistent to", "similar to", and "cannot be differentiated" can be interpreted many ways. Those terms are used by the forensic analysts in the process of analyzing DNA, conveying results to the courts and juries, and yet they are not accurately explained or defined. Such terms can be ambiguous and have several interpretations and can be communicated incorrectly when results are delivered (LaPorte, 2018). Analysts must pass along results that are impartial and free of bias based on accurate and dependable processing techniques and equipment. In the convictions that were later found to be incorrect, problems existed within the interpretation and individual statistical analysis by the forensic analyst. As evidence was gathered, the un-tested rape kits in North Carolina will continue to impact the delay. Additionally, old or so called "cold cases" are being reopened with the hope that DNA testing may solve cases since many were concluded before processing DNA was mandated. If and when legislation is passed that all rape kits must be tested, the backlogs could once again be at a costly level. In the 2017-2018 annual report from the North

Carolina State Crime Laboratory, there are a couple of main factors that influence their success going forward.

First, future legislation could mandate the testing of all rape kits (LaPorte, 2018). This would require hiring at least six more DNA forensic analysts. Second, the laboratory is experiencing more backlog due to the opioid crisis and at least four more scientists are needed to help with this problem. Last, latent evidence submissions have increased due to many law enforcement agencies across the state closing their latent evidence labs. Those submissions are now sent to the State Crime laboratory creating more work with not enough analysts in any discipline. Director Byrd disclosed in the 2017-2018 annual report that case submissions had increased 28.57% in the last three years. Funding and the possibility of acquiring the needed analysts is something that the state budget will need to address but past experiences show that ample funds will not be allocated.

Limitations of the Study

This research study intended to examine why the state of North Carolina appears to process DNA slower than other neighboring states. Law enforcement, attorneys, prosecutors, judges, and most importantly forensic analysts, were all questioned by surveys and questionnaires as to their beliefs and experience with processing times of DNA and the criminal justice system. A report has not been generated since 2009 that actually revealed turn-around times for DNA processing which was a definite gap in the literature. For this study, there was 100% participation from the forensic analysts at the crime laboratory in Raleigh. 300 questionnaires were sent to law enforcement and 149

participated. With the study of forensic science and DNA processing there are limitations within the scope of the entire process. Speed and accuracy can be related to technology and budget restrains prohibit some laboratories from having the most up to date methods of processing.

Recommendations

The recommendations for this study are based on the factors creating delays in DNA processing as well as the responses from the forensic analysts who are currently employed at the Raleigh state crime laboratory. A State Crime Laboratory working group led by Jessica Smith with the University of North Carolina School of Government prepared a report in 2014 with recommendations after a meeting with Raleigh Laboratory Director, John Byrd. Members of the working group included: Assistant District Attorney, Forensic Resource Counsel with NC Indigent Defense Services, Chief District Court Judge, Professor at UNC School of Government, Assistant Attorney General and State Crime Lab Legal Counsel, Senior Resident Superior Court Judge, and a Resource Victim Witness Legal Assistant with the NC Conference of DA's. A simplified version of the 17 recommendations were as follows:

Allow for testing priority in habitual and personal injury impaired driving (DWI) cases.
The DA's offices should use the Lab's Forensic Advantage (FA) System for all subpoenas for Laboratory analysts, notices releasing Laboratory analysts from subpoenas, rush testing requests, and stop work orders.

All DA office personnel assigned to use the FA System should receive timely computer training.
Each DA should assign one person in each county to serve as the primary communication liaison between the DA's office and the Laboratory regarding scheduling of Laboratory analysts as witnesses and should provide the name of the liaison to the Laboratory's Court Coordinator.
For all district court cases involving expert testimony, the district court judge should give a trial a priority setting at a time certain when the experts have been called to appear.
When the district court judge will be present and holding criminal court for all or most of the week, the judge should consider recessing the case until later in the week if doing so will make efficient use of the expert's time.
For DWI blood cases in district court in which the defense has filed a motion to suppress the blood sample and the blood has not yet been tested, the DA should schedule the suppression motion for a motions hearing date before trial. The motion should be heard then, absent a defense objection on grounds that the test results have not been received.
As soon as possible but no later than at the Monday calendar call, the DA should notify the trial judge and defense counsel of any case on the trial calendar where a scheduling conflict may exist regarding expert testimony. The trial judge should address scheduling of trials involving experts at Monday calendar call.

When a case has been given a final continuance because the Laboratory has not completed testing, the DA's FA rush testing request should indicate the reason for the request.
Unless the Laboratory analyst has been told to report to a specific courtroom at a specific time, analysts arriving for court should report to the DA's assigned communication liaison (See recommendation 4 above). The liaison should immediately notify the prosecuting attorney of the analyst's arrival. The prosecuting attorney should so notify the judge as soon as practicable and the judge should, as appropriate, take expert testimony out of order.
The Laboratory should simply the process for submitting FA System stop work requests by deleting the requirement that the DA office attach the court's dismissal order to the request.
When testing has been requested in a case that has been resolved (by plea, etc.), the prosecutor shall, as soon as practicable but within five working days following the expiration of the appeal period, have a stop work order submitted in the FA System. The trial judge should remind the prosecutor to submit the stop work order.
When a case for which a Laboratory analyst has been subpoenaed or ordered to court is resolved prior to trial or is continued, the prosecutor should, at that time or as soon as practicable but within five working days following the expiration of the appeal period, have the analyst released from subpoena through the FA System. If the timing is such that the DA's liaison to the

Laboratory has requested the analyst's presence at a specific date and time, the DA's office also should inform the Laboratory's Court Coordinator by phone or email of the release of the subpoena. The trial judge should remind the prosecutor to release the analyst from subpoena.
Every motion for a proposed testing order that involves the State Crime Laboratory shall be served on the Laboratory by mail and accompanied by the following certification by the requesting party: The undersigned attorney certifies that this proposed order has been served on the State Crime Laboratory's legal counsel and (check one) _____ The State Crime Laboratory has no objection to the proposed order. _____ The State Crime Laboratory has concerns about the proposed order as indicated in the attached document from the Crime Laboratory. _____ Signed and certified as true
Every motion for a preservation of evidence order shall be served on the Laboratory and accompanied by the certification above in Recommendation 14. Additionally, all proposed preservation of evidence orders should include language that allows for required testing or, if the evidence will be consumed by testing, a date within 30 days by which the prosecutor, defense, and laboratory legal counsel shall submit proposals for how testing will be conducted.
When the Laboratory emails DA's with its Pending Testing Docket/Resolved Cases report, it should inform the DA that unless told otherwise, cases listed in

the report will be removed from the Laboratory's testing docket within 30 days from the DA's receipt of the report.
The Laboratory should develop a report that identifies non-CR testing requests over 1 year old.

While Director Byrd approved and helped with the formation of these recommendations, not one has been actually implemented into practice. Director Byrd explained to the group that there still remains practices by some judges and prosecutors that contribute to the backlog of cases. DNA processing is costly and as stated in Chapter 4, resources are wasted when the Laboratory is not notified when a case is closed tests are run unnecessarily.

This table illustrates the National Percentile for Cost per case by Investigate Area:

Investigate Area	25th Percentile	Median	75th Percentile	NC State Crime Laboratory
DNA Casework	$1,306	$1,885	$3,295	$1,566
DNA Database	$42	$103	$178	$100

There are two types of forensic tests that are completed at the Laboratory. One is presumptive and the other is confirmatory. A presumptive test is able to ascertain whether a bodily tissue, substance or even body fluids are present. A confirmatory test is used to determine without any doubt that a substance or some form of biological matter

exist (Grine & Rackley, 2018). There are advantages and disadvantages of each. See Table below.

Advantages/Disadvantages of Presumptive	Advantages/Disadvantages of Confirmatory
Narrows possibilities and allows analyst to determine which testing should come next	Can come to a conclusion and identify an existing substance
Larger areas can be used in testing	Less chance of false positive than presumptive
Able to locate evidence that otherwise would not be detected by the naked eye	Cost much more than presumptive
Very sensitive	Will mandate more equipment
There is a chance of false positives	Takes longer to complete

In order for the courts and the criminal justice system to fully understand reports that are used, more training and definitive terminology needs to be established. While a confirmatory test will identify a certain material present, a presumptive can only say that there is a possibility a substance exists. The testing of DNA is costly and the laboratory reports do not usually include the type of testing that was completed. When analysts testify in court the prosecutor, defense attorney, jury members, and judge may not understand and the testimony may be misleading. All testimony that is misleading should be objected to or eliminated at the trial proceeding. In addition, defendants should raise

questions to see what type of tests were done at the laboratory and if testing protocol was followed. There are testing standards established for quality assurance by the FBI.

False convictions have been seen that prove detrimental to a state's budget and North Carolina has been impacted by many costly exonerations as detailed in earlier chapters. Most of the errors occur with "mistaken witness identification, perjury or false accusations, false confessions, official misconduct, inadequate defense counsel, and false or misleading forensic evidence" (Bell, et als., 2018). The state crime laboratory needs to adopt the recommendations that were suggested by the Working Group and alleviate or minimize errors. The recommendations can lead to improved quality and consistency at the laboratory. It is crucial for laboratories to keep up with new technologies and methodologies in the forensic science field. From the questionnaire completed by all the analysts at the Raleigh Crime Laboratory, evidence is provided that shows the analysts want and need to see better communication which was addressed in the Working Group's recommendations.

The analysts offered many alternatives in the questionnaire that was completed. Some of those were faster case assignments once the laboratory receives evidence and it has been logged in, making submissions automatic, make the testing agencies more independent of law enforcement, more training for law enforcement, common terminology between the laboratory and the criminal justice system, more funding for analysts, and allowing the use of private laboratories. Prosecutors reported that they are sometimes forced to dismiss charges in drug cases only to later directly indict the

defendant once the laboratory report is back. This forces a waste of time and resources and the defendant is arrested again.

Director John Byrd in the Annual Report of the North Carolina State Crime Laboratory expressed that another laboratory in the Western part of the state has been added and is currently being trained to process DNA, however it will take up to two years to have analysts trained. He also insisted that the laboratories are at a point that future progress cannot be made without additional funds. Director Byrd has requested the hiring of twelve forensic scientists to help keep pace with the ever increasing case submission at the laboratory. There are still no funds available to make this request a reality.

Implications for Social Change

The implications for positive social change are evident for the State of North Carolina and its taxpayers. The significance of this study goes beyond the crime laboratories themselves as any errors or discrepancies that exist in the forensic science world impact other aspects of the criminal justice system. New updated and faster methods of processing DNA would keep guilty individuals off the streets and allow those innocent parties freedom. The state would not have to raise taxes or reallocate funds to be able to house inmates at the cost of nearly $30,000 annually, and the state would not have to spend time and money processing cases that will never go to court or those that have been dismissed by plea without notifying the laboratory. There is always the potential for another scandal to develop as in the past with the crime laboratory. Scandals regarding the processing of DNA or the procedures in the laboratories never represent

positive results, particularly for those involved in the justice system. Law enforcement, citizens, and the courts must adopt a common terminology to ease the misleading and misconstrued testimonies in court proceedings. If legislation is passed that requires all rape kits to be tested, victims could see their perpetrator arrested and punished at a faster rate. Again, this would keep citizens safer, but funding must be established to get the 15,000 plus rape kits that are currently waiting to be tested. Outsourcing and using private laboratories can help with this.

Conclusion

Throughout this study, numerous variables were identified that contribute to the delay in processing DNA in the state of North Carolina. There is a definite gap in literature with regards to DNA processing, and there is no definitive timeline for processing because the states included in this study all had different technologies and methodologies. While the common variable was funding, other issues were identified by the analysts as well. Better communication between the courts and the analysts is a simple solution for some of the problems but will require effort by all parties for it to prove helpful. Lab Director Byrd and other crime laboratory administrators face challenges daily. Byrd reported that the CODIS system in place at Raleigh is another problem as it is not being used to its full potential. Due to the work load, analysts are not able to upload possible matches daily. Many times, weeks go by before an analyst has time to work with the CODIS system and this could be a full time position if funds were allocated. Accreditation of a laboratory means that clear policies for all technical aspects as well as administrative duties are well defined. The North Carolina State Crime

Laboratory is accredited and has been for thirty years but accreditation does not require laboratory directors to look at internal problems specifically (ISO/IEC 17025:5.2.1, 2005). DNA processing is crucial in the criminal justice courts when felony charges are present even with budget restraints and limitations exist. Defendants deserve the right to have due process and the right to a speedy trial. This requires efficient processing of DNA evidence that could potentially prove innocence or guilt. Citizens, law enforcement, attorneys, judges and state crime laboratories need to collaborate and come together to advocate for more research, more training, and more financial support to help the forensic science community. Policies to eliminate waste of time and money need to be implemented to improve efficiency at the laboratories. Hours analysts spend traveling and waiting to testify need to be eliminated as well. Video or satellite testimony could help with this factor. In 2015, the National Research Council reported that funding for the improvement of forensic science across the United States has shown little improvement. The North Carolina criminal justice system is clearly influenced by many bias and prejudices when it comes to court proceedings and defendants dismissals, continuances, and exonerations. Effective legislation and definitive operating protocol for the courts as well as forensic analysts and laboratories directors would encourage a positive social change for all citizens in the state.

References

Abernathy, M. (2015). The constitution guarantees the right to a speedy trial, but-in a judicial system fraught with delays—what does that mean? *N.C. Law Review,*.

Allen, D. (2004). The constitutional floor doctrine and the right to a speedy trial, *Campbell Law Review, 26*(2), .

Andrews v. State, 533 So., 2d 841.

Asbell, V. (December 1, 2016) (February 20, 2019) Personal interviews

Augenstein, S. (2017, August). Rapid DNA act signed into law, setting target of 90 minute CODIS profiles. *Forensic Magazine,* https://www.forensicmag.com/article/2017/08/rapid-dna-act-signed-law-setting-target-90-minute-codis-profiles.

Balkin, R.S. (n.d.). *Research methods and statistics*. Retrieved from http://www.balkinresearchmethods.com/Balkin_Research_Methods/Research_Methods_and_Statistics.html

Balko, R. (2010, August) North Carolina's corrupted crime lab, *Reason,* https://reason.com/2010/08/23/north-carolinas-corrupted-crim/.

Barker v. Wingo, 407 U.S. 514 (1972)

Bell, S., Sah, S, Albright, T. D., Gates Jr., J., Denton, M. B., & Casadevall, A. (2018). A call for more science in forensic science, *SPNAS*, *115*(18), 4541-4544. doi:10.1073/pnas.1712161115

Blackmore, V. & Laird, J. (2009, March). Forensic DNA analysis: strengths, and limitations. https://sinkingabovetheline.wordpress.com/2016/03/16/dna-evidence-strengths-weaknesses-history/

Blacks Law Dictionary, 435 (9th ed. 2009)

Bryant, C. (2017, April 11). Guilty. *Roanoke-Chowan News Herald*, pp. https://www.roanoke-chowannewsherald.com/2017/04/11/guilty-3/

Byrd, J. (December 19, 2018) (March 13, 2019) Personal interviews

Calandro, L., Reeder, D. & Cormier, K. (2005). Evolution of DNA evidence for crime-solving- A judicial and legislative history. *Forensic Magazine*, *2*(3), pp. https://www.forensicmag.com/article/2005/01/evolution-dna-evidence-crime-solving-judicial-and-legislative-history

Cecil, S., (2018). North Carolina's speedy trial. *Raleigh Criminal Defense Journal*.

Chemtob, D. (2018, March 7). NC may have more untested rape kits now than any state. Advocates want answers, *The News & Observer*, https://www.newsobserver.com/news/local/crime/article203795399.html.

Cooley, C. M. (2011). Nurturing forensic science: How appropriate funding and government oversight can further strengthen the forensic science community. *Wesleyan Law Review*, *441*, 442.

Cox, J. (October 20, 2016). Personal Interview

Crawford v. Washington, 541 U.S. 36, 2004

Dantzker, M.L. & Hunter, R.D. (2012). Research Methods for Criminology and Criminal Justice, 3rd ed., Jones & Bartlett Learning, Sudbury, MA.

Daubert v. Merrell Dow Pharmaceuticals, Inc., 509 U.S. 579 (1993).

Denning, S. (2013). State crime lab backlogs and the right to speedy trial, *North Carolina Criminal Law*, 3/25/2013.

Dillon, A. (2018) Cooper and the Curious Case of the Crime Lab Backlog, LL1885, Politics, NC, March 8, 2018.

Donovan, B. & Ungvarsky,E. (2012) *Strengthening Forensic Science in the United States: A Path Forward-or Has it been a Path Misplaced?* 36 Chamption 22, 23, 24, 27.

Fisher, J. (2008). Forensics Under Fire: Are Bad Science and Dueling Experts Corrupting Criminal Justice, Rutgers University Press, New Jersey.

Ford, M. (2015) "Guilty, Then Proven Innocent," by Matt Ford, The Atlantic, Feb. 9, 2015.

Forensics Simplified (n.d.) Frye Standard. *A simplified guide to forensic evidence,* http://www.forensicsciencesimplified.org/legal/daubert.html.

Frye v. United States, 293 Fed. 1013 (1923)

Gabel, J. (2014). *Realizing Reliability in Forensic Science from the Ground Up?*, The Journal of Law & Criminology, Vol 104. No. 2.

Gianelli, P. (2012). The North Carolina Crime Lab Scandal, *Criminal Justice Report*, 27 (1), 43-45, 62.63.

Grine, A., & Rackley, S. (2018) Presumptive and Confirmatory Forensic Tests, Power Point presentation by the State Crime Laboratory Working Group.

Groves, I. (2016, November) State Crime Lab Improving, but police still need to fill gaps, *The Times-News*, https://www.thetimesnews.com/news/20161106/state-crime-lab-improving-but-police-still-need-to-fill-gaps

Haberman, C. (2014). DNA Analysis Exposes Flaws in an Inexact Forensic Science, Retro Report, May 18, 2014.

Hansen, M. (2014). Crimes in the lab: A string of shoddy, suspect and fraudulent results has put forensic labs under the microscope, *ABA Journal*, Sept. 2014.

Hayes, J. (2010). Forensic Testing Turnaround in 50 States, OLR Research Report, February 17, 2010.

Hopwood, S. (2014). The Not So Speedy Trial Act, *Washington Law Review*, 10/9/2014.

Houck, M. (2015). Professional Issues in Forensic Science, 1st ed., Academic Press.

Houck, M., et als. (2012) The Balanced Scorecard: Sustainable Performance Assessment for Forensic Laboratories, *Science and Justice*, Vol. 52, pgs. 209-216.

Houck, M., Henry, J. & Speaker, P. (2013). Improving the Effectiveness of Forensic Science: Using the Foresight Project as a Platform for Quality, Proceedings of the American Academy of Forensic Sciences, Vol XIX, p. 21.

https://www.newsobserver.com/news/local/crime/article202727479. html

http://www.theatlantic.com/politics/archive/2015/02/guilty-then-proven-innocent/385313/

Intrensic Forensics, Why does DNA testing take so long, Monday, June 29, 2009, http://intrensic.blogspot.com/2009/06/why-does-dna-testing-take-so-long.html.

Johnson, A., (2015, January) Turnaround for DNA testing at state crime lab improving, *The Columbus Dispatch*, https://www.dispatch.com/article/20130104/NEWS/301049696

Jost, J. (2015) Resistance to Change: A Social Psychological Perspective, *Social Research*, Vol. 82, No. 3, Fall 2015.

Kanter, R. (2012) Ten Reasons People Resist Change, Harvard Business Review, September 25, 2012.

Kurtz, H. (2014). Underfunded SBI is a Disgrace to Justice, *N.C. Law Review*, July 8, 2014.

Lander, E. (2017). *An Addendum to the PCAST Report on Forensic Science in Criminal Courts* (President's Council on Advisors on Science and Technology, Washington, DC).

Lean Ohio, (2011-2019) https://www.lean.ohio.gov/Portals/0/docs/info/LeanOhio_InfoKit.pdf.

LaPorte, G. (2018). Wrongful Convictions and DNA Exonerations: Understanding the Role of Forensic Science, NIJ Journal, Issue No. 279, April, 2018.

Leslie, L. (2015) State Crime Lab can't keep analysts, *NC Capitol*, December 12.

Little, R. Betterman argument analysis: What "prejudice" counts, and what is the remedy, for an inordinate delay in sentencing? SCOTUSblog (Mar. 29, 2016, 10:38 AM), https://www.scotusblog.com/2016/03/betterman-argument-analysis-what -prejudice-counts-and-what-is-the-remedy-for-an-inordinate-delay-in-sentencing/

Locke, Neff & Curliss, (2009). *The News & Observer*, August 19, 2010.

Loranger, G. (2009). North Carolina confronts Melendez-Diaz ruling, *North Carolina Lawyers Weekly*, 8/17/2009.

Majchrowicz, M. (2018) With SLED lab backed up, Charleston police hope to do own DNA testing.

McAdam, A. (2015) NC rape victims waiting 2 years for DNA test results, WECT, June 22, 2015.

Melendez-Diaz v. Massachusetts, 557 U.S. 305 (2009)

Mills, S. (2012 July 5). Weak DNA evidence could undermine justice, experts say. *Chicago*

Moody, V. (December 12, 2016) Personal Interview

National Research Council (1992) *DNA Technology in Forensic Science,* Washington, DC: The National Academies Press. https://doi.org/10.17226/1866.

North Carolina General Statute G.S. 7A-61.

North Carolina Law Enforcement Officers Association, https://ncleoa.org/

North Carolina Center on Actual Innocence: http://www.nccai.org/

North Carolina Innocence Inquiry Commission: http://innocencecomission-nc.gov/

Osnowitz, S. (2016) Demanding a Speedy Trial: Re-Evaluating the Assertion Factor in the *Baker v. Wingo* Test, Case Western Reserve Law Review, Vol 67, Issue 1.

Pickerel, C. (2015, September) Seeking Justice: The Story of an Ohio Crime Lab, *Forensic Magazine*, https://www.forensicmag.com/article/2015/09/seeking-justice-story-ohio-crime-lab

Pillai, K. (2011). A Balanced Private-Public Solution to North Carolina's Forensic Science Problem, *North Carolina Law Review* Association, Dec. 2011.

Pyrek, K.M. (2007). *Forensic Science under siege*. New York, NY: Elsevier.

Richardson, S. (November 10, 2016) Personal Interview

Roewer, L. (2013) DNA fingerprinting in forensics: Past, present, future. *Investig Genet* 4:22.

Samuel, J. (2010, Spring). *Getting Started with SPSS for Windows*. Retrieved March 1, 2019, from Indiana University UITS Research Technologies website: http://rt.uits.iu.edu/visualization/analystics/stats/spss-getting-started-windows.php.

Starr & McMillan, (2014), Human Biology, 11th ed., Cengage Publishing.

Summers, A. & Yeung, S. (2014) New technology may help labs clear backlogs, apply the tool more often to property crime investigations, and bring DNA analysis to the field, ProPublica, May 9.

Swecker, C. & Wolf, M. (2010) An Independent Review of the SBI Forensic Laboratory 4.

Swigert, V., & Farrell, R. (1980). Speedy Trial and the Legal Process. *Law and Human Behavior*, 4(3), 135-145. Retrieved from http://www.jstor.org/stable/1393638

The National Registry of Exonerations, http://www.law.umich.edu/special/exoneration/Pages/about.aspx.

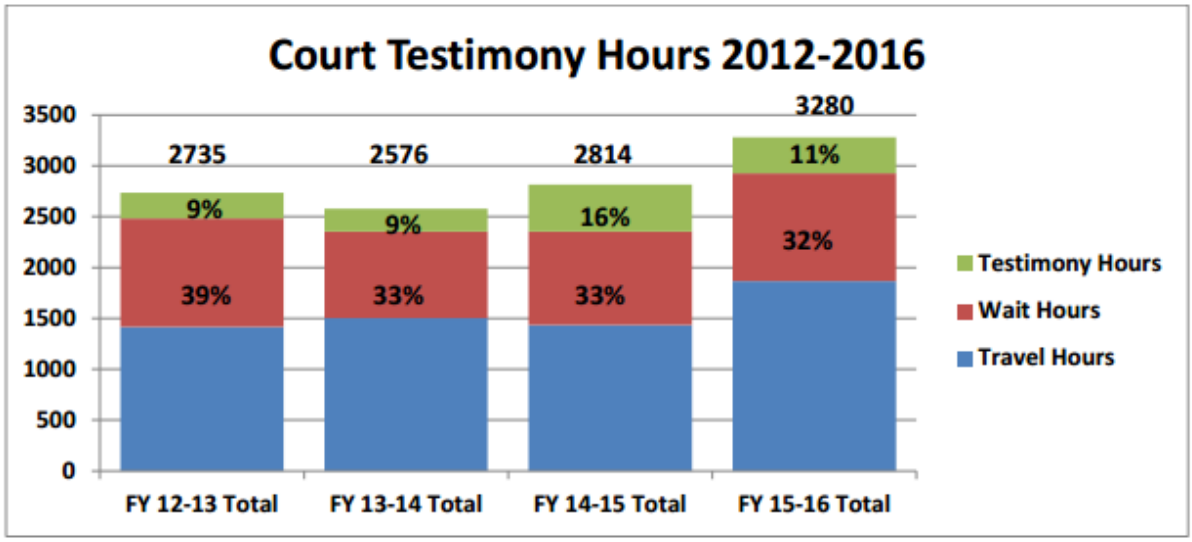
United States Constitution, Amendment 6, 541 U.S. 36, 2004

Walter, Ashlie, The Roanoke Times, October 22, 2017.

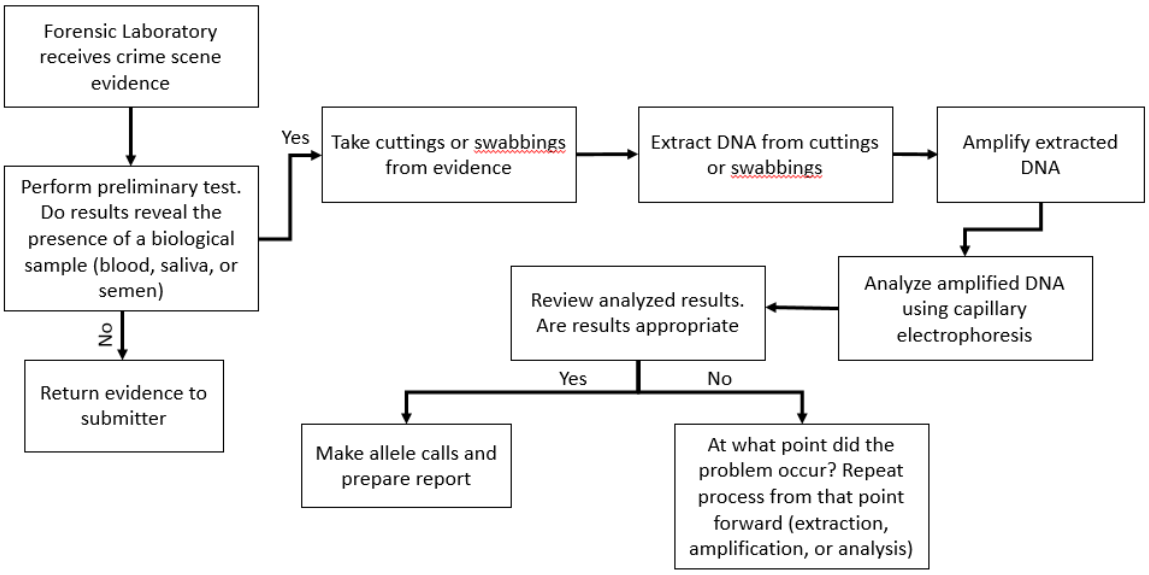
Welty, J (2015). Is North Carolina the Only State in Which the Prosecutor Controls the Calendar?, North Carolina Criminal Law, Nov. 17, 2015.

Winecker & Kemp (2012) Forensic Toxicology: American Academy of Forensic Science Reference Series- A Decade of Research and Case Study Proceedings, Columbus Springs, CO.

Appendix A: Court Testimony Hours



Appendix B: Flow Chart



Appendix C: Letter of Cooperation

North Carolina State Crime Laboratory
Department of Justice
121 E. Tryon Road
Raleigh, North Carolina 27603

JOSHUA H. STEIN
ATTORNEY GENERAL

JOHN A. BYRD
DIRECTOR

Pamela Woodard
Walden University

RE: IRB Approval # 10-10-18-0377603
Dear Ms. Woodard,

Based on my review and our communication regarding your research proposal entitled *"The Ramifications of Evidence Processing Delays on the Legal Rights of North Carolina Felons: A Comparative Study"* I grant permission for cooperation from the State Crime Laboratory, Raleigh, NC. I give approval for you to contact me and the forensic analysts to have them complete a short questionnaire.

I understand that the data collection will remain entirely confidential and may not be provided to anyone outside of the research team without permission from the Walden

Sincerely Yours,

John A Byrd

University IRB.
John A. Byrd
Director
cc: File

Appendix D: Forensic Analyst Questionnaire

1. Generally, how many DNA samples are analyzed in a single case?
    a. Less than 10
    b. 20+
    c. 30+
    d. More than 50
    e. Not certain
2. How often are you away from the laboratory traveling to provide testimony for a case where you were the analyst who performed the tests?
    a. 10 days per month
    b. 15 days per month
    c. Less than 10 days per month
    d. More than 15 days per month
    e. I am not sure
3. When you travel to provide testimony on average how far in terms of miles would you have to travel to give your expert testimony?
    a. 100 miles
    b. 200 miles
    c. Less than 100 miles
    d. Over 200 miles
    e. Not sure

4. When you travel to provide testimony on average how many days are you away from the laboratory?
    a. 5 days
    b. 10 days
    c. 15 days
    d. Other _____
5. On average, how long does it take to process one batch of DNA evidence per discipline?
    a. 24 hours or less once it is assigned to analyst
    b. One to six weeks
    c. One month to six months
    d. Other _____
6. On average, how long does it take to process an item (non swab item) for a bodily fluid?
    a. Less than one hour
    b. One to three hours
    c. More than 3 hours
    d.Not sure
7. On average, how many hours do you spend at a computer analyzing and preparing reports after the DNA has been processed by all the steps and machines used?
    a. 8 hours
    b. 16 hours

c. 24 hours

d. One Week

e. Two Weeks or more

f. Not sure

8. How long have you been employed with the North Carolina State Crime laboratory?

a. 0-Five years

b. Five- Ten years

c. Ten +

d.Choose not to answer

9. In your opinion, what is the most challenging aspect of your job? Any recommendations?

Appendix E: Legal Questionnaire

1. In which state's criminal justice system are you affiliated with?
    a. North Carolina
    b. Virginia
    c. Ohio
    d. South Carolina
2. How are you affiliated with the criminal justice system of your state?
    a. Criminal Defense Attorney
    b. Prosecutor or Assistant Prosecutor
    c. Judge (retired or current)
    d. Choose not to answer
3. How many years of experience do you have with the criminal justice system in your state?
    a. 1-5
    b. 6-10
    c. 11-15
    d. Over 15 years
    e. Choose not to answer
4. In your experience how long does it normally take for a rape/murder/sexual assault case to be concluded?
    a. 12 months or less
    b. 18 months

c. 24 months

d. Over 24 months

e. More than 24 months

f. Choose not to answer

5. In your experience, does law enforcement investigate and submit DNA to the laboratory for analysis in your state in a timely manner?

    a. Yes

    b. No

    c. Maybe but cannot guarantee

    d. Choose not to answer

6. In your experience, what is the longest amount of time you have had to wait for DNA results to be returned from the laboratory?

    a. 30 days or less

    b. 60 days

    c. 90 days

    d. 120 days

    e. 1 year

    f. 2 years

    g. More than 2 years

    h. Choose not to answer

7. In your experience, did this delay have an impact on your case?

    a. Yes

b. No

c. Cannot say

8. In your state, who is responsible for formulating the court docket for offenders to be tried?

    a. District Attorney's Office

    b. Superior or Circuit Court Staff

    c. Judge

    d. Defense Attorneys

    e. Other

9. In your experience, have you ever had to dismiss or advise a client to take a plea bargain because of DNA evidence not being returned for such a long period of time?

    a. Yes

    b. No

    c. Rarely

    d. Other _____

10. Have there been cases in your state where offenders served time in prison and years later DNA was processed again that established their innocence?

    a. Yes

    b. No

    c. Not sure

11. To the best of your knowledge, about how many exonerations have been entered in your state in the last five years due to problems with DNA evidence?
    a. 5-10
    b. 10-20
    c. 20+
    d. Have no idea
12. Do you believe that Melendez v. Diaz requiring analysts to testify in court contributes to court delays?
    a. Yes
    b. No
    c. Sometimes
13. Are you currently waiting to proceed with a case because you are waiting on the state crime laboratory?
    a. Yes
    b. No
    c. Not certain
14. How often do you employ a private agency to perform DNA analysis and charge the client for those services?
    a. Always use the state laboratory
    b. Seldom use private agencies
    c. Often use private agencies

d. Choose not to answer

15. Any comments on your state's crime laboratory, court delays or DNA processing?

Appendix E: Law Enforcement Questionnaire

1. Based on years of experience, would you consider yourself an expert in your area of law enforcement expertise?
    a. Yes
    b. No
    c. Somewhat
2. DNA has been an area of controversy for years in the state of North Carolina. As a law enforcement professional do you think DNA evidence should be prioritized in the laboratories according to level of seriousness?
    a. Yes
    b. No
    c. Maybe
    d. Other
3. The Melendez-Diaz decision in the U.S. Supreme Court in 2009 mandated forensic analysts to travel across the state to testify in court proceedings. Did this create more chaos and backlogs in the courts in your professional opinion?
    a. Yes
    b. No
    c. Sometimes
    d. Rarely

4. As a law enforcement professional do you think most agencies submit evidence as soon as possible to the crime laboratories?
    a. Yes
    b. No
    c. Departments try but sometimes it must wait until an officer can take the time and travel to the laboratory.
5. As a law enforcement professional do you think lines of communication are always open with the courts, attorneys, law enforcement, and crime laboratory analysts?
    a. Yes
    b. No
    c. Needs improvement
    d. Choose not to answer
6. As a law enforcement professional, in your experience have you seen DNA evidence take months and years to be returned to the agency that submitted it?
    a. Yes
    b. No
    c. Choose not to answer
7. Do you feel that communication between the laboratory and your department is a problem?
    a. Yes

b. No

c. Sometimes

d. Choose not to answer

8. Do you agree with analysts in that you spend many wasted days in the court room waiting to testify for a case?

a. Yes

b. No

c. Choose not to answer