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Police Opinions of Digital Evidence Response Handling in the State of Georgia: An Examination from the Viewpoint of Local Agencies' Patrol Officers

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by

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We hereby certify that this dissertation, submitted by Tanya MacNeil, conforms to acceptable standards and is fully adequate in scope and quality to fulfill the dissertation requirements for the degree of Doctor of Philosophy.

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An Abstract of a Dissertation Submitted to Nova Southeastern University
in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy

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This research examined opinions of local law enforcement agencies' patrol officers in the State of Georgia regarding preparedness and expectations for handling of digital evidence. The increased criminal use of technology requires that patrol officers be prepared to handle digital evidence in many different situations. The researcher's goal was to gain insight into how patrol officers view their preparedness to handle digital evidence as well as their opinions on management expectations regarding patrol officers' abilities to handle digital evidence. The research focused on identifying whether a gap existed between patrol officers' opinions of digital evidence and the patrol officers' views on what management expectations are for patrol officers handling digital evidence. Using a Web-based survey, the researcher collected data from 144 departments, 407 individual patrol officers in four strata across the State of Georgia. The analysis of the data found that most patrol officers handle digital evidence in at least some situations. The patrol officers' opinions stated that most understood management expectations for handling of digital evidence and felt those expectations were realistic based on the officers' current knowledge and training; therefore no significant gap was found. The patrol officers state that they need additional training in order to stay up to date with the current and future needs for handling existing and new technology.

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Chapter 1

Introduction

Background

Technology is constantly changing and as these changes affect everyday lives, law enforcement must adapt in order to investigate crimes involving technology appropriately. Therefore, law enforcement agencies must support training efforts for their officers who are first on scene as well as those who perform the in-depth investigations of the evidence. This research will help determine if a gap exists between the knowledge and skills for handling digital evidence and the perceptions of management expectations by patrol officers at local law enforcement agencies in the State of Georgia. Handling of digital evidence refers to the patrol officers' ability to identify, collect, preserve, document, and maintain integrity of digital evidence, which may be part of a criminal investigation.

Whether included in serious crimes, such as murder or assault, minor crimes such as texting while driving, or cybercrimes the increase of criminal activity that includes the use of networks, computers, smart phones, tablets, or other electronic devices has caused a need for law enforcement to handle digital evidence regularly. Law enforcement officers also use these devices in support of tracking criminal behavior. This study uses the term "digital evidence" when referring to the accumulation of data from any type of crime where computer, smart phones, or other electronic storage device evidence is

handled. The discrepancies between how local, state, national, and international law enforcement agencies measure crimes involving digital evidence can make an accurate assessment of these crimes difficult. Montoya, Junger, and Hartel (2013) studied differences in measuring information and communication technologies used in traditional crimes. The study found that information and communication technologies do not affect all crimes equally. Information and communication technologies were involved in crimes comprising threats and fraud more than in other crimes such as burglary. The Montoya et al. study is exploratory in nature and requires further research for validation, but it supports the concern that cyber components are involved in traditional crimes.

Cybercrime is a growing issue that results in billions of dollars in losses annually; however, the losses cannot be accurately determined, as there is no standard for reporting on the impact of such crimes. This means that victims reporting cybercrimes may include only direct losses, such as financial losses or lost work time, while other victims may calculate future losses caused by damage to an organization's reputation (Hyman, 2013). Many of the studies focus strictly on cybercrimes and do not include other types of crime that may involve digital evidence. The lack of focus on traditional crime that involves handling of digital evidence means that there is little data on the cost and extent of need for handling digital evidence in these crimes. In 2013, McAfee Inc. estimated the worldwide annual losses at approximately $1 trillion while Symantec Corp. estimated the losses at $110 billion (Hyman, 2013). By 2014, McAfee Inc. estimated the annual global losses to be more than $400 billion (McAfee, Inc. Center for Strategic and International Studies, 2014). Issues such as organizations failing to report, undetected losses, and no standard for accounting for losses result in wide variation in estimates of losses (Hyman,

2013). Likewise, the reasons for the losses vary widely depending on whether the losses were due to malicious or accidental data loss. These issues exacerbate the accuracy of estimates. Regardless, reported cases of Internet crimes have risen significantly in the past decade (National White Collar Crime Center [NW3C], n.d.a, 2002, 2004, 2005, 2010, 2011, 2012, 2013; NW3C & Federal Bureau of Investigation [FBI], n.d.a, n.d.b, n.d.c, n.d.d, 2003; NW3C, Bureau of Justice Assistance, & FBI, n.d.a). While there was a decrease in reported complaints in 2012 and 2013, financial losses have continued to increase (NW3C, 2013; NW3C, & FBI, n.d.c). In 2014, both the number of reported complaints and the size of financial losses increased (NW3C & FBI, n.d.d).

Despite the best efforts of various organizations to assist in reporting, crimes involving a cyber-component are still deemed to be underreported (Brenner, 2008; Davis, 2012). In 2000, the FBI and the NW3C established the Internet Fraud Complaint Center (IFCC) to allow individuals to submit online Internet complaints. The NW3C began publishing annual reports about the organization's activities in 2002 (NW3C, n.d.a, 2002, 2004, 2005, 2010, 2011, 2012, 2013; NW3C & FBI, n.d.a, n.d.b, n.d.c, n.d.d, 2003; NW3C et al., n.d.a). In 2003, the IFCC was renamed the Internet Crime Complaint Center (IC3). IC3 refers criminal complaints received to the appropriate law enforcement or regulatory agency. The number of complaints annually range from fewer than 50,000 to more than 300,000 (Table 1). In 2011, the organization began summarizing the adjusted dollar loss value rather than the number of complaints referred to law enforcement.

While large numbers of Internet crimes are reported and referred to law enforcement at the federal, state, and local levels, this total accounts for only a portion of

the criminal activity that involves cyber components, as the reports from IC3 account for only those Internet crimes reported by individuals. The IC3 reports do not include Internet crimes detected by organizations, which then handle the issue internally, Internet crimes reported directly to law enforcement, or Internet crimes detected through a law enforcement investigation.

Table 1

IC3 Annual Complaints

	Complaints		
Year	Filed	Referred to Law Enforcement	Loss From Referred Fraud Cases
2001	49,711	33,940	$17,800,800
2002	75,063	48,252	$54,000,000
2003	124,509	95,064	$125,600,000
2004	207,449	190,143	$68,140,000
2005	231,493	97,076	$183,120,000
2006	207,492	86,279	$198,440,000
2007	206,884	90,008	$239,090,000
2008	275,284	72,940	$264,600,000
2009	336,655	146,663	$559,700,000
2010	303,809	121,710	
2011	314,246		$485,253,871[a]
2012	289,874		$525,441,110[a]
2013	262,813		$781,841,611[a]
2014	269,422		$800,492,073[a]

Note. [a] adjusted dollar loss. Adapted from *IFCC 2001 Internet fraud report: January 1, 2001 - December 31, 2001,* NW3C. *IFCC 2002 Internet fraud report: January 1, 2002 - December 31, 2002,* NW3C & FBI. *IC3 2003 Internet fraud report: January 1, 2003 - December 31, 2003,* NW3C. *IC3 2004 Internet fraud - crime report: January 1, 2004 - December 31, 2004,* NW3C. *IC3 2005 Internet crime report: January 1, 2005 - December 31, 2005,* NW3C & the FBI. *Internet crime report: January 1, 2006 - December 31, 2006,* NW3C & FBI. *2007 Internet crime report,* NW3C et al. *2008 Internet crime report,* NW3C. *2009 Internet crime report,* NW3C. *2010 Internet crime report,* NW3C. *2011 Internet crime report,* NW3C. *2012 Internet crime report,* NW3C. *2013 Internet crime report,* NW3C & FBI. *2014 Internet crime report,* NW3C & FBI.

The increased use of electronic devices means that patrol officers responding to crimes are more likely to find it necessary to handle digital evidence or devices (Goodman, 1997; Hinduja, 2004, 2007; Holt & Bossler, 2012a, 2012b; U.S. Department of Justice (DOJ), 2001, 2008). The research of Holt and Bossler (2012a, 2012b) focuses

on computer crime and the law enforcement response to computer crime. While there has been some limited research on law enforcement and computer crime, research on patrol officer opinions most closely relates to the work of Holt and Bossler (2012a, 2012b); however, their studies are limited in scope to only two law enforcement agencies. The current research examined local law enforcement in the State of Georgia and handling of digital evidence.

Problem Statement

Not all law enforcement agencies have in-house cyber investigative units. Patrol officers are increasingly required to handle digital evidence as effective first responders at crime scenes (Bossler & Holt, 2012; Goodman, 1997; Hinduja, 2004, 2007; Holt & Bossler, 2012a, 2012b; U.S. DOJ, 2001, 2008). There is a gap between the patrol officers' perceived level of preparedness and the patrol officers' perceived expectations of their respective agencies regarding handling of digital evidence (Bossler & Holt, 2012; North Carolina Governor's Crime Commission / Criminal Justice Analysis Center, 2010).

Dissertation Goal

The goal of this research was to determine if the knowledge and skill gap Bossler and Holt (2012) identified exists within Georgia local law enforcement agencies based on factors patrol officers identify as concerns related to their preparedness for handling digital evidence at crime scenes and their perceptions of management expectations. The researcher anticipates that local law enforcement agencies can use the results of the study to clarify expectations and correct perceptions, if needed, or affirm the officers perceive

that they are prepared to handle digital evidence and meet management expectations. This research can also assist in determining whether earlier findings of needed support for patrol officers in handling digital evidence are still applicable.

This study provides the first statewide study of local law enforcement, examining the patrol officers' opinions on digital evidence. Other studies, such as the North Carolina Governor's Crime Commission / Criminal Justice Analysis Center (2010), have examined statewide preparedness in North Carolina for handling computer crime but did not examine opinions or focus on patrol officers. Holt and Bossler (2012a) examined perceptions of patrol officers in two southeastern metropolitan areas. Senjo (2004) examined patrol officer perceptions in a single metropolitan area in a western state. Hinduja (2004) used a sampling of state and local law enforcement agencies in the Lansing, Michigan area while focusing on perceptions of the role of computer crime investigative teams. An earlier national study by the U.S Department of Justice's National Institute of Justice performed a needs assessment of state and local law enforcement agencies (U.S. Department of Justice, Office of Justice Programs, NIJ, 2001). The study did not focus on patrol officers but rather agency needs, as assessed by a specific individual tasked with the responsibility for electronic crime within the organization. Consequently, the results do not represent the specific needs of individual patrol officers within an organization. These studies represent various components that, when pieced together, indicated the need for the current study as they have each identified specific gaps related to police officers' handling of digital evidence.

Research Questions

The researcher used the following questions to guide this research on opinions of Georgia local patrol officers on digital evidence.

R1: What are the opinions of Georgia patrol officers at local law enforcement agencies regarding their level of expertise for handling digital evidence?

R2: What are the opinions of Georgia patrol officers at local law enforcement agencies regarding the expectations of their management for the officers' handling of digital evidence?

R3: What is the basis of patrol officers' opinions regarding the expectations of management for the handling of digital evidence by patrol officers?

R4: What is the gap between the opinions of patrol officers regarding their level of expertise and the expectations of their management for handling digital evidence?

Relevance and Significance

Paucity of funds, infrequent training, lack of qualified individuals to handle digital evidence, equipment shortages, and rotations of officers are among the reasons identified for the lack of officer preparedness in dealing with Internet fraud and handling of digital evidence (Burns, Whitworth, & Thompson, 2004). While law enforcement agencies have detailed training programs designed for new recruits and various training resources available for officers on more traditional types of evidence collection, the agencies have only recently increased availability of training for handling of digital evidence by patrol officers. However, such training still does not match the standards of traditional officer training (Georgia Public Safety Training Center, 2015).

In 2002, Beauprez found that anecdotal discussions with professionals in law enforcement suggested that numerous cyber investigators who had 10 or more years of experience were generally those who had a hobby interest in computer hardware or programming. The patrol officers' hobby interest often led to an assignment as the department computer crime expert, even without appropriate training. The officers who chose to stay in the computer crime expert role generally received training later. Bossler and Holt's (2012) study of patrol officers' perceptions found that 65.5% of respondents agreed that it was important or very important to provide more computer training for line officers; 23.8% had the opinion that more training was somewhat important. This left only 10.8% of respondents who indicated the matter was not important or only one of minimal importance for which they needed additional training. This means the majority of officers in Bossler and Holt's study recognized a need for more training.

As the patrol officers are the first responders to crime scenes, supervisors expect patrol officers to handle digital evidence effectively (Goodman, 1997; Hinduja, 2004, 2007; Holt & Bossler, 2012a, 2012b; U.S. DOJ, 2001, 2008). Limited research exists on needs assessments and officer opinions on this issue. A North Carolina study revealed that training was a major concern for agencies across the state (North Carolina Governor's Crime Commission / Criminal Justice Analysis Center, 2010). An earlier study sponsored by the U.S. DOJ (2001), included respondents from law enforcement agencies across the country. The respondents ranked training and certification for investigating digital crime third in the top 10 critical issues for law enforcement; there is no evidence of an in-depth statewide study that includes Georgia in over a decade.

Holt and Bossler (2012a, 2012b) and Senjo (2004) are exceptions to studies of law enforcement agencies and computer crime, as they examined police officer perceptions on computer crime using agencies in metropolitan areas, whereas other studies examined cybercrime investigators within agencies or focused on management perceptions. The current study focuses on Georgia in order to examine changes occurring in southeastern states related to patrol officers' handling digital evidence, and to build upon the Holt and Bossler (2012a) research. The current research examined the broader applicability of results found in the Bossler and Holt (2012) study, which examined metropolitan police departments in Savannah, Georgia and Charlotte, North Carolina. The use of the Bossler and Holt research along with the in-depth studies by Davis (2012) and North Carolina Governor's Crime Commission / Criminal Justice Analysis Center (2010) in North Carolina provides recent research for comparison and relevance.

The choice to examine the State of Georgia was, in part, a convenience sample based on the researcher's ties to the law enforcement and digital investigation's community in the state. The U.S. Department of Justice administers a Census of State and Local Law Enforcement every four years, with the 2008 census results being the latest available (U.S. Department of Justice, Office of Justice Programs, Bureau of Justice Statistics [BJS], 2011). The census provides statistics for state and local law enforcement agencies in the United States. While Georgia has a larger population and law enforcement community than the U.S. average, it is within one standard deviation above the average and median state population, number of local law enforcement agencies, and number of sworn personnel in the state (U.S. Department of Justice, Office of Justice Programs, BJS, 2011; U.S. Census Bureau, 2014). Georgia is within one standard deviation below

the U.S. average and median for total full time law enforcement employees per 100,000 residents and sworn personnel per 100,000 residents (U.S. Department of Justice, Office of Justice Programs, BJS, 2011). The State of Georgia is therefore an appropriate sample for this study. One of the benefits of examining Georgia local law enforcement agencies is the state's broad range of community sizes. The Department of Justice (U.S. Department of Justice, Office of Justice Programs, BJS, 2011) notes that Georgia has large city police departments in Atlanta and DeKalb County, which rank as the 23rd and 46th respectively, in the top 50 largest U.S. local law enforcement agencies. Georgia also has many smaller agencies, such as the city of Plains Police Department with four sworn officers (Georgia, Plains, 2015). Many of the small agencies have fewer than five sworn officers. The range of agency sizes provides for broader applicability of this study's findings.

Researchers have discussed the concerns surrounding cybercrimes for many years. Many types of crimes include digital evidence that patrol officers may be required to handle. Early research by Groover (1996) suggested integration of computer training in basic training. More recently, Bossler and Holt (2012) examined patrol officers' perceptions on responding to computer crimes in Charlotte, North Carolina and Savannah, Georgia, and found 43.1% of patrol officers agreed or strongly agreed and 43.1% were neutral about the need for additional training; only 13.8% disagreed or strongly disagreed that training was important. The Bossler and Holt research also found that patrol officers ranked increased funding for training sixth and more computer training for line officers 13th when asking what police departments should do about computer crime. Patrol officers believed that Internet users needed to be more careful on

the Internet and that more severe penalties for cyber criminals were the top two strategies. Bossler and Holt found a connection between the level of interest in training for patrol officers and things that would change the officers' daily routine.

The *Census of State and Local Law Enforcement Agencies, 2008* found that more than 70% of state and local law enforcement agencies had fewer than 25 full time employees (U.S. Department of Justice, Office of Justice Programs, BJS, 2011); 76% of local law enforcement agencies had fewer than 25 full-time employees. Additionally, 49% of agencies in the study employed fewer than 10 full-time officers. These smaller agencies require employees to have a broader range of knowledge and skills. These agencies generally have lower operating budgets, and therefore are less likely to have officers with specialized skills such as digital evidence handling. Local law enforcement agencies may use the results of this present research to improve understanding of the gap between patrol officers' opinions of management expectations as well as their own assessment of their preparedness when handling incidents involving digital evidence. From the results, agencies may determine next steps for clarification of expectations, training needs, additional funding, and community education.

In the law enforcement field, the increasing use of technology has created challenges for patrol officers. Some changes are concrete, such as the increased use of electronic devices by individuals in the commission of crimes, while perceptions and opinions may shape other changes, as identified by this research. Limited research places agency management at a disadvantage in understanding the opinions of the patrol officers regarding digital evidence. While managers who work with patrol officers may have a broad understanding of officers' opinions, it is unlikely that more than a few managers

have an in-depth knowledge of officers' opinions, given the many types of crimes handled by local law enforcement agencies. This research may benefit patrol officers and their managers by providing an improved understanding of the gap between the patrol officers' opinions of their knowledge and skills for digital evidence handling and their opinions of management expectations for patrol officers' knowledge and skills for digital evidence handling. Agencies may also better understand the need for additional support for patrol officers to ensure appropriate confidence, knowledge, and skills when handling digital evidence.

Barriers and Issues

Several issues posed potential barriers to this research. The first barrier was the unwillingness or inability of the desired Subject Matter Experts (SMEs) to assist with the study. The researcher consulted with SMEs in law enforcement, cybercrime, and related areas. To protect against the number of SMEs being insufficient for the study, the researcher arranged for additional committee members so that if one or more individuals were unable to continue, the minimum number would still be available to complete the process.

The next potential issue was difficulty in distributing the electronic survey, specifically, gaining access to distribution lists for delivery of the surveys. Some of the SMEs assisted with distribution of the surveys, supporting access to the intended distribution lists. Additionally, the researcher developed a list of local law enforcement agency chiefs or senior officers, who the researcher contacted to support the distribution and to encourage completion of surveys at the agencies. The researcher also obtained

support for distribution of surveys from Dr. Gary Kessler through his access to additional professional associations that include law enforcement officers (LEOs) in Georgia.

One of the most formidable potential barriers was the unwillingness of patrol officers to complete the survey or to complete the survey at an unacceptably low rate. To address this issue, the researcher stressed the anonymity of responses so that patrol officers had confidence that the researcher would not release individual results, and that the researcher would only release the results in aggregate as part of the overall results, consequently making no individuals or specific departments identifiable. The researcher addressed the low response rate by using the previously mentioned list of chiefs or senior officers at the law enforcement agencies to discuss the survey, any concerns the patrol officers may have expressed, or other questions that arose. The researcher ensured that the emails noted professional affiliations with InfraGard, the High Technology Crime Investigation Association, and the American Society of Digital Forensics and E-Discovery in hopes that these affiliations would engender a level of confidence among the patrol officers with the researcher's professionalism. The researcher sent the survey and corresponding emails from the university email address to ensure the chiefs or senior officers were confident that the survey was for academic research. Sheehan (2001) found that affiliation had a positive effect on response rate. The most important aspect of addressing this concern was to ensure that the survey was concise and easy to understand. Despite best efforts, low response resulted in one stratum. The researcher planned to include interviews to supplement the survey results if there was potential to secure a sufficient number of additional interviews to fulfill the stratum response needs. Due to

the low level of responses within the one to five officers stratum, it was determined interviews would not result in sufficient responses.

Assumptions, Limitations, and Delimitations

Assumptions

When conducting a survey, the researcher must assume that respondents will answer truthfully (Bryant, 2004). In the current research, the researcher assured potential respondents of their anonymity and confidentiality through the Web-based survey tool, SurveyMonkey, and through release of the results as cumulative and not at a local agency or individual level. Thus, there would be no publication or release of any potentially identifying data.

In choosing the sample population for this survey, the researcher assumed that the population would be representative of patrol officers at local law enforcement agencies across the State of Georgia. The researcher cross-referenced multiple listings of local law enforcement agencies to ensure that potential respondents to the survey included all local agencies within the state. Participant departments had an equal chance of selection within the department's size category.

Based on the researcher's request in the invitation, the researcher assumed that the respondents would be patrol officers and not be special examiners or experts whose primary job duties are digital evidence collection, examination, analysis, or reporting. The request for participation also made it clear that participants would not include management-level officers who do not regularly respond to incidents as part of patrol duties. The initial survey questions further clarified the subject of the survey as the patrol

officer. If a respondent self-identified that his or her role required less than 50% of his or her job duties spent on patrol duties then the respondent's data was not included in the results, as it was assumed that the officer was not serving primarily as a patrol officer. SurveyMonkey allows the use of skip logic to direct respondents to the end of the survey whose job duties did not meet the 50% threshold.

The researcher assumed that the respondents would be qualified and knowledgeable of their job responsibilities, enabling them to understand and accurately respond to the survey. Georgia defines police officers as a subset of peace officers. Police officers are part of the group of professionals who are involved with protecting the public, among other duties. The State of Georgia requires that all peace officers be at least 18 years of age, have a high school diploma or recognized equivalent, and successfully complete a job related academy entrance exam, among other requirements under the Official Code of Georgia, Title 35, Chapter 8 (LEOs and Agencies, 2013). In addition, the Code requires the peace officer applicant to be a U.S. citizen, be free of convictions for criminal activities that could have resulted in imprisonment, be fingerprinted, have good moral character, and be free of physical, emotional, or mental conditions that might affect his or her duties. Peace officers must meet these requirements in order to attain eligibility for basic training. The Code also requires patrol and all peace officers in Georgia to complete 20 hours of in-service training per year in order to maintain the "power to arrest" (LEOs and Agencies, 2013).

The researcher assumed the survey instrument is valid and reliable. The researcher enlisted SMEs, including those with graduate degrees as well as others who have significant experience in the fields of law enforcement and digital evidence

handling, to review the survey instrument. Additionally, the dissertation committee and Institutional Review Board (IRB) reviewed the survey to ensure appropriateness.

Limitations

This survey addressed a point in time, although multiple follow-ups were required to obtain sufficient response levels. The researcher did not request additional officers complete the survey if at least one officer in the department responded. This exploratory study does not claim to identify causal relationships; it provides an exploration of the current patrol officers' opinions on handing of digital evidence.

In a survey, the respondents may limit generalizability of the study results. The results of the current research did not indicate a homogeneous response or a lack of correspondence with the overall patrol officer population within the state, which would have reduced the generalizability of the results. The researcher did not request that all patrol officers at each chosen police department complete the survey; it was unrealistic to expect such a comprehensive response. The goal was that one or more patrol officers in an agency complete the survey and that those respondents were representative of the agency.

There was a potential for lack of response to some or all questions. If the respondents chose to skip some of the questions, this would reduce the valid set of response data. The researcher intended to minimize such a result by making response to the survey easy and understandable. Another step was to ensure the respondents would not deem the survey length burdensome and would be encouraged to complete their responses.

Surveys request respondents to self-report. As such, survey results reflect respondents' memory and perception differences. This potential limitation of surveys posed less concern in this study as this research was seeking patrol officers' opinions or views. While respondents' memory and perception limitations still exist, the potential impact was less than it would be in other surveys using a different research methodology. While there were aspects of the survey for which memory and perception limitations were of more concern for the researcher, the overall focus of the survey reduced the potential impact of this limitation.

Delimitations

The research was limited to local law enforcement patrol officers in the State of Georgia to keep the study manageable and to provide for a more granular analysis. The researcher has contacts within the Georgia law enforcement community, ranging from agencies with fewer than five officers to agencies with more than 1,000 officers.

The population under study was limited to local police departments. It did not include university or transit police departments, marshal offices, sheriff departments, or state and federal law enforcement agencies. The population included in the study was limited to afford a sampling frame that would best represent similar basic level and type of training. The local agencies would also have a similar type of focus to law enforcement duties.

The ages of respondents may influence responses to the survey since individuals who are younger have had access to technology from a younger age and may be more comfortable with different types of technology. Older patrol officers may have had less

experience with technology and may be more resistant to adoption of technology within the workplace. Patrol officers' ages may also influence their comfort level for completing the online survey used in this study. This may have resulted in a higher percentage of younger patrol officers completing the survey than older patrol officers.

The researcher could have chosen other populations related to digital evidence, such as the officers responsible for examination of digital evidence; however, the researcher assumed that those officers would have sufficient training, as it is one of their primary responsibilities. Other research has focused on digital examiners or similar personnel such as Burns et al. (2004), Holt and Blevins (2011), James and Gladyshev (2013), and U.S. DOJ (2001). Patrol officers represented a gap in the literature relating to the handling of digital evidence. Study results may be generalizable to local police department patrol officers in the State of Georgia. Law enforcement agencies in other states or regions may find the results useful for comparative analysis or for a research framework. The survey was limited in length to encourage its completion. SMEs vetted the survey for comprehension and appropriateness.

Definition of Terms

The terms, *cybercrime, computer-related crime, digital technology crime, and e-crime* refer to the use of computer or networked systems used or targeted in the commission of a crime (Chawki, Darwish, Khan, & Tyagi, 2015). Examples of this type of criminal activity include fraud, espionage, terrorism, and computer intrusions. Cybercrime investigations will include examination of digital evidence.

Digital forensics evidence is stored on electronic devices or storage media, including but not limited to computers, portable storage devices, and mobile devices that may contain evidence related to criminal activities. Digital evidence includes such items as e-mails, digital photographs or videos, word processing documents, Internet browser histories, databases, computer backup, etc. that may be used in the investigation or prosecution of a criminal or civil investigation (U.S. DOJ, Office of Justice Programs, NIJ, 2010).

Digital examiners, also called *computer forensic examiners*, are individuals who perform examinations of digital evidence. Examinations include the extraction and analysis of data from computers, networks, or other digital devices (Lonardo, White, & Rea, 2008).

The *electronic devices* discussed in this research refer to any device that stores digital data, such as a smart phone, computer, tablet, digital camera, and other storage devices. Investigations may include the devices, as well as the data stored on them, as digital evidence (U.S. DOJ, Office of Justice Programs, NIJ, 2008).

Electronic discovery, commonly referred to as e-discovery, is the identification, collection, preservation, analysis, and production of digital evidence for use in civil or criminal legal cases (EDRM (edrm.net), 2014; Sedona Conference, 2014). The process identifies what is relevant to the litigation from the volume of electronically stored information.

Georgia Peace Officer Standards and Training Council (2013) is an organization that helps to ensure Georgia peace officers and criminal justice professionals have the appropriate qualifications and training for their roles. Title 35, Chapter 8 of the Official

Code of Georgia established the Georgia Peace Officer Standards and Training Council for the employment and training of peace officers (LEOs and Agencies, 2013).

Internet crime is any crime committed using the Internet. This can include auto fraud, extortion, real estate fraud, confidence fraud, and more (NW3C & FBI, n.d.d).

Law enforcement officer (LEO) is a term that includes not only police or patrol officers but also those individuals who hold managerial roles, such as a chief, those who have achieved other positions, such as detective, or other types of officers such as campus police (U.S. Department of Justice, Office of Justice Programs, BJS, 2013). *Local law enforcement agencies*, also referred to as *police departments*, are local departments that employ law enforcement officers (U.S. Department of Justice, Office of Justice Programs, BJS, 2013).

Peace officers includes those individuals who by law or employment have authority to enforce laws, preserve public order, protect life and property, and prevent, detect, or investigate crimes (Georgia Peace Officer Standards and Training Council, 2013). Police or local LEOs are one type of peace officer. The term "peace officer" also includes state officers, sheriffs, campus police, and may include probation and parole officers. Some states differ in their definition of peace officer as defined by Georgia's state code.

Police officers' duties include responsibilities such as the protection of lives and property, enforcing laws, patrolling communities, traffic duty, and responding to calls (U.S. Department of Labor, Bureau of Labor Statistics, 2014). Police officers are one type of peace officer. *Patrol officer* is a term used to describe a police officer whose

duties include patrolling communities. The current research defines patrol officers as police officers who spend at least 50% of their time on patrol duties.

List of Acronyms

Bureau of Justice Statistics (BJS)

Crime Scene Investigation (CSI)

Criminal Justice Information Services (CJIS)

Department of Justice (DOJ)

Electronic discovery (e-discovery)

Federal Bureau of Investigation (FBI)

Institutional Review Board (IRB)

Internet Crime Complaint Center (IC3)

Internet Fraud Complaint Center (IFCC)

Law Enforcement Officer (LEO)

National Institute of Justice (NIJ)

National White Collar Crime Center (NW3C)

Standard Operating Procedure (SOP)

Statistical Package for the Social Sciences (SPSS)

Subject Matter Experts (SMEs)

Summary

This research is the first known statewide examination of patrol officers' opinions of digital evidence response handling in the State of Georgia. Related studies have been

performed in other states; limited research on a specific police department in Georgia has also been published in recent years (Bossler & Holt, 2012; Hinduja, 2004; Holt & Bossler, 2012a, 2012b; North Carolina Governor's Crime Commission / Criminal Justice Analysis Center, 2010; Senjo, 2004). These earlier studies lack coverage of an entire state or lack the more comprehensive examination of the opinions of local agencies' patrol officers that are included in the current research.

Chapter 2

Review of the Literature

News media, crime dramas, and other media sources have created a public perception that forensic evidence, such as digital evidence, is vital, but this crime scene investigation (CSI) effect means that the public, attorneys, and others may have unrealistic expectations regarding such evidence (Makin, 2012; Shelton, 2008). Handling digital evidence is not a traditional part of the police officer role. Like other changes in the role, this can result in resistance to change (Skogan, 2008; Sparrow, Moore, & Kennedy, 1990). When police officers perceive job change as an improvement, it is more likely that they will accept the change and have fewer concerns about how the change will affect their job. Changes in law enforcement techniques not only create a need for additional training but also increase stress on the police officers who must learn additional procedures that may initially have limited use. As the need for these new procedures increases, police officers may need additional training and support, which may not always be available (Holt & Bossler, 2012b).

Yesilyurt (2011) found that many agencies have a part time or full time individual, or a group that handles forensic examination of digital evidence. While some research focuses on the police officers and civilians who perform forensic examinations of digital evidence as their primary job duty, there is limited research on the police officers who may handle and collect digital evidence as part of their patrol officer duties.

Most of the research of digital examinations has focused on individuals who perform forensic examinations of digital evidence that focus on child exploitation and pedophilia (Burns, Morley, Bradshaw, & Domene, 2008; Krause, 2009; Marcum, Higgins, Freiburger, & Ricketts, 2010; Perez, Jones, Englert, & Sachau, 2010). While child exploitation and pedophilia are a significant focus area of forensic examinations of digital evidence, other types of crime may involve the handling of digital devices. As the use of portable digital devices, such as smart phone and tablets, has increased, this has led to patrol officers encountering this type of evidence at many different types of crime scenes (Montoya et al., 2013). The handling of digital evidence, job related stress, acceptance of change, and perceptions of digital evidence used in the course of criminal activities are important research areas to recognize in order to understand the patrol officers' opinions of handling digital evidence.

Law Enforcement and Digital Evidence

The CSI effect has influenced patrol officers' response to crime scenes and evidence (Makin, 2012). Public awareness caused by increased media exposure of the use of electronic devices in criminal activity has led to changing public opinions of digital evidence (Furnell, 2002; Yar, 2006, 2012). Such media coverage, combined with the increased use of the Internet, mobile devices, and computers, means the public is more aware of technology, and has some understanding of how technology may be used in different types of criminal activities. The increase in publicly available information has resulted in changes on the part of law enforcement. This has led to a need to provide additional information to the public regarding the role of patrol officers in handling

digital evidence, as they are the first to handle evidence at a crime scene and often the first called upon if individuals or organizations detect a crime. Makin found police officers stated that they frequently collected evidence that is never processed or never intended for processing; Makin refers to this as simulated evidence collection. Police officers may perform this type of evidence collection to appease a victim who believes that evidence collection should be as it is on television (Makin, 2012). Criminals may use technology in support of simple or complex crimes; therefore, law enforcement must be prepared to handle digital evidence at many types of crime scenes (McQuade, 2006). Early research in the field indicates that police officers generally resisted handling cases involving digital evidence (Collier & Spaul, 1992; Goodman, 1997). More recent research found one-third of officers believed that computer crime investigation reduced the focus on traditional crime (Hinduja, 2004). Holt and Bossler (2012a) found 20.1% of patrol officers in Charlotte-Mecklenburg, North Carolina, and Savannah-Chatham, Georgia police departments believed that most computer crimes were minor annoyances. However, 79.2% believed computer crime to be a serious problem. Bossler and Holt (2012) found that 22.2% of patrol officers believed that law enforcement did not take computer crime seriously enough; however, 49.4% neither agreed nor disagreed with this statement. Holt and Bossler (2012b) found that 57.7% of the responding patrol officers were interested in receiving computer crime investigation training and 39.5% were interested in conducting computer crime investigations. The two agencies that were part of the Holt and Bossler (2012a, 2012b) and Bossler and Holt research represented 1,400 patrol officers in the Charlotte-Mecklenburg department and fewer than 400 in the

Savannah-Chatham department. These studies illustrate the challenges within law enforcement and digital evidence handling that require further examination.

Goodman (1997) recognized the issue of departments identifying the computer hobbyist or person most proficient with word processing as the "computer expert." Unfortunately, this situation still exists in some law enforcement agencies. For example, "experts" were those individuals recognized as having a higher than average level of technical skills in areas where the individuals did not have insufficient training. Such a mentality is often reflected when managers or executives underestimate the time, knowledge, skills, and costs needed for a technology project. Such underestimations easily lead to failed digital examinations in much the same way as inadequate skills are cited as a prominent reason why information technology projects fail (Cerpa & Verner, 2009; Levinson, 2009). Gaining a clearer understanding as to what patrol officers' true opinions are regarding digital evidence can help guide future steps for improving law enforcement agencies' digital forensic investigations. Hinduja (2007) addressed the importance of patrol officers responding to a crime scene specifically for documentation and protection of evidence. These skills require specialized training, such as how to collect and store evidence to help ensure admissibility. The results of poor documentation or a lack of protection of digital evidence can be key obstacles to prosecution of a case.

Yesilyurt (2011) studied large local police agencies' adoption of digital forensic practices. Large agencies were those with 100 or more sworn officers. The study found that 37.7% of the agencies have dedicated personnel who address digital evidence; 24.3% of the agencies have a specialized unit for examining digital evidence; 32.8% of agencies address digital evidence but do not have dedicated personnel; and 5% of the agencies did

nothing to address digital evidence. The greatest impact on adoption of digital forensics practices came from environmental constraints, such as population size, citizen complaint review boards, regional location, and partnerships (Yesilyurt, 2011). Contextual factors had less influence while organizational control and structural control factors did not have a statistically significant influence. Yesilyurt's study determined that large local law enforcement agencies are more likely to adopt digital forensics practices if there are stronger environmental factors. Recent publications intended for law enforcement use, such as the *Practical Homicide Investigation Checklist and Field Guide*, have included a focus on digital evidence at crime scenes (Geberth, 2013). As policing changes with the increased use of technology, this type of updated publication may encourage those who were unconvinced of the importance of digital evidence to consider its value to an investigation.

Police Officers Job Related Stress and Digital Evidence

There has been extensive research on police officer perceptions and opinions on topics such as responses to persons with mental illness, crisis intervention, community policing, and job satisfaction (Compton, Bahora, Watson, & Oliva, 2008; Engel & Worden, 2003; Johnson, 2012; Morabito, Watson, & Draine, 2012; Wells & Schafer, 2006). The examination of police offer perceptions or opinions on topics related to digital evidence has lacked focus (Holt, Blevins, & Burruss, 2012). This may be, at least in part, due to the relative newness of the need for police officers to handle or collect digital evidence, as well as the increased use of electronic devices. Local and state agencies may lack the technology knowledge, skill, or equipment to investigate crimes with digital

evidence (Burns et al., 2004; Swire, 2009). These deficiencies may lead to additional job stress for patrol officers who find digital evidence when responding to crime scenes.

Indeed, the focus of existing literature on law enforcement perceptions and reactions to job stressors found many police officers had concerns regarding workload or stress (Burns et al., 2008; Holt & Blevins, 2011; Krause, 2009; Perez et al., 2010; Violanti & Aron, 1995). The effect of forensic examinations of digital evidence on the police officers who conduct them can result in a need for adjustment in the examiner's personal and professional life. Police officers who perform forensic examinations of digital evidence, hereafter referred to as digital examiners, have high stress jobs but these officers also experience satisfaction with their jobs (Holt et al., 2012). Holt et al. found that job-related training reduces these officers' job related stress. Violanti and Aron examined police stressors and the variations of perceptions at a time when computers had not yet become a major concern for police investigations and the widespread use of the World Wide Web had not yet emerged as a major force in the creation and sharing of child pornography.

Patrol officers have always had various stressors as part of their jobs. Digital evidence handling is one of the current stressors. Violanti and Aron's (1995) sample included 110 full-time sworn police officers in a large police department in New York State. With a 93% response rate, the survey provided valuable insight on stressors. The researchers found the police officers' top two stressors related to the officer killing someone in the line of duty and a criminal killing a fellow officer. A physical attack ranks third, and cases involving battered children ranked fourth. Much has changed in the two decades since the publication of the Violanti and Aron research; however, issues

related to battered children or other forms of child abuse and exploitation continue to rank high on the list of stressors (Burns et al., 2008; Holt & Blevins, 2011; Krause, 2009; Perez et al., 2010). While not all cases of child abuse or battered children will involve a patrol officer at the scene of the incident, these types of cases will often involve digital evidence today, due to the prevalent use of mobile phones and other devices by individuals. As such, these types of cases may provide a two-fold stressor where the patrol officer is handling a case involving abuse of children and the need to handle digital evidence. Burns et al. (2008) found that the types of digital evidence examined in Internet child exploitation cases, in particular videos, audio, and pictures, has a measureable impact on both the professional and personal lives of police officers or civilian employees. Interviewing 14 members of an Internet child exploitation team, Burns et al. found that forensic examinations of digital evidence involving child exploitation may create a feeling of alienation from other police officers, family, and friends, furthering the perspective that child abuse and exploitation cases are a highly ranked stressor on police officers.

Further research related to the concerns of digital examiners who investigate Internet child exploitation cases, such as Krause (2009) and Perez et al. (2010), found similar issues with digital examiners of these types of cases and addressed the particular concerns of secondary traumatic stress because of the continued viewing of images in child exploitation investigations. Krause found that repeated exposure to obscene content increased stress. Other issues related to technology and pressures of the job were among the top stressors for digital examiners. LEOs and civilian employees who perform forensic examinations of digital evidence are exposed to disturbing images and have been

found to experience high stress levels due to viewing these images as part of their job requirements (Burns et al., 2008; Holt & Blevins, 2011; Krause, 2009; Perez et al., 2010). This type of job related stress is not the same as what might be experienced by an inadequately trained patrol officer who encounters digital evidence, but understanding the different types of stressors that police officers experience may enable researchers to understand the similarities and differences that relate to different types of job related stress.

The additional stress related to the continual need to learn new technology is not a unique stressor to those performing forensic examinations of digital evidence. Patrol officers cannot opt out of duties required of their job, such as handling of digital evidence when necessary. Research has used the Job Demand-Control Model to examine workplace stressors, including those related to implementation or change in use of technology and found that technology increased stress (Karasek, 1979; Karasek & Theorell, 1990; Knani & Fournier, 2013; Salanova, Pieró, & Schaufeli, 2002). To help reduce the potential for these stressors in performing forensic examinations of digital evidence, Krause recommended using police officers who volunteered to take on these roles, peer support programs, and an interconnected squad, team, unit, or task force. Other recommendations included a reduced workload, job rotation, and increased management concern (Perez et al., 2010). Some police officers and civilian employees whose primary duty is forensic examinations of digital evidence may perceive that their role lacks support and is less valued than other types of police investigations. Perez et al. surveyed 28 investigators who perform forensic examinations of digital evidence at a federal law enforcement agency. Similar to Krause, the results indicated that digital

examiners may suffer from burnout and secondary traumatic stress, particularly as the examiner views increasing numbers of disturbing images.

Holt and Blevins (2011) looked more broadly at the effect of job stress on digital examiners in law enforcement as crimes involving digital evidence have increased in number. Holt and Blevins mailed the electronic survey to 257 digital examiners who completed the certified forensic examiner course. The response rate was 21.79% (56) but was comprised of similar demographics to those reported by the Bureau of Labor Statistics. While a vast majority of the digital examiners reported a high level of job satisfaction, over one-half reported stress related to their job. The researchers noted the need for training on digital crime for senior management and line officers to promote acceptance and understanding of forensic examination of digital evidence.

Holt et al. (2012) surveyed active LEOs who completed a computer-training program through the NW3C. The results included 224 responses. The study examined predictors of job satisfaction and found that digital examiners have consistent levels of stress and job satisfaction to those in traditional police roles. The results indicated demographic indicators had no effect on job satisfaction but this is contradictory to other studies that did find an effect on job satisfaction and stress (Belknap & Shelley, 1992; Krimmell & Gormley, 2003; Morash, Haarr, & Kwak, 2006; Zhao, Thurman, & He, 1999). Krimmell and Gormley surveyed female LEOs in New Jersey and Pennsylvania to determine job satisfaction. The Krimmell and Gormley research showed that female LEOs in departments where there were less than 15% female officers experienced higher levels of dissatisfaction. It is unclear if the differences between studies relate to the types

of duties performed but does require further research to determine if demographics have an effect on the digital examiners, in general.

Police Officers Acceptance of Change

Police officers generally resist change and or express a lack of interest in new programs or requirements that could increase workload (Skogan, 2008; Sparrow et al., 1990). Implementation of changes for police officers such as crisis intervention teams and community policing have met resistance as these types of changes often result in increased workloads and the requirement to obtain new knowledge or skills (Morabito et al., 2012). Technology changes in police departments have met with similar resistance in some situations. If management identifies the new technology as an improvement for the police officers, management can improve acceptance with an appropriate rollout plan (Collerette, Legris, & Manghi, 2006).

When considering additional duties related to handling digital evidence, it is critical to keep in mind police officers' acceptance of change. The adoption of crisis intervention teams for police response to people with mental illness is one such example of adopting a new, generally recognized procedure for police officers. Compton et al. (2008) as well as Morabito et al. (2012) have examined these types of crisis intervention teams.

Crisis intervention teams change the way that police officers respond to situations involving people with mental illness, which has created a change in overall policing procedures. This type of change required additional training for those patrol officers who volunteered for the crisis intervention teams, but patrol officers have always been

involved in dealing with situations involving those with mental illness. While some may view this change as additional responsibilities, it is, in reality, a modification of responsibilities. If departments ensure that those involved in the crisis intervention team are volunteers, this can help increase the possibility of success for the team. Morabito et al. (2012) noted that experience or a different perspective on individuals with mental illness might influence officers who choose not to participate in crisis intervention teams. The choice to use volunteers for these teams does not require officers to discuss their perceptions of individuals with mental illness, therefore being less invasive than some other potential forms of recruitment. Similar to officers who choose to become members of teams who perform forensic examinations of digital evidence, those who choose to participate in crisis intervention teams are more likely to have a positive perspective on the team they are joining. While patrol officers may initially resist change that will add requirements to their job, such as handling digital evidence, most patrol officers will generally become more accepting and adopt a more positive perspective on the new requirements once they understand the requirements and can meet the expectations related to them.

Collerette et al. (2006) studied a successful technology change at the Police Department of Geneva Canton (Switzerland). The department had a prior technology change that created a negative environment. The department rolled-out the new technology in phases over four years to the approximately 1200 employees at the police service. Each phase focused on a particular unit for training followed by rollout of the technology. The study identified the importance of training, individual guidance, short implementation cycles, and manageable work unit sizes for the success of technology

change. This type of plan could provide a guide for law enforcement agencies to implement additional training successfully, such as new or updated training related to handling of digital evidence.

Colvin and Goh (2005) identified factors to explain why patrol officers would embrace or reject technology: ease of use, usefulness, timeliness, and information quality. The ability of managers at police departments to understand and plan based on an understanding of these factors could lead to increased success of technology change. Collerette et al. found two factors were of more importance than usefulness and ease of use. These factors were timeliness of the system response and quality of the information produced by the system. As identified by Skogan (2008), "street officers do not want to be plagued by out-of-touch programs that add to their workload and give them tasks that lie outside their comfort zone" (p. 23). If management at law enforcement agencies understands the needs and concerns of the patrol officers, then appropriate training and equipment can be supplied to address these needs and concerns in a way that will allow the patrol officers to meet management expectations.

Perceptions of Digital Evidence

Prior research in the area related to digital evidence and police officers has generally focused on child pornography or pedophilia (Burns et al., 2008; Krause, 2009; Marcum et al., 2010; Perez et al., 2010). Other research on perceptions of digital evidence has focused on professionals in the legal field, such as judges or attorneys (American Bar Association, 2009; Kessler, 2010; Losavio, Adams, & Rogers, 2006; Rogers, Scarborough, Frakes, & San Martin, 2007). There has been limited research

focusing on police officer involvement in other areas of digital evidence. Among the research not specifically focused on child-exploitation are surveys examining police officers' perceptions of cybercrime, needs of law enforcement related to cybercrime investigations, preparedness for addressing Internet fraud, and computer crime investigative teams (Bossler & Holt, 2012; Burns et al., 2004; Davis, 2012; Goodman, 1997; Hinduja, 2004; Holt & Bossler, 2012a, 2012b; North Carolina Governor's Crime Commission / Criminal Justice Analysis Center, 2010; Senjo, 2004; U.S. DOJ, Office of Justice Programs, NIJ, 2010). The prior surveys provided some questions that the researcher was able to modify for use in the current study. Additionally, the results of the prior research helped guide the researcher towards topics that required further exploration, such as whether patrol officers felt there was a need for increased training related to digital evidence.

The Holt and Bossler (2012a) and Bossler and Holt (2012) research provide the most recent results of studies similar to the current research. Their research focused on the Savannah-Chatham Metropolitan police department in Savannah, Georgia and the Charlotte-Mecklenburg police department in Charlotte, North Carolina. The departments served populations of over 134,000 in Savannah and over 687,000 in Charlotte. The police departments employed 400 officers in Savannah, and over 1,400 in Charlotte. Both studies focused on patrol officers' perceptions relating to computer crime or responding to computer crime. The articles by Holt and Bossler (2012a, 2012b), and Bossler and Holt (2012) do not focus specifically on handling digital evidence but do represent the most applicable comparisons for the current research based on perceptions of Georgia police officers. Additionally, as one of the agencies in the studies is in Georgia, it

provides a valuable comparison for related survey questions. Holt and Bossler (2012a, 2012b) found that management discussion and support of crimes involving digital evidence increases patrol officer interest and acceptance of these crimes and training to support the investigations. Patrol officers generally had limited training or experience with digital evidence (Bossler & Holt, 2012; Holt & Bossler, 2012a). As indicated by other research, officers had little interest in changes to their job that would affect their daily routine (Bossler & Holt, 2012).

Davis (2012) and North Carolina Governor's Crime Commission / Criminal Justice Analysis Center (2010) have presented statewide research on police officer needs related to digital crime. The Davis and North Carolina Governor's Crime Commission / Criminal Justice Analysis Center publications are separate analyses of the same survey data. Davis was the researcher of the North Carolina Governor's Crime Commission / Criminal Justice Analysis Center study. The Davis and North Carolina Governor's Crime Commission / Criminal Justice Analysis Center studies used law enforcement agencies as the sample population rather than individual LEOs, which is similar to the current research. Davis mailed the survey for the research to departments and requested that the head of the cybercrime investigative unit, or the head of the agency in agencies without such a unit, complete the survey.

The research reported here differs from the two studies above in two significant ways. First, while the researcher emailed the current survey to individuals in departments, such as the Chief or other senior officer, the message specifically requested that one or more *patrol officers* complete the survey. Second, the North Carolina research did not

focus on patrol officers' handling of digital evidence but rather on the department's overall ability to examine cybercrime components of investigations.

The Burns et al. (2004) research focused on larger police departments. It assumed that larger agencies were more likely to have resources to support forensic examinations of digital evidence due to their size. Burns et al. sent the surveys to 700 law enforcement agencies across the U.S. that had at least 100 officers. The authors asked that the most qualified person in the agency complete the survey. In 2001, the U.S. DOJ conducted a nationwide survey that included 126 individuals from 114 police departments. This research included participants with various levels of involvement in forensic examinations of digital evidence. Ultimately, the findings identified 10 critical concerns that were most common among respondents. The top 10 included: (1) public awareness, (2) data and reporting, (3) uniform training and certification courses, (4) onsite management assistance for electronic crime units and task forces, (5) updated laws, (6) cooperation with the high-tech industry, (7) special research and publications, (8) management awareness and support, (9) investigative and forensic tools, and (10) structuring a computer crime unit.

Hinduja (2004) represents some the earliest research related to perceptions of digital evidence by law enforcement, using a sample from the state of Michigan. Hinduja sent the survey to 490 departments and had 276 (56.3%) responses. The survey focused on the types of crimes using digital evidence at the time, such as harassment, child pornography, counterfeiting, identity theft, and e-commerce fraud, as well as training needs. It identified a concern that police work needed to move away from its traditional role.

Senjo (2004) is one of the earlier studies in police officers' perceptions of crimes involving digital evidence, particularly in focusing on patrol officers and looking at a larger representative group. Senjo (2004) represents another study similar to the current research. It was an exploratory study focusing on police officer perceptions but it used a non-probability sample, which differs from the current researcher's disproportionate stratified random sample, and implemented use of the population to request survey completion. Senjo's sample included four cities in a single unspecified western state. The survey questions varied from the current research in that they addressed officers' perceptions of types of computer-related crime and of those who committed those crimes. Senjo stated that the findings on police officer perceptions were inconsistent with computer crime facts as reported in the literature at the time, but Senjo did find that most of the respondents agreed that computer crime was a serious concern. This research served as the basis for Bossler's and Holt's multiple publications on the topic.

The common finding of researchers is that there is a lack of training related to digital evidence (Bossler & Holt, 2012; Burns et al., 2004; Davis, 2012; Goodman, 1997; Hinduja, 2004; Holt & Bossler, 2012a; North Carolina Governor's Crime Commission / Criminal Justice Analysis Center, 2010; Senjo, 2004; U.S. DOJ, Office of Justice Programs, NIJ, 2001, 2010). The topic of sufficient training has proven to be a concern across research on the forensic examination of digital evidence. The current research also explores this area. Examining the results of the current research in light of the Holt and Bossler (2012a), Bossler and Holt, Senjo, North Carolina Governor's Crime Commission / Criminal Justice Analysis Center, and Davis studies provided a basis for the current research to build upon in examining opinions of patrol officers in Georgia.

While this study provides the first statewide examination of patrol officers' opinions, agencies within and outside of Georgia may be able to use the results to gain further understanding of their own patrol officers' opinions on digital evidence. Additionally, future research may build upon the findings of this study in order to gain understanding in other states. The Holt and Bossler (2012a), Bossler and Holt, and Senjo studies examine patrol officers' perceptions, but only at the narrower level of a metropolitan area. The North Carolina Governor's Crime Commission / Criminal Justice Analysis Center and Davis studies examined local law enforcement across a state, but focused on needs assessment at the agency level.

Summary

Prior research into various policy and technology changes affecting patrol officers has found consistent resistance to change, particularly when it may result in an increased workload (Morabito et al., 2012; Skogan, 2008; Sparrow et al., 1990). Law enforcement personnel on crisis intervention teams and teams performing forensic examination of digital evidence need the support of all those involved with the team in order to be successful. This may include dispatch staff, management, and peers, as they may play a vital role in the support and reduction of stressors for the team members. Digital evidence is more common as most individuals today, including criminals, victims, and witnesses have a computer or mobile device, so patrol officers can expect to encounter situations that may require the collection and handling of these types of evidence items frequently.

In recent years, researchers have studied the effects of police officers or civilians examining child exploitation images and video (Burns et al., 2008; Holt & Blevins, 2011;

Krause, 2009; Perez et al., 2010). The results of these studies found a need to minimize viewing of disturbing images. While search technology has made advances in helping to identify known images of child exploitation, the prevalence of such cases still requires extensive human reviewing, leading to high stress levels. However, such research is beyond the scope of this study in that it would focus more on the psychological effects and less on officers' perceptions of technology. While there have been some research results published regarding the viewpoint of patrol officers on various aspects of the officers' job and, in particular, the role that digital evidence plays in law enforcement today, this is still a relatively new area of examination. By understanding the stressors and needs related to handling of digital evidence, management at law enforcement agencies can apply techniques for successful training programs to address patrol officers' stress as it relates to handling of digital evidence.

Chapter 3

Methodology

There has been limited exploration of police officers' opinions or perceptions of various aspects of digital evidence and related topics. Researchers employ an exploratory design when limited research exists on a particular topic (Sekaran, 2003). Using a department-level survey completed by one or more patrol officers, the researcher assessed the current opinions of patrol officers on their preparedness for handling digital evidence and their perception of management expectations of the patrol officers in such situations. The researcher used a cross-sectional survey in a two-phased approach. Prior to Phase 1, the researcher obtained input from the SMEs to gain insight on survey development. Phase 1 consisted of an online survey distributed to departments identified in the sample. Phase 2 was a follow-up survey sent to replacements of non-responsive departments. Based on the results of Phase 2, it was determined that it was unlikely the researcher would obtain sufficient responses in one stratum that was lacking responses. Phase 3 was to be interviews with representatives of departments that fit within strata lacking results, if the researcher determined that interviews would result in sufficient responses.

The researcher attempted to gain input from the five strata of agencies based upon size: one to five officers, six to 10 officers, 11 to 24 officers, 25 to 74 officers, and 75 or more officers. To assist with survey completion, the researcher followed-up and provided

contact information in case any patrol officers or agencies had questions about the survey. The researcher used SMEs to support the development of the survey questions and based as many questions as appropriate on prior research in an effort to obtain comparability across studies.

While cognizant of low response rates to Web-based surveys, the researcher employed methods identified as helping to increase response rates (Cook, Heath, & Thompson, 2000; Sheehan, 2001; Sheehan & Hoy, 1999). Concerns regarding survey response rates predate the increased use of email- and Web-based surveys. Dey (1997) examined low response rates and ways to increase them in the context of paper-based surveys. Dey examined the Astin and Molm (1972) weighting procedure for reducing nonresponse bias in univariate distributions and found the procedure effective.

Nulty (2008) compared response rates between paper-based and online-based surveys and found that, in general, most of the prior comparative research examined since 1999 had better response rates for face-to-face, paper-based surveys. The results did not yield comparative data for online surveys administered with the researcher present so the difference between paper as opposed to an online format may not have affected the response rate. However, Nulty's findings supports earlier research that showed that personal contact helped to increase response rates (Cook et al., 2000). Later research showed that Web-based surveys had response rates as high as mailed surveys (Baruch & Holtom, 2008). Kaplowitz, Hadlock, and Levine's (2004) study comparing Web and mail survey response rates at a university used five data sets, varying the type and amount of contact with the students. Kaplowitz, Hadlock, and Levine found there were comparable response rates to mail and Web surveys when both received a pre-survey notification.

The mean age of Web survey respondents was younger than respondents to mail surveys. The results of comparing Web and mail survey response rates may indicate a difference in the contact preferences for respondents of different ages. While younger respondents have grown up with more access to technology from a younger age, older respondents may adopt the use of technology due to work requirements or personal preferences. The ease of access to technology and contact lists for potential respondents also may indicate that respondents receive more surveys than in the past since the cost to send the survey is less than when sending a survey by postal mail.

The Baruch and Holtom (2008) research indicated that surveys requiring responses from organizations had lower response rates, but researchers accept lower organizational response rates as a norm in comparison to studies of individuals. The authors based their research on 490 studies in 17 refereed management and behavioral sciences journals, 241 published in 2000 and 249 published in 2005. Of the 490 studies, 27 did not include response rates; Baruch and Holtom excluded them from the study. The Baruch and Holtom study of organizational research found an average response rate in 2000 of 36.2% and a standard deviation of 19.6. By 2005, the average response rate was 35% with a standard deviation of 18.2. This varies from individual research, where in 2000 the average response rate was 52.6% with a standard deviation of 19.7, and in 2005, the response rate was 52.7% with a standard deviation of 21.2.

Pre-contact prior to sending the survey and multiple contacts are two factors that help to increase response rate (Cook et al., 2000; Sheehan, 2001; Sheehan & Hoy, 1999). Kaplowitz, Hadlock, and Levine's (2004) study supported other studies that indicated pre-survey contact might help improve response rates. Some research results indicate that

the length of business-oriented surveys has an effect on response rate (Jobber & Saunders, 1993). Porter and Whitcomb (2003) studied the impact of contact type on response rates. The study surveyed students who did not apply for college admission. It considered four factors, (1) email salutation, (2) email address of the sender, (3) authority of the email signatory, and (4) department authority. The study found that personalization of the email and the authority of the email sponsor had little impact, but statements indicating a limitation of selected participants and deadlines for when the survey would end increased response rates.

Proposed Sample

The *Census of State and Local Law Enforcement Agencies, 2008*, identified 12,947 sworn full time employees at 366 local police departments in Georgia (U.S. Department of Justice, Office of Justice Programs, BJS, 2011). Not all of these individuals were patrol level officers; some were manager or other non-patrol positions. To ensure accuracy of the number of current local law enforcement departments, the researcher created a list of Georgia law enforcement agencies and found 338 active agencies in the state based on agency type defined in the research. The researcher cross-referenced the list against city and county lists from the state to help ensure adequate coverage of the survey across the state and by agency size. The researcher collected the department contact information, department size based on the number of officers, and the population size served by the department.

The researcher originally planned to use a disproportionate stratified random sample; however, based on response, the researcher attempted contact with all police

departments in the sampling frame. The number of total police officers in the agency is the basis for the stratification. This stratification allows for detailed analysis of patrol officers' opinions for different sizes of departments.

Sampling calculations specified that for the updated population size of 338 agencies acceptable responses range between 105 and 181 (Table 2). For the top four strata with a population of 243 agencies, eliminating the stratum of one to five officers, acceptable responses range between 94 and 150 (Table 2). Ideally, the researcher intended to collect the planned 181 valid responses, but the presented alternatives provided other acceptable response rates that could still be considered valid (Hickman et al., 2009; Lekesiz, 2010).

Table 2

Population, Confidence Level, Precision, and Responses Required

Population	Confidence Level (%)	Precision (%)	Responses Required
338	95	±5	181
338	90	±5	151
338	95	±8	105
243	95	±5	150
243	90	±5	129
243	95	±8	94

After examining the agency sizes from existing lists, the researcher defined strata as one to five officers; six to 10 officers; 11 to 24 officers; 25 to 74 officers, and 75 or more officers. The researcher compared the collected local agency data with data from the *Census of State and Local Law Enforcement Agencies, 2008*, to determine an appropriate distribution of departments across the strata based on the number of officers in the local law enforcement agencies (U.S. Department of Justice, Office of Justice Programs, BJS, 2011).

The researcher planned distribution for the strata with 25% for each of the first three strata, 15% for the stratum of 25 to 74 officers, and 10% for the stratum of 75 or more officers based on the originally compiled list of local law enforcement agencies. The researcher deemed an equal allocation of the strata not appropriate based on the distribution of department sizes; however, the researcher chose these department sizes to gain better understanding of whether resources and support may affect patrol officers' opinions of digital evidence. The researcher defined strata proportions to be within 4% of the proportion of the sampling frame. As contact, via email or telephone, was attempted with the original list of local law enforcement agencies, the researcher had to update the distribution of strata as the researcher found some departments had been closed. In order to stay within 4% of the sampling frame distribution, the researcher decreased the percentage to 20% for the 6 to 10 officers stratum, and increased the 11 to 24 officers stratum to 30%. When the researcher decided to include only the top four strata, the distribution was updated again. In defining the distribution for the top four strata, the distribution was 25%, 30%, 30%, and 15% for the smallest to largest department sizes, respectively. Again, this kept the distribution within 4% of proportion of the population. This helped to ensure an accurate representation of the Georgia police departments' distribution.

Research Methods

In May 2014, the researcher established a group of SMEs to support the development of the survey. Eight individuals agreed, by email, to support the research by participating as SMEs (See Appendix A for the email request for participation). If the

number of SMEs had decreased to four, the researcher would have recruited additional members to ensure the available SMEs never decreased below the set minimum of three; however, the SMEs did not decrease below the set level. The researcher provided the SMEs with a copy of the proposal abstract, research questions, and survey draft. SMEs reviewed and provided input on the materials the researcher shared with them. The distributed survey incorporated feedback received from four SMEs, thus fulfilling the originally planned minimum of three participants (see Appendix B for survey). Many of the SMEs provided support for the research beyond survey development, by making introductions to people involved in government, policing, and public safety in Georgia who were able to provide additional support for the distribution of the survey. Once the dissertation committee approved the survey, the researcher submitted it, along with other required documents, to the IRB for the appropriate approvals required for contact with the chiefs of police and distribution of the survey.

Phase 1 involved initial distribution and follow-up from the survey. The researcher compiled a list of Georgia police departments, the chiefs or other senior officers, and their contact information. The researcher used this list to identify the disproportionate stratified random sample. The sample of police department contacts, along with additional support through the researcher's contacts and SMEs, were used for distribution of the survey. Professional associations in Georgia such as InfraGard, the High Technology Crime Investigation Association, the American Society of Digital Forensics and E-Discovery, and the Digital Forensics Association provided additional contacts for the researcher.

Prior to sending the initial email request to complete the survey, the researcher sent an email to the chiefs or senior officers explaining the purpose of the research and asking for support of the survey distribution (see Appendix C for initial email to chiefs). Three days after the initial email, the researcher sent an email with the link to the survey (see Appendix D for invitation to complete survey). If the researcher did not receive a response, the researcher sent a second email one week following the initial survey invitation as a reminder to complete the survey (see Appendix E for follow-up email to chiefs). Kaplowitz et al. (2004) found that reminder emails sent within 10 days of the survey request had a positive effect on response rate. When a department chief or senior officer requested to opt-out of the survey, the researcher selected a new agency from within the sample stratum.

The survey included a question to identify the department so that the researcher could identify participating departments and follow-up with non-responsive departments. Comparing the responding department names to the original list of agencies contacted, the researcher determined which departments had not responded. Phase 2 involved replacement of departments that failed to respond with another department randomly chosen from the remaining departments within that stratum. The researchers used the same email messages to contact the chiefs of the chosen additional departments, again with a follow-up as needed.

Phase 2 required more time and departments contacted than the researcher originally anticipated. The researcher discovered that while some of the originally compiled email addresses did not produce a bounced email, it did not appear that all reached their intended recipients. The researcher attempted to call the police departments

to confirm the appropriate person to assist with the survey distribution and obtain the individual's contact information. Using this data, the researcher was able to send emails to the contacted departments and obtain responses from those that had previously not responded. While the proposal stated the researcher sought a disproportionate stratified sample to obtain sufficient responses for the appropriate precision and scale, the researcher attempted to contact all known departments.

Instrument Development and Validation

The researcher used SurveyMonkey to build the survey with a Likert scale that assessed Georgia patrol officers' opinions related to readiness to respond to digital evidence at a crime scene and their viewpoints of the expectations of management in their agencies regarding officers' preparedness and handling of digital evidence. The survey was used to help define the gap between Georgia law enforcement patrol officers' opinions of their preparedness for handling digital evidence and agency management expectations of response preparedness, as perceived by patrol officers. Using Hinduja (2004), Senjo (2004), and Bossler and Holt (2012) as the primary basis for the research, with Holt and Bossler (2012a), Burns et al. (2004), and North Carolina Governor's Crime Commission / Criminal Justice Analysis Center (2010) as secondary examples, an electronic survey was sent to Georgia local law enforcement agencies. The study included local police departments as defined in the *Census of State and Local Law Enforcement Agencies, 2008* (U.S. Department of Justice, Office of Justice Programs, BJS, 2011).

The survey included demographic questions including age, ethnicity, gender, education, years of law enforcement experience, and extent of training for digital evidence handling. The researcher used the results of the demographic data to determine if the respondents aligned with other research that examined local patrol officers in Georgia. For example, gender distribution is a demographic that is more readily available on law enforcement officers. The other collected demographic data does provide insight on the respondents concerning a general expectation of technology experience and comparison to Bossler and Holt (2012).

The survey also included questions that focused specifically on patrol officers' perceptions of their own preparedness for responding to digital evidence, as well as their perceptions of management expectations for patrol officers' response to digital evidence. The survey contained questions that were, in part, adapted from the existing literature that included surveys and additional questions specific to the current research that were not addressed in the literature.

Below is a selection of survey statements, adapted, in part, from Bossler and Holt (2012) that used a Likert scale (see Appendix B for complete survey):

- Increased funding is needed for digital evidence handling training for law enforcement agencies.
- Additional digital evidence handling training should be a top priority for our agency.
- Digital evidence has dramatically changed my job as a first responder.
- As a first responder, I understand what management expects of me when handling digital evidence.

- As a first responder, I feel the expectations of management related to digital evidence handling are realistic.
- As a first responder, I feel the expectations of management related to digital evidence handling are achievable with my existing training.

The survey expanded upon some of the questions to gain additional input by allowing respondents to provide further explanation through a text box on some of the questions using the Likert scale.

The results of the first round of surveys led to a need for additional rounds of surveys. As previously indicated, the researcher intended to include interviews of patrol officers at agencies of the particular strata previously identified if there was a low response rate. The SMEs, other contacts, and Dr. Kessler served as additional support for access to distribution lists for electronic survey distribution. After the rounds of surveys were complete, the one to five officers stratum had received approximately one third of the needed responses. The researcher determined that through surveys the response rate needed was unlikely to be obtained due to the number of interviews required and therefore the results are not applicable to that stratum due to lack of responses. The survey results do not include the one to five officers stratum. The researcher obtained sufficient response level for the other four strata; therefore, the Phase 3 interviews were unnecessary.

Data Analysis

The researcher analyzed the collected data to identify the opinions of patrol officers at the departments within the identified strata. Tables and figures identify the

question, frequency distribution within the strata, and the aggregated results for the responses. The mean was determined in a similar manner to the Bossler and Holt (2012) results by assigning values to responses; strongly agree to 1; agree to 2; neither agrees nor disagrees to 3; disagree to 4; and strongly disagree to 5. While the research uses an exploratory methodology, it crosses over to some level of descriptive research by using a survey rather than focus groups or interviews as the primary data collection. Once the researcher collected sufficient data, the analysis included additional descriptive statistics.

Formats for Presenting Results

Results for similar research has been enhanced using tables (Bossler & Holt, 2012; Davis, 2012; Hinduja, 2004; Holt & Bossler, 2012a; North Carolina Governor's Crime Commission / Criminal Justice Analysis Center, 2010; Senjo, 2004). The researcher employs tabular formats to summarize demographics of participants and their agencies, followed by the results of the survey questions. The strata results to the survey question are also included. North Carolina Governor's Crime Commission / Criminal Justice Analysis Center uses figures to display important data results; this format is used to highlight any results that vary greatly from expected or from similar questions in related research.

Resource Requirements

The resources required for this research included Microsoft Office; Internet access; the online survey tool, SurveyMonkey; and email, all of which were readily available to the researcher. For data analysis, the researcher required statistical analysis

software; the researcher chose the Statistical Package for the Social Sciences (SPSS), which the university provided. The researcher required approval of the survey from the IRB (see Appendix F for IRB approval). Additionally, the researcher required access to the SMEs for support with contacting additional professionals with knowledge of research and the Georgia law enforcement community, as well as contacts within the local law enforcement community who supported the distribution of the survey. The researcher gained support from a group of SMEs that hold master's or doctoral degrees, and SMEs that have knowledge and contacts in the Georgia law enforcement community. These individuals supported the research idea, and were willing to review the survey materials and support the distribution of the survey.

Summary

This exploratory study focuses on local law enforcement agencies in the state of Georgia. The researcher defined the sampling frame with five strata based on the number of officers within each agency. The researcher developed the sampling frame and contact information list. Additionally, with the assistance of the SMEs, the researcher contacted professional associations such as InfraGard to discuss support for distributing the survey. The researcher developed a Likert-scale, Web-based survey that the SMEs vetted. The survey was emailed to the contacts in the strata during Phase 1. In Phase 2, the researcher completed follow-up calls to departments with invalid or outdated contact information. The results were analyzed using frequency distribution and displayed in tables and figures. All of the needed resources to complete the research were available to the researcher.

Chapter 4

Results

Introduction

In this chapter, the researcher will discuss results from the survey. The survey was open from January 22 to May 12, 2015. The researcher exported the results from the survey, confirmed there were insufficient results from the one to five officers stratum and removed those results. The researcher uploaded the data into SPSS Version 23 to perform statistical analysis. The detailed findings of the survey for the total and per stratum respondents are included and discussed. The chapter concludes with a summary of the results.

Data Collection

The researcher received IRB approval for the survey on January 13, 2015 (see Appendix F for IRB approval). The researcher then created the survey in the SurveyMonkey online survey tool and had it tested by SMEs to ensure it worked as expected. This also allowed the researcher to gain insight on the time needed to complete the survey. The researcher sent the Phase 1 pre-survey email requesting support to the first group of departments on January 19, then sent the survey on January 21. There were a number of bounced emails from Phase 1. Wherever possible, the researcher obtained updated contact information for those departments and re-sent the request for

participation and survey emails to the departments. The researcher sent a follow-up email to the Phase 1 requests on January 28 and sent additional follow-up messages to departments as appropriate based on questions or follow-up from the departments.

Based on the level of response by stratum, Phase 2 began at the end of January 2015. The researcher sent a new set of email requests, surveys, and follow-ups at the beginning of February. Again, the researcher attempted to correct and re-send any bounced emails. The researcher continued to send emails to additional departments until the initially compiled list of contacts per stratum was exhausted. There was still an insufficient response level. In cases where no one responded, the researcher could not confirm whether the intended department representative had received the emails. The researcher attempted to locate additional contact information for any non-responsive departments. Departments that requested exclusion from the survey had their information removed from the list to ensure no further contact was attempted. Throughout the survey period, nine departments declined to participate and requested removal from the follow-up list.

There were departments where email contact information was unavailable on the Internet. For these departments, the researcher called the police department or city hall, depending on the available phone numbers, and requested contact information for the police department so that the researcher could send the survey request. These calls took place beginning in mid-February and concluded in early May, when the researcher determined it was unlikely the researcher would receive sufficient responses for the one to five officers stratum, and the survey exceeded the minimum number of department responses needed to include only the top four strata.

During the time when the researcher was attempting contact with the police departments, the researcher also enlisted support from Dr. Kessler and his access to additional mailing lists, as well as other professional contacts and SMEs for support in distributing the survey to any contacts they might have within the Georgia law enforcement community. The researcher contacted professional associations and, where possible, used the associations' LinkedIn groups or other contacts to make additional contacts with the intended police departments.

The researcher monitored survey responses, and found some were incomplete. Depending upon which questions respondents skipped and the number of questions that were incomplete, surveys were included or excluded from the final data set. If a survey response was missing more than one response to questions that directly related to the research questions, or if more than 18% of the survey questions unanswered (including demographics), were unanswered, then the researcher excluded the survey from the final data set. The researcher selected 18% as the threshold of unanswered survey questions for exclusion based on a review of the responses and the survey questions directly related to the research questions; most of the surveys missing more than 18% of responses were generally lacking more than half of the survey questions, and therefore, would not have provided sufficient data to assess. This extended the time for data collection, as it required regular review and analysis for completion of the data, but this provided a more complete data set for analysis.

Data Analysis

The researcher used SPSS to analyze the data resulting from the survey. The data analysis examined the total responses as a whole as well as responses by stratum. Survey Question 7 asked the respondents to choose the number of sworn officers in their department. The researcher used this data to determine the number of responding officers within the strata. The survey closed with 156 departments providing valid responses; 12 were in the one to five officers stratum and the researcher removed these from the data analysis, as this did not represent a sufficient level of response for statistical validity. The results for analysis included 144 departments with 407 respondents. The 144 departments were comprised of 29 in the stratum of six to 10 officers (Stratum 2), 45 in the stratum of 11 to 24 officers (Stratum 3), 44 in the stratum of 25 to 74 officers (Stratum 4), and 26 in the stratum of 75 or more officers (Stratum 5). The department sample frame for the top four strata was 243, with 144 department responses, which resulted in a 95% confidence level with a precision of ±5.22%. Due to a lack of responses, the researcher removed the stratum with one to five officers (Stratum 1).

The researcher examined the frequency data for the survey question results, comparing percentages for overall response results to those from the strata. The percentages allowed the researcher to compare across the total respondents and the individual strata to determine if response in the strata varied from the total responses. The researcher also examined the median and mode for questions using the Likert scale. This provided the opportunity to gain further insight on the data when combined with the frequency. The researcher mapped specific survey questions to each of the research questions. The researcher mapped R1 to Survey Question 23; R2 to Survey Questions 20,

21, and 22; R3 to Survey Question 27; and R4 to Survey Questions 21 and 22. R4 is a comparison of the management expectations and the patrol officers' opinion that they could achieve those expectations. The researcher designed these survey questions to identify the opinions of patrol officers as they relate to the research questions and, when examined as a whole and by strata, they reveal the opinions that clarify the current state of digital evidence handling by patrol officers in the State of Georgia.

Findings

The survey asked respondents if digital evidence dramatically changed their job as a first responder (Survey Question 19). Overall, most respondents specified that digital evidence had dramatically changed their job as a first responder; however, Stratum 5 had more respondents that responded, "neither agree nor disagree" (Table 3). Additionally, overall respondents indicated that they thought their agency had sufficient expertise to handle digital evidence (Survey Question 26). Stratum 2 and Stratum 3 had more respondents who indicated, "neither agree nor disagree," regarding whether their agency had sufficient expertise for handling digital evidence (Table 4). Since larger departments are more likely to have officers with specialized policing skills, while smaller departments often require officers to handle most or all types of incidents, these results are as expected. This provides valuable insight on how respondents view the changes in their job as it relates to the increased possibility of encountering digital evidence on the job.

Table 3

Respondents Perception of Dramatic Change Caused by Digital Evidence

Level of Agreement	All Respondents (n = 405)	Stratum 2 (n = 30)	Stratum 3 (n = 79)	Stratum 4 (n = 105)	Stratum 5 (n = 191)
Strong Disagree	1.7	3.3	2.5	0.0	2.1
Disagree	7.2	13.3	6.3	4.8	7.9
Neither Agree Nor Disagree	38.0	33.3	26.6	36.2	44.5
Agree	40.2	40.0	49.4	44.8	34.0
Strongly Agree	12.8	10.0	15.2	14.3	11.5

Note. One respondent in Stratum 4 and one respondent in Stratum 5 did not answer this survey question.

Table 4

Respondents Perception of Agency Expertise for Handling Digital Evidence

Level of Agreement	All Respondents (n = 404)	Stratum 2 (n = 30)	Stratum 3 (n = 78)	Stratum 4 (n = 105)	Stratum 5 (n = 191)
Strong Disagree	2.5	6.7	1.3	1.0	3.1
Disagree	12.9	16.7	12.8	16.2	10.5
Neither Agree Nor Disagree	32.2	40.0	43.6	25.7	29.8
Agree	44.3	33.3	37.2	49.5	46.1
Strongly Agree	8.2	3.3	5.1	7.6	10.5

Note. One respondent in Stratum 3, one respondent in Stratum 4, and one respondent in Stratum 5 did not answer this survey question.

Examination of the demographic data from the survey (Survey Question 3) found over 80% of all respondents and within each of the strata was male (Table 5). The FBI's *Uniform Crime Reports*' data reflected similar percentages of officers by gender in Georgia for the 2009 through 2013 reports (U.S. Department of Justice, FBI, Criminal Justice Information Services (CJIS) Division, 2010, 2011, 2012, 2013, 2014). The percentage of male officers during the five years of reports ranged from 83.61% to 84.35%. While Stratum 4 is higher for male officers than the other strata, it still falls within a reasonable range of the expected population. Bossler and Holt (2012) and Holt and Bossler (2012a, 2012b) had a majority of male respondents (approximately 85%) and Senjo (2004) reported 83% male respondents.

Table 5

Percentage of Respondents by Gender

Gender	All Respondents (n = 405)	Stratum 2 (n = 30)	Stratum 3 (n = 79)	Stratum 4 (n =105)	Stratum 5 (n = 191)
Male	86.2	86.7	82.3	88.7	86.5
Female	13.3	13.3	17.7	10.4	13.0

Note. One respondent in Stratum 4 and one respondent in Stratum 5 did not answer this survey question.

Survey Question 6 asked respondents to identify by age category. The majority (51.1%) of all respondents were in the 35 to 49 years age category, followed by 28.7% in the 25 to 34 years category (Table 6). The same two age categories were the two highest levels of respondents in all but Stratum 2. In Stratum 2, the 35 to 49 age category was 43.3% followed by 23.3% in the 50 to 60 age category. This is similar to Bossler and Holt (2012) and Holt and Bossler (2012a) which had an average age of respondents of 37.1 years old.

Table 6

Percentage of Respondents by Age

Age	All Respondents (n = 405)	Stratum 2 (n = 30)	Stratum 3 (n = 79)	Stratum 4 (n =106)	Stratum 5 (n = 190)
Under 25	3.9	6.7	3.8	2.8	4.2
25 to 34	28.7	20.0	32.9	33.0	26.0
35 to 49	51.1	43.3	46.8	50.0	54.7
50 to 60	14.0	23.3	12.7	13.2	13.5
Over 60	1.7	6.7	3.8	0.9	0.5

Note. Two respondents in Stratum 5 did not answer this survey question.

The respondents' ethnicity (Survey Question 4) was 69.8% or greater white/Caucasian in each of the stratum (Table 7). Ethnicity of respondents was similar to Bossler and Holt (2012) and Holt and Bossler (2012a, 2012b) with a majority of white

respondents. Senjo (2004) included demographic information on ethnicity and found a majority of respondents were white.

Table 7

Percentage of Respondents by Ethnicity

Ethnicity	All Respondents (n = 407)	Stratum 2 (n = 30)	Stratum 3 (n = 79)	Stratum 4 (n = 106)	Stratum 5 (n = 192)
American Indian or Alaskan Native	0.7		2.5		0.5
Asian or Pacific Islander	1.0		2.5	0.9	0.5
Black or African American	13.3	16.7	16.5	7.5	14.6
Hispanic or Latino	2.9	3.3	1.3	1.9	4.2
White/Caucasian	74.7	80.0	70.9	84.9	69.8
Prefer not to answer	4.9		2.5	2.8	7.8
Other	0.5		1.3		0.5
Multiple Ethnicities	2.0		2.5	1.9	2.1

Education level for the group (Survey Question 5) found that 36.6% had some college credit, but no degree, and 27% had a bachelor degree. Within the strata, there were similar results in the two largest strata. Within Stratum 3, 45.6% held some college credit, but no degree and 16.5% identified as a high school graduate or equivalent. Stratum 2 had 33.3% of the respondents identified as high school graduate or equivalent, 20% with some college credit, but no degree, and 20% with an associate degree (Table 8). There are few available resources for demographic data on law enforcement officers. O*NET OnLine provides some data for police patrol officers at a national level, identifying 42% of respondents as having a high school diploma or equivalent, 24% having an associate degree, and 22% having some college, but no degree (U.S. Department of Labor, Employment & Training Administration, 2014). The *Census of State and Local Law Enforcement Agencies, 2008* addresses numbers of sworn officers and non-sworn employees but does not include demographics (U.S. Department of Justice, Office of Justice Programs, BJS, 2011).

Table 8

Percentage of Respondents by Education

Education Level	All Respondents (n = 400)	Stratum 2 (n = 28)	Stratum 3 (n = 79)	Stratum 4 (n = 105)	Stratum 5 (n = 188)
High school graduate or equivalent	12.8	33.3	16.5	12.3	8.3
Some college credit, no degree	36.6	20.0	45.6	36.8	35.4
Trade / technical / vocational training	2.5	10.0	6.3	0.9	0.5
associate degree	13.3	20.0	15.2	9.4	13.5
bachelor degree	27.0	10.0	12.7	32.1	32.8
master's degree	6.1		3.8	7.5	7.3

Note. Two respondents in Stratum 2, one respondent in Stratum 4, and four respondents in Stratum 5 did not answer this survey question.

Most respondents (57%) had over 10 years of experience as sworn officers in law enforcement (Table 9). This also corresponds with Bossler and Holt (2012) and Holt and Bossler (2012a, 2012b) which had half the respondents with at least 10 years of experience. Within each stratum, 54.4% to 73.3% had over 10 years of experience. Some respondents appear to have worked at multiple agencies, as the percentages vary between the years at the current agency (Survey Question 9) and the total years of experience (Survey Question 9) as a sworn officer (Table 10). Stratum 2 had 43.3% of respondents with 2 to 5 years of experience at their current agency. Stratum 3 had 31.6% with 2 to 5 years with their current agency. Stratum 4 had 32.1% with 6 to 10 years of experience at their current agency. Stratum 5 had 31.8% of respondents with 11 to 20 years with their current agency. All strata reflected different years of experience when comparing the total years as a sworn officer in comparison to years at their current agency.

The results identified that most respondents have been involved in handling some type of digital evidence (Table 11). Stratum 2 has the largest percentage of respondents (13.3) who never handled digital evidence. The other strata ranged from 1.9% to 2.5%

who never handled digital evidence. In all strata, the largest percentage of respondents stated that they handled digital evidence in some situations.

Table 9

Percentage of Respondents Total Years of Experience

Years of Experience	All Respondents (n = 407)	Stratum 2 (n = 30)	Stratum 3 (n = 79)	Stratum 4 (n = 106)	Stratum 5 (n = 192)
< 2	6.4	3.3	6.3	2.8	8.9
2 to 5	14.5	10.0	13.9	13.2	16.1
6 to 10	22.1	13.3	25.3	29.2	18.2
11 to 20	33.7	36.7	26.6	33.0	36.5
> 20	23.3	36.7	27.8	21.7	20.3

Table 10

Percentage of Respondents by Years at Current Agency

Years at Current Agency	All Respondents (n = 406)	Stratum 2 (n = 30)	Stratum 3 (n = 79)	Stratum 4 (n = 106)	Stratum 5 (n = 191)
< 2	15.0	10.0	21.5	16.0	12.5
2 to 5	23.3	43.3	31.6	20.8	18.2
6 to 10	24.6	16.7	21.5	32.1	22.9
11 to 20	24.1	20.0	13.9	18.9	31.8
> 20	12.8	10.0	11.4	12.3	14.1

Note. One respondent in Stratum 5 did not answer this survey question.

Table 11

Percentage of Respondents Handling Digital Evidence

Frequency Handing Digital Evidence	All Respondents (n = 404)	Stratum 2 (n = 29)	Stratum 3 (n = 77)	Stratum 4 (n = 106)	Stratum 5 (n = 192)
Never	2.9	13.3	2.5	1.9	2.1
In few situations	12.8	16.7	7.6	10.4	15.6
In some situations	49.9	36.7	43.0	53.8	52.6
In most situations	20.6	13.3	29.1	18.9	19.3
In all situations	13.0	16.7	15.2	15.1	10.4

Note. One respondent in Stratum 2 and two respondents in Stratum 3 did not answer this survey question.

The researcher attempted to assess the annual number of cases that the local law enforcement agencies handled overall (Survey Question 11) as well as those that required handling digital evidence (Survey Question 12); however, the over 90% of the responses

were estimates and the range of responses varied so widely that the results did not provide any useful data.

Research Questions Findings

Four research questions guided this research. Each of these is addressed based on all department responses and by strata to identify whether there are differences that exist between the overall responses and those of the different sized departments as defined by the strata.

R1: What are the opinions of Georgia patrol officers at local law enforcement agencies regarding their level of expertise for handling of digital evidence?

The researcher mapped Research Question R1 to Survey Question 23, *As a first responder, I feel the expectations of management related digital evidence handling are achievable with my existing training.*

The majority of patrol officers (62.6%) responded that management expectations for handling of digital evidence are achievable with the existing training; however, 30.2% neither agreed nor disagreed, which provided a definitive response for those officers. The remaining 6.9% of respondents disagreed or strongly disagreed (see Figure 1 for achievability of management expectations for handling digital evidence with existing training - all respondents). The strata had similar results where the combined respondents who agreed or strongly agreed was over 60%, 27% to 33% neither agreed nor disagreed, and less than 10% of each stratum disagreed or strongly disagreed (see Figure 2 for achievability of management expectations for handling digital evidence with existing training - strata).

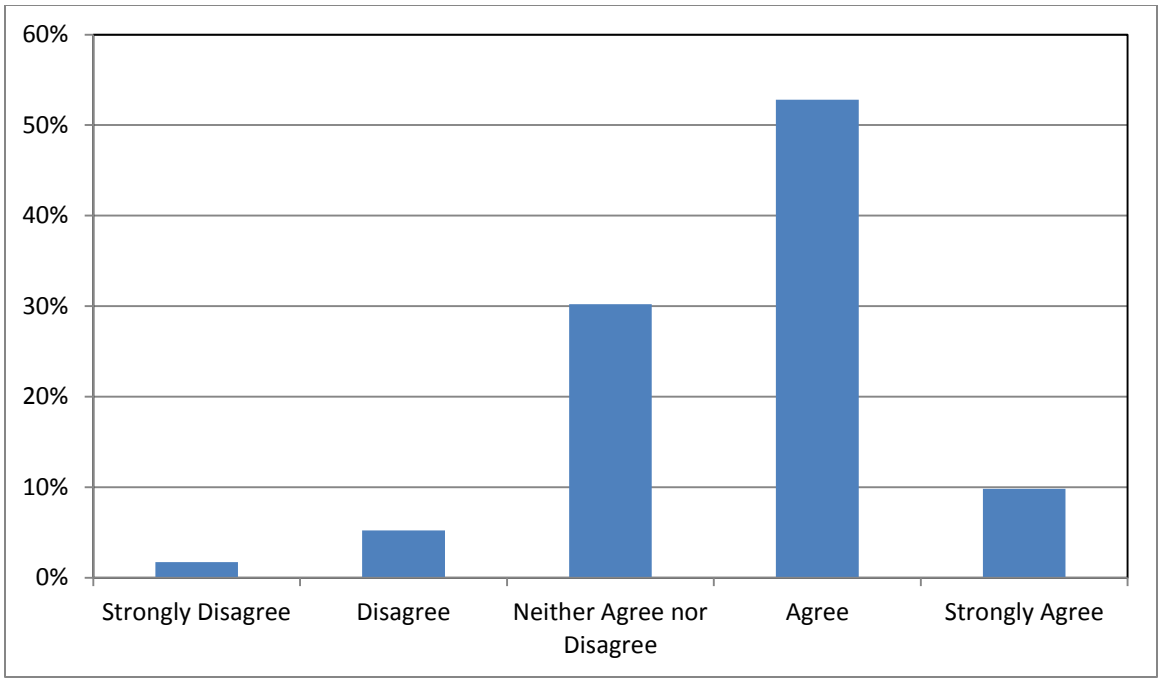

Figure 1. Achievability of management expectations for handling digital evidence with existing training - All respondents.

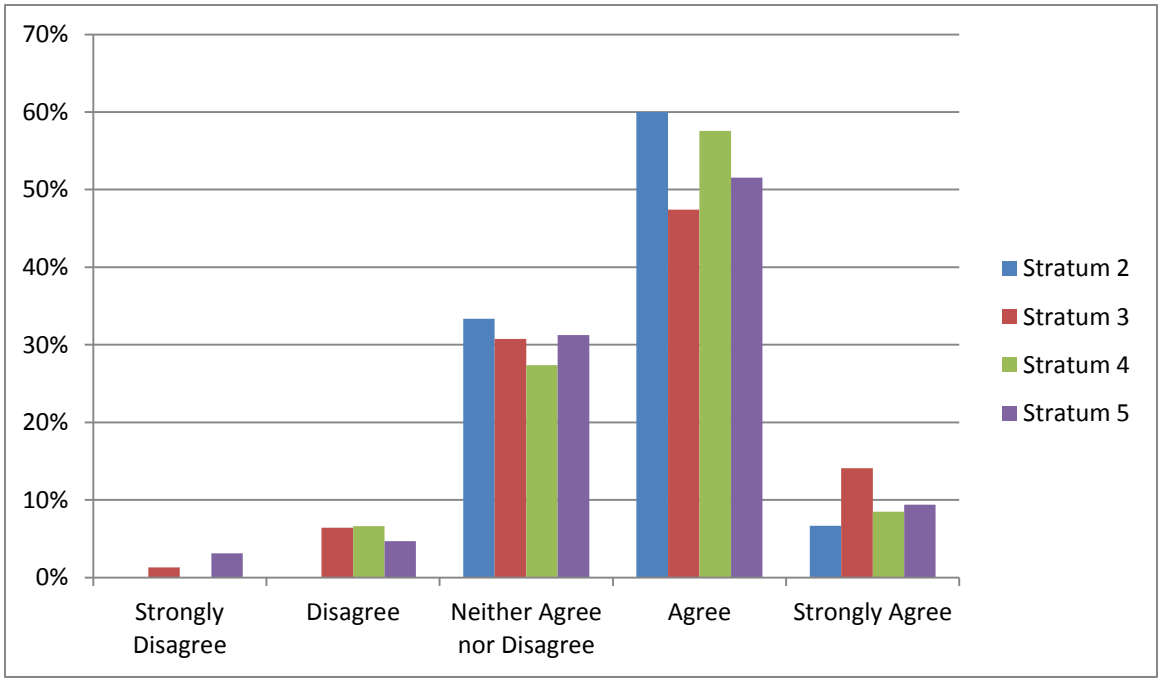

Figure 2. Achievability of management expectations for handling digital evidence with existing training - Strata.

A demographic analysis found that those who did not specify level of education and those with trade/technical/vocational training did not disagree or strongly disagree (Table 12). In addition, the trade/technical/vocational training respondents specified only 10% neither agreed nor disagreed, while 70% agreed, and 20% strongly agreed. Responses related to some ethnicities lacked sufficient data for analysis (Table 13). The higher numbers of respondents in other ethnicities revealed similar responses to those from the overall and strata results. All other demographic data showed no significant difference from the overall and strata results.

Table 12

Achievability of Management Expectations for Handling Digital Evidence by Education Level (Percentage)

Education Level	n	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Not Specified	7			28.6	57.1	14.3
High school graduate or equivalent	52	1.9	3.8	28.8	59.6	5.8
Some college credit, no degree	149	0.7	6.0	31.5	50.3	11.4
Trade/ technical/ vocational training	10			10.0	70.0	20.0
associate degree	53	1.9	3.7	33.3	44.4	14.8
bachelor degree	110	2.7	5.5	32.7	54.5	4.5
master's degree	25	4.0	8.0	16.0	56.0	16.0

Note. One respondent in the associate degree education level did not answer this survey question.

Table 13

Achievability of Management Expectations for Handling Digital Evidence by Ethnicity (Percentage)

Ethnicity	n	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
American Indian or Alaskan native	3			33.3	66.7	
Asian or Pacific Islander	4			100.0		
Black or African American	54	1.9		42.6	38.9	16.7
Hispanic or Latino	12		8.3	33.3	33.3	25.0
White/Caucasian	303	1.0	5.3	20.5	60.7	12.5
Prefer not to answer	20	5.0	10.0	20.0	60.0	5.0
Other	2		50.0	50.0		
Multi-ethnic	8	12.5	12.5	12.5	50.0	12.5

Note. One White/Caucasian respondent did not answer this survey question.

While the majority of respondents agreed that they currently have sufficient training to meet management expectations for handling digital evidence, in related Survey Questions (15 and 13), the respondents indicated that additional digital evidence handling training should be a priority for the department (53.6%), and that departments need additional funding for training (77.9%) (see Figure 3 for opinions on the need for additional training on digital evidence handling as a priority - strata and Figure 4 for opinions on the need for additional funding to support training on digital evidence handling - strata). For those respondents who included an explanation of management expectations, the responses focused on the importance of following defined procedures, such as maintaining chain of evidence, documenting and securing evidence, or contacting the appropriate person within the department. Of the total respondents, 36.1% indicated that they had not had any training on digital evidence handling within the past two years (Survey Question 14) and 36.9% specified one to four hours of training on digital evidence handling within the past two years. The strata results for Stratum 2 (63.3%),

Stratum 3 (63.3%), and Stratum 4 (65.1%) also indicated that training should be a priority. Stratum 5 indicated 41.78% agreed or strongly agreed that digital evidence handling training should be a priority, but 46.4% neither agreed nor disagreed.

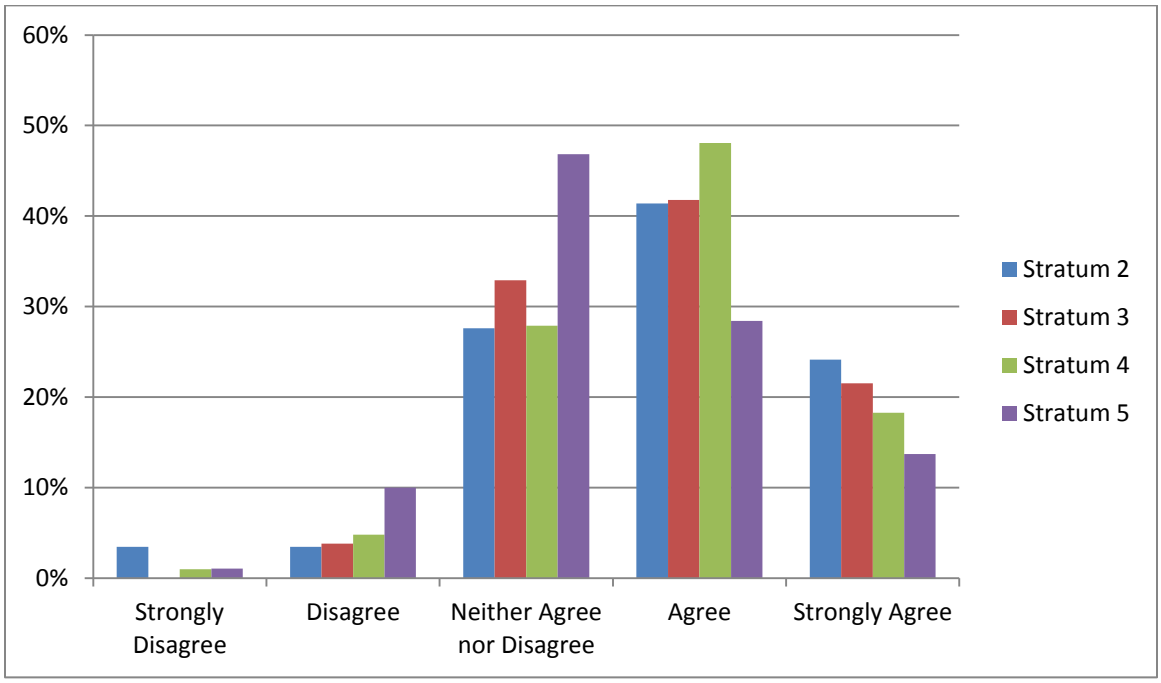

Figure 3. Opinions on the need for additional training on digital evidence handling as a priority - Strata.

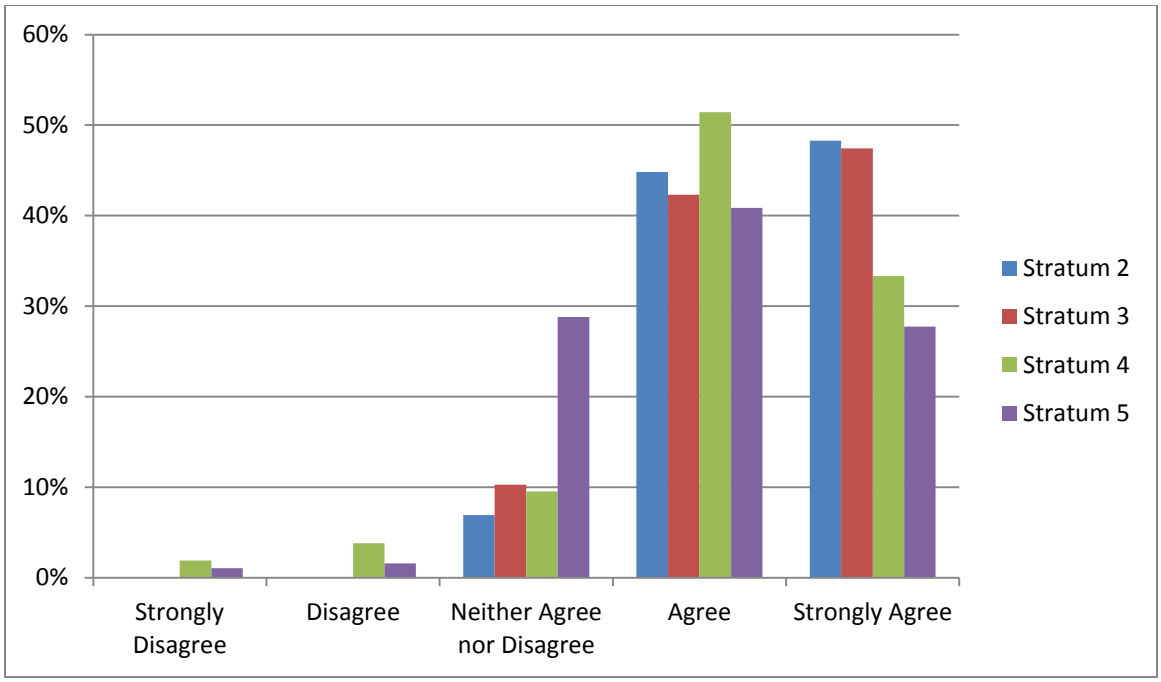

Figure 4. Opinions on the need for additional funding to support training on digital evidence handling - Strata.

The types of training respondents completed within the past two years (Survey Question 16) specified that 99 respondents indicated no training, while 191 stated they had attended training on the collection and documentation of evidence (see Figure 5 for number of respondents attending training within two years). Note that some respondents attended multiple training events. All strata had a majority of respondents who agreed or strongly agreed that departments needed additional funding for digital evidence handling training (68.2% to 90%). Within the strata, 35.4% to 43.3% of respondents indicated they had lacked training for handling of digital evidence during the past two years, while 26.74% to 41.7% indicated one to four hours of training for handling digital evidence within the past two years.

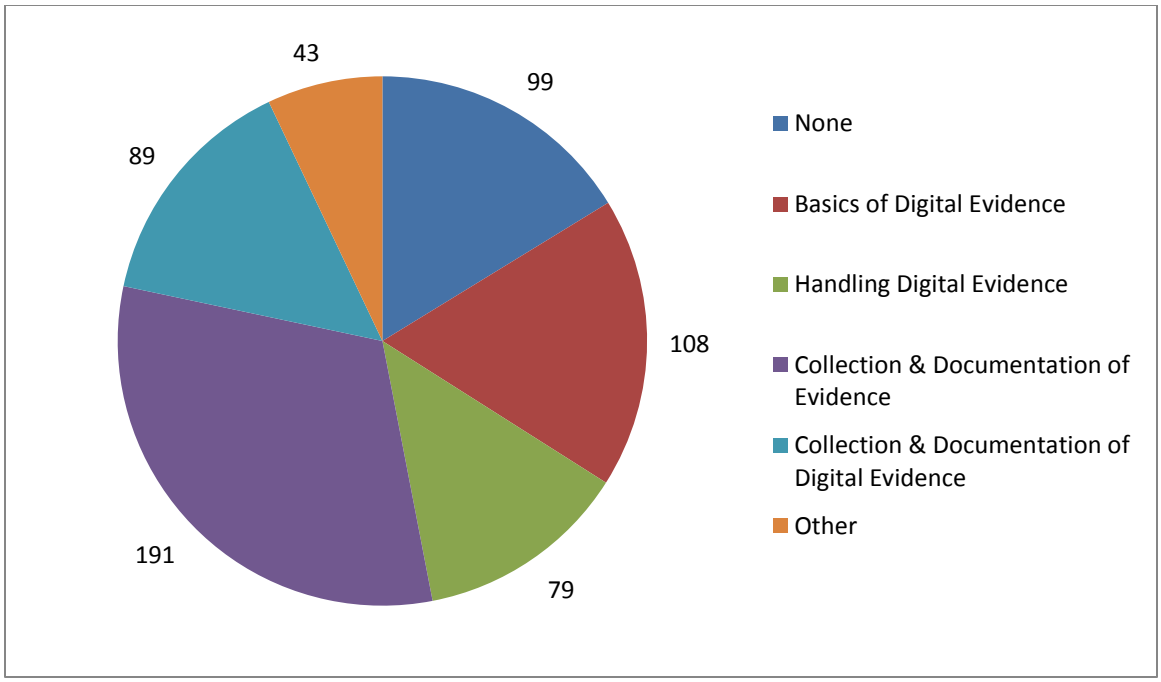

Figure 5. Number of Respondents Attending Training within Two Years (n = 609)

Most respondents indicated that they did not belong to professional associations (Survey Question 25): all respondents (93.4%), Stratum 2 (96.7%), Stratum 3 (94.9%), Stratum 4 (88.7%), and Stratum 5 (94.8%). Respondents did feel it would be helpful to participate in professional associations that focus on digital evidence (Survey Question 24). A majority of respondents in Strata 2, 3, and 4 agreed that this would be helpful (Table 14). Stratum 5 had slightly less interest with 47.9% indicating that the agreed or strongly agreed that the professional associations related to digital evidence would be helpful.

Table 14

Percentage of Respondents Interested in Professional Associations related to Digital Evidence Handling

Level of Agreement	All Respondents (n = 406)	Stratum 2 (n = 30)	Stratum 3 (n = 79)	Stratum 4 (n = 105)	Stratum 5 (n = 192)
Strong Disagree	1.0	0.0	0.0	1.9	1.0
Disagree	9.6	6.7	10.1	5.7	12.0
Neither Agree Nor Disagree	34.7	16.7	25.3	39.0	39.1
Agree	43.3	53.3	48.1	45.7	38.5
Strongly Agree	11.3	23.3	16.5	7.6	9.4

Note. One respondent in Stratum 4 did not answer this survey question.

The researcher mapped Research Question R2 to Survey Questions 20, 21, and 22. *As a first responder, I am aware of the standard operating procedures within my agency for handling of digital evidence; As a first responder, I understand what management expects of me when handling digital evidence;* and *As a first responder, I feel the expectations of management related to digital evidence handling are realistic.*

The survey attempted to gauge the patrol officers' opinions related to their awareness of their department's policy or standard operating procedure (SOP) for handling digital evidence. Over 75% of the group agreed or strongly agreed that they were aware of their department's policy or SOP; 20.1% neither agreed nor disagreed, and 10.4% disagreed or strongly disagreed (see Figure 6 for awareness of SOP for handling digital evidence - all respondents). Some of the responses that strongly disagreed, disagreed, or neither agreed nor disagreed may relate to the explanation provided by some of the respondents who stated that their department did not have a policy or SOP for handling digital evidence. Looking at the individual strata, Stratum 5 had the lowest percentage to agree or strongly agree at 72.3%, while Stratum 4 had the highest percentage that agreed or strongly agreed at 81.1%. While Stratum 5 had the lowest percentage to agree or strongly agree, it had the highest percentage of respondents who

neither agreed nor disagreed. This may indicate a lack of understanding of the policy or SOP. Examining the smallest to largest strata, there were 23.3%, 13.9%, 15.1%, and 25.1% who neither agreed nor disagreed (see Figure 7 for awareness of SOP for handling digital evidence - strata). The 6 to 10 officers stratum had no officers disagree or strongly disagree. The 11 to 24 officers stratum had 10.1% who disagreed or strongly disagreed. The other two strata were 3.8% and 2.6% from Stratum 4 and Stratum 5, respectively.

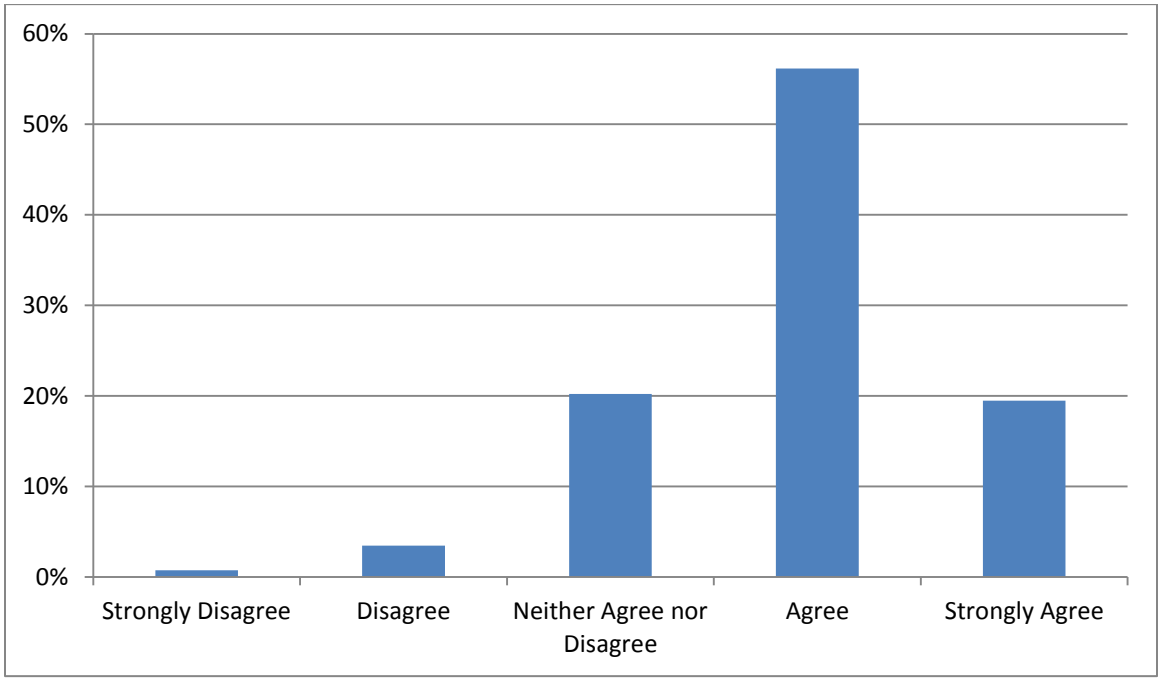

Figure 6. Awareness of SOP for handling digital evidence - All respondents.

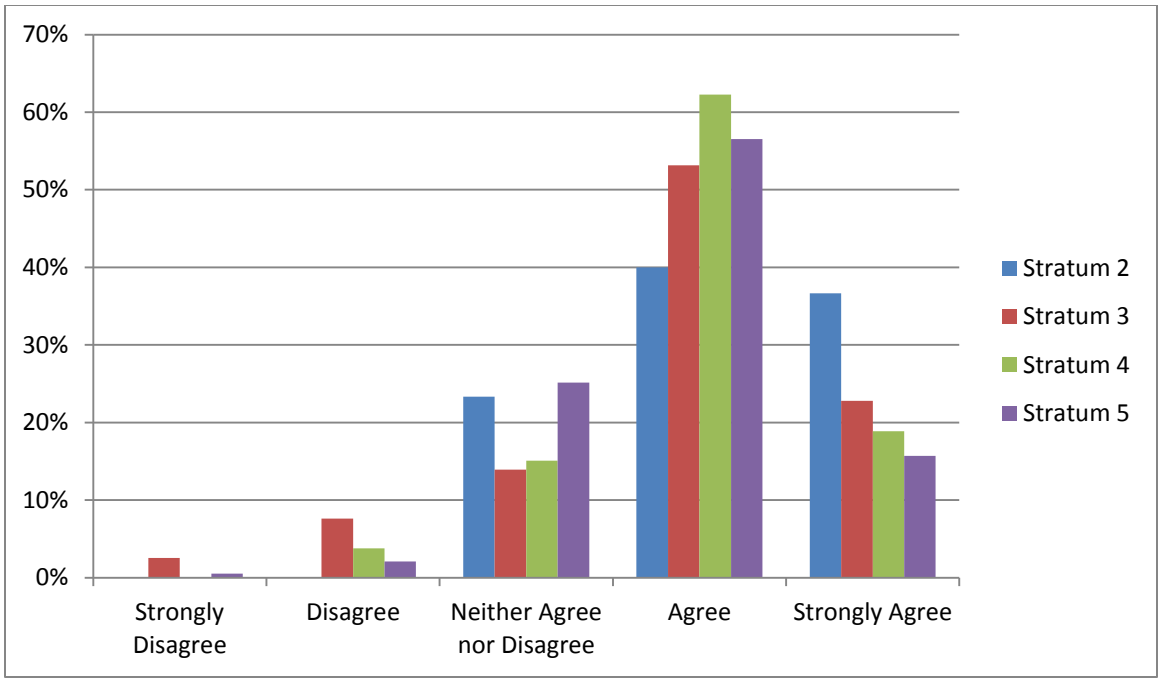

Figure 7. Awareness of SOP for handling digital evidence - Strata.

A demographic analysis found no significant differences based on age or educational level. Female respondents had a higher percentage of those who neither agreed nor disagreed (27.8%), 44.4% who agreed, and 24.1% who strongly agreed. The respondents who had fewer than 2 years of experience also had a higher percentage who neither agreed nor disagreed (26.9%), 46.2% who agreed, and 19.2% who strongly agreed. The ethnicity groups with fewer than 10 respondents yielded insufficient data to determine similarity to the overall or strata responses. Of the other ethnicities, the Black or African American and Multi-Ethnic had higher percentages of respondents who specified neither agreed nor disagreed, 31.5% and 25% respectively. The Multi-Ethnic group had no respondents who disagreed but had 12.5% who strongly disagreed.

Survey questions 21 and 22, related to the patrol officers' opinions on understanding management expectations of the officers for handling digital evidence and

specifying whether the patrol officers believe the management expectations for handling digital evidence are realistic. Of all respondents, 76.9% agreed or strongly agreed that they understood management expectations for handling digital evidence while 68.5% agreed or strongly agreed that the management expectations were realistic (see Figure 8 for opinions on whether management expectations for handling digital evidence are understood and realistic - all respondents). There were 3.69% of respondents who disagreed or strongly disagreed that they understood management expectations for handling digital evidence; 6.63% of respondents disagreed or strongly disagreed that management expectations for handling digital evidence were realistic. The strata responses followed closely to the overall responses. The largest variance was in Stratum 5 where 9.4% disagreed or strongly disagreed and 62.5% agreed or strongly agreed that management expectations were realistic (see Figure 9 for opinions on whether management expectations for handling digital evidence are understood and realistic - strata).

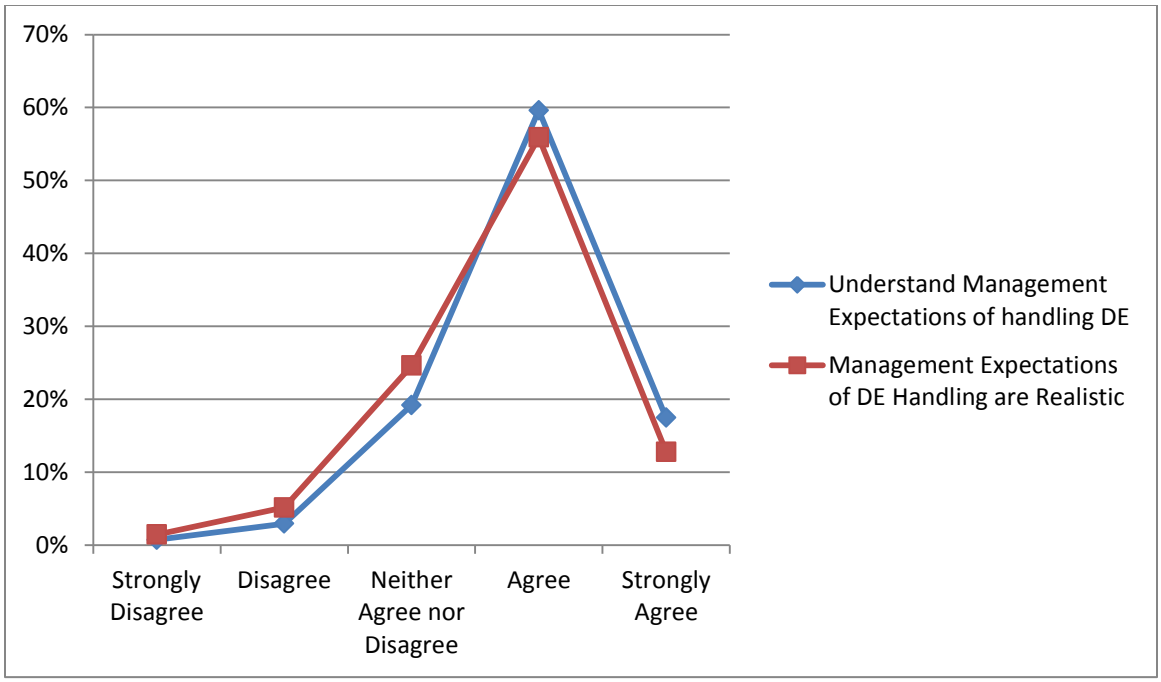

Figure 8. Opinions on whether management expectations for handling digital evidence are understood and realistic - All respondents.

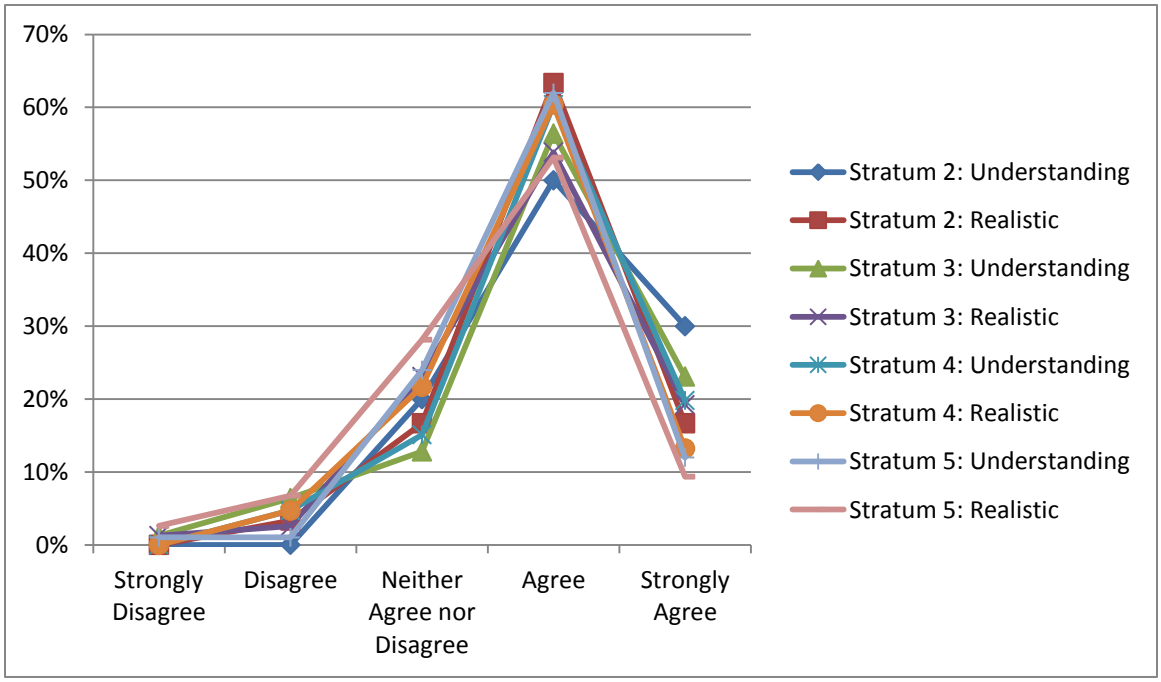

Figure 9. Opinions on whether management expectations for handling digital evidence are understood and realistic - Strata.

In the analysis by demographics, there were no significant differences in gender. The 50 to 60 years age category had a higher percentage of respondents who neither agreed nor disagreed for both understanding of management expectations (29.8%) as well as whether the management expectations for handling digital evidence were realistic (35.1%). This decreased the overall responses for agree and strongly agree to 66.7% and 59.6% for understanding of and belief that management expectations were realistic. Disagree and strongly disagree responses remained in line with the strata and overall responses at less than 10%.

Responses by education level were mostly in-line with the overall and strata responses, with the exception of the associate degree responses for understanding of management expectations. This group had an increase in neither agree nor disagree responses (31.5%), the strongly disagree and disagree responses were similar to other education groups. The strongly agree and agree responses were somewhat lower at 64.8% for understanding of management expectations.

The larger ethnicity groups were similar to overall and strata responses with the exception of the Black or African American group reporting a higher percentage of respondents who neither agreed nor disagreed (27.8% for understanding of management expectations and 42.6% for perception that management expectations are realistic). This decreased the overall responses for agree and strongly agree (63.0% and 55.6% for the respective survey questions). Similarly, the respondents with fewer than 2 years of experience had higher responses of neither agree nor disagree (26.9% and 30.8% for the respective survey questions), and lower combined percentages of those who agreed or strongly agreed (65.4% and 57.5% respectively).

R3: What is the basis of patrol officers' opinions regarding the expectations of management for the handling of digital evidence by patrol officers?

The researcher mapped Research Question R3 to Survey Question 27, *My knowledge as a first responder, of the expectations for the handling of digital evidence are based on … (choose all that apply).*

This survey question allowed the respondents to choose multiple answers. The responses to this question revealed that the respondents based their expectations of patrol officers' on their departments' policy or SOP (55.8%), followed by their departments' training (51.8%) (see Figure 10 for basis of management expectations - all respondents). The strata had the same top two responses, their departments' policy or SOP and their departments' training for Stratum 4 and Stratum 5. Stratum 2 had department training (53.3%) followed by department policy or SOP (43.3%). Stratum 3 had department training and the department policy or SOP at 54.4% (see Figure 11 for basis of management expectations - strata). All strata had department's management explanation as the third highest response ranging from 20.3% to 32.9%. Each of the strata yielded some officers who did not know the basis of expectations, as well as some officers who specified other reasons for their expectations. An unknown basis for expectations may relate to a department without a defined policy or SOP for handling of digital evidence.

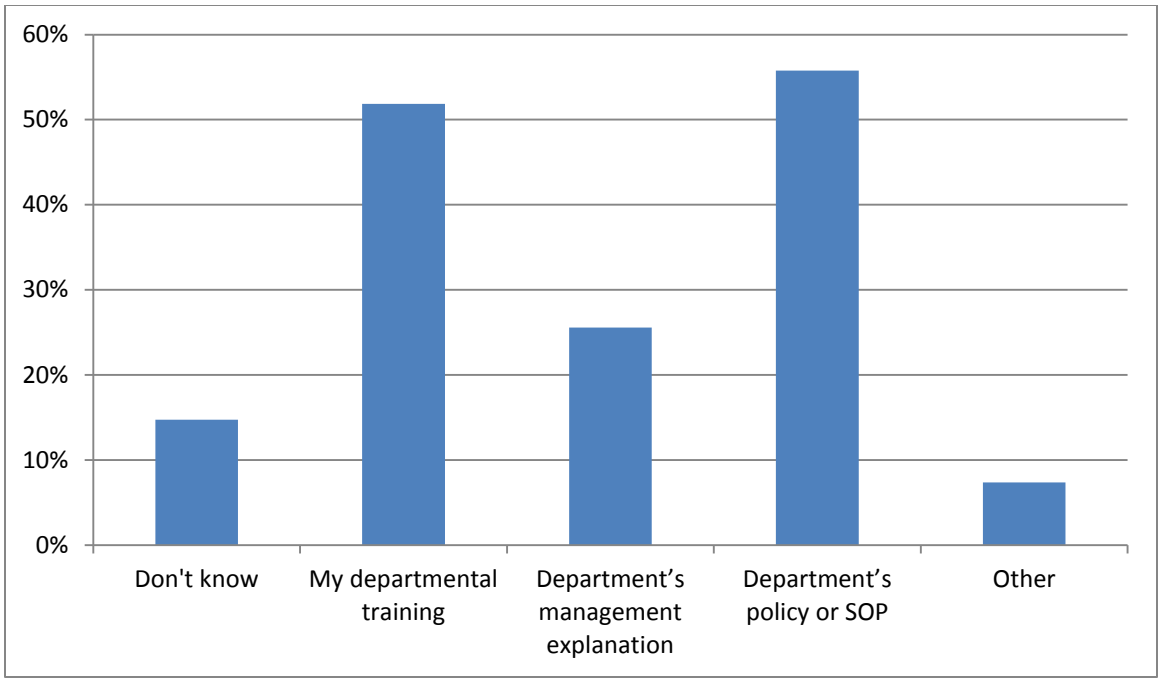

Figure 10. Basis of management expectations - All respondents.

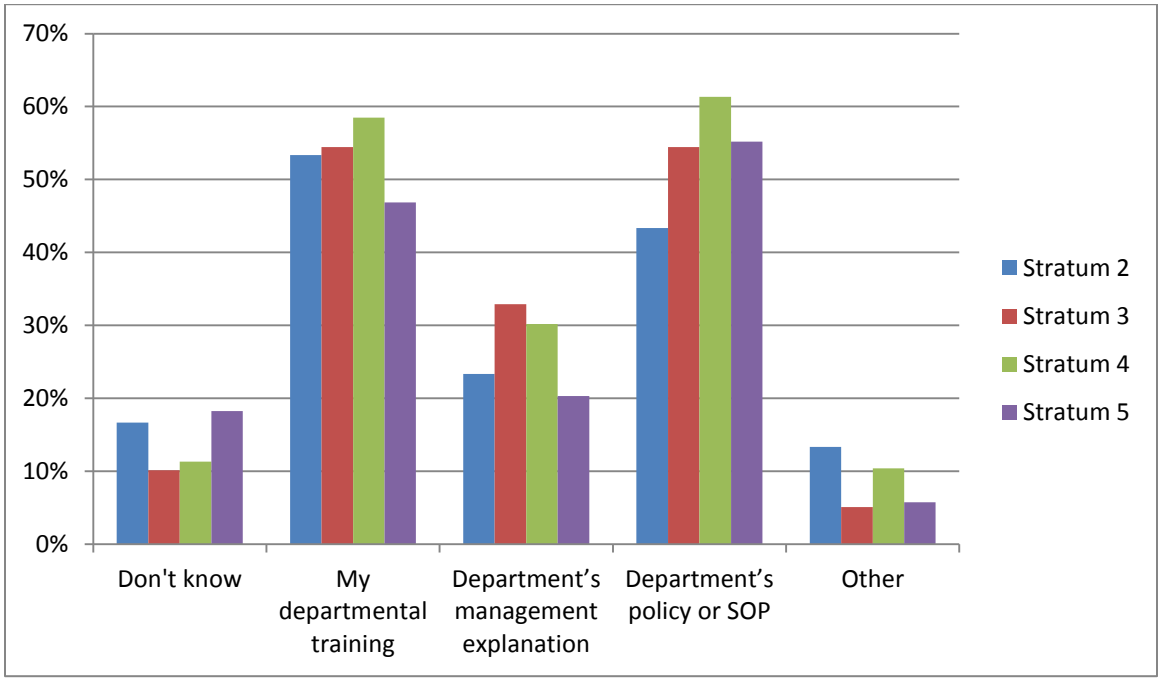

Figure 11. Basis of management expectations - Strata.

R4: What is the gap between the opinions of patrol officers regarding their level of expertise and the expectations of their management for handling digital evidence?

The researcher mapped Research Question R4 to Survey Questions 21 and 22, *As a first responder, I understand what management expects of me when handling digital evidence,* and *As a first responder, I feel the expectations of management related to digital evidence handling are realistic.*

Prior research in this area had identified a discrepancy between local law enforcement agency patrol officers' opinions regarding their level of expertise and their ability to investigate crimes with a cyber-component (Bossler & Holt, 2012; North Carolina Governor's Crime Commission / Criminal Justice Analysis Center, 2010). The current research does not indicate a significant gap between the patrol officers' opinions of their level of expertise in comparison to their opinions of management expectations for handling of digital evidence. While the researcher expected that some officers would be unclear about the expectations or level of expertise, the researcher found that only 14.7% of the overall respondents and an average of 14.1% for the strata, ranging from 10.1% to 18.2%, reported that they did not know the basis of expectations for handling of digital evidence (Survey Question 27).

Of the respondents, 3.69% stated they disagreed or strongly disagreed that they understood management expectations for handling digital evidence (Survey Question 21), while 6.63% disagreed or strongly disagreed that management expectations for handling of digital evidence were realistic (Survey Question 22). More significantly, 19.16% neither agreed nor disagreed that they understood management expectations for handling of digital evidence and 24.57% neither agreed nor disagreed that management

expectations for handling of digital evidence were realistic. These results indicate that the majority of respondents agreed or strongly agreed that they understood management expectations and believed the expectations were realistic. Fewer of the total respondents (8.35%) indicated that they agreed or strongly agreed that management expectations were realistic than those who agreed or strongly agreed that they understood management expectations. A comparison of the strata results for the two questions found a difference of 0% in Stratum 2, 6.4% in Stratum 3, 6.6% in Stratum 4, and 11.5% in Stratum 5.

With ordinal data, it is generally not appropriate to use the mean or standard deviation for evaluation of the data. Additionally, statistical calculations based on the mean would generally provide invalid or misleading results. The two survey questions examined to determine if a gap exists between patrol officers' opinions regarding their level of expertise and their opinions of management expectations for handling digital evidence used a Likert scale resulting in ordinal data. The questions asking patrol officers to rate their opinions on management expectations for handling digital evidence as realistic and the question asking whether the patrol officers think those management expectations are achievable with their existing training found that the median and mode for all respondents as well as the strata responses were four, which indicates "agree" as the response.

The researcher examined the responses by demographics, to identify any significant differences between the respondents based on gender, age, ethnicity, education, or experience. There were more categories where no members of a demographic group responded in a particular manner, for example, no one who did not specify education level or who had trade/technical/vocational training responded strongly

disagreed or disagreed to the achievability of management expectations for handling digital evidence (Table 12). In the ethnicity analysis of the same question, American Indian or Alaskan native also did not have any respondents that strongly disagreed or disagreed (Table 13). They also did not have any respondents who strongly agreed. Except where previously noted, the overall results were not significantly different from those found in the overall and strata distributions.

Summary of Results

The analysis of the data included valid responses from all respondents as well as by stratum. The survey had a sampling frame of 243 departments and closed with 407 responses from 144 responding departments within the four remaining strata. This resulted in a 95% confidence level with a precision of ±5.22%. The typical respondent was a white/Caucasian male, aged 35 to 49, with some college credit but no degree.

The researcher examined each of the research questions through one or more survey questions. R1 examined the level of expertise for handling digital evidence. The majority of respondents in the overall responses and the strata agreed or strongly agreed that management expectations were achievable with the existing training. R2 asked about the officers' opinions of management expectations for handling digital evidence. The respondents indicated their awareness of the management expectations for handling digital evidence came from their awareness of their departments' policy or SOP, and that, in their opinion, management expectations were realistic. R3 asked respondents for the basis of their understanding of management expectations for handling digital evidence. The respondents specified that they based their knowledge on the departments' policy or

SOP, followed by department training. R4 attempted to identify if a gap existed between the patrol officers' opinions on their level of expertise for handling digital evidence and their opinions of management expectations for handling digital evidence. The survey results did not identify a significant gap in this area.

Chapter 5

Conclusions, Implications, Recommendations, and Summary

Introduction

The goal of this study is to determine whether a gap exists between police officers' opinions of their own preparedness for handling digital evidence and their perceptions of management's expectations of their preparedness for handing digital evidence at local law enforcement agencies in the State of Georgia. Holt and Bossler (2012a) found a need for increased training of patrol officers and a concern that local law enforcement agencies may not recognize the inherent problems computer related crimes pose for patrol officers. Researchers have identified a lack of training numerous times over the years (Bossler & Holt, 2012; Burns et al., 2004; Davis, 2012; Goodman, 1997; Hinduja, 2004; Holt & Bossler, 2012a; North Carolina Governor's Crime Commission / Criminal Justice Analysis Center, 2010; Senjo, 2004; U.S. DOJ, Office of Justice Programs, NIJ, 2001, 2010). This research examined patrol officers' opinions related to their knowledge, skills, and management expectations.

Conclusions

This study found that the majority of patrol officers believe that management's expectations for their handling of computer-related crime are realistic and achievable with existing training. This represents a possible increase in officers' level of confidence

in their knowledge and skills since the Bossler and Holt study in 2012, which may be the result of additional training, creation or clarification of policies or procedures, or increased familiarity with technology related to the handling of digital evidence. For this study, the *Electronic Crime Needs Assessment for State and Local Law Enforcement* served as the broadest scale assessment of law enforcement agencies (U.S. DOJ, 2001). While the *Needs Assessment* did not focus solely on patrol officers, it readily identified a deficiency in entry-level patrol officer training. A significant difference also existed between the current research and Senjo's (2004) earlier research, which found local police officers played a relatively small role in handling computer crime. Other research found 6% of investigations contained a cyber-component (North Carolina Governor's Crime Commission / Criminal Justice Analysis Center, 2010). The current research found that 83.5% of patrol officers were required to handle digital evidence (Survey Question 10) in at least some situations, only 2.9% stated they never handled digital evidence, and 12.8% handled digital evidence in few situations (see Figure 12 for frequency of handling digital evidence - all respondents and Figure 13 for frequency of handling digital evidence - strata). Overall, the researcher found few differences when examining data of overall results, strata, or demographics. The most significant differences were where demographic data had an increase in the percentage of neither agree nor disagree responses.

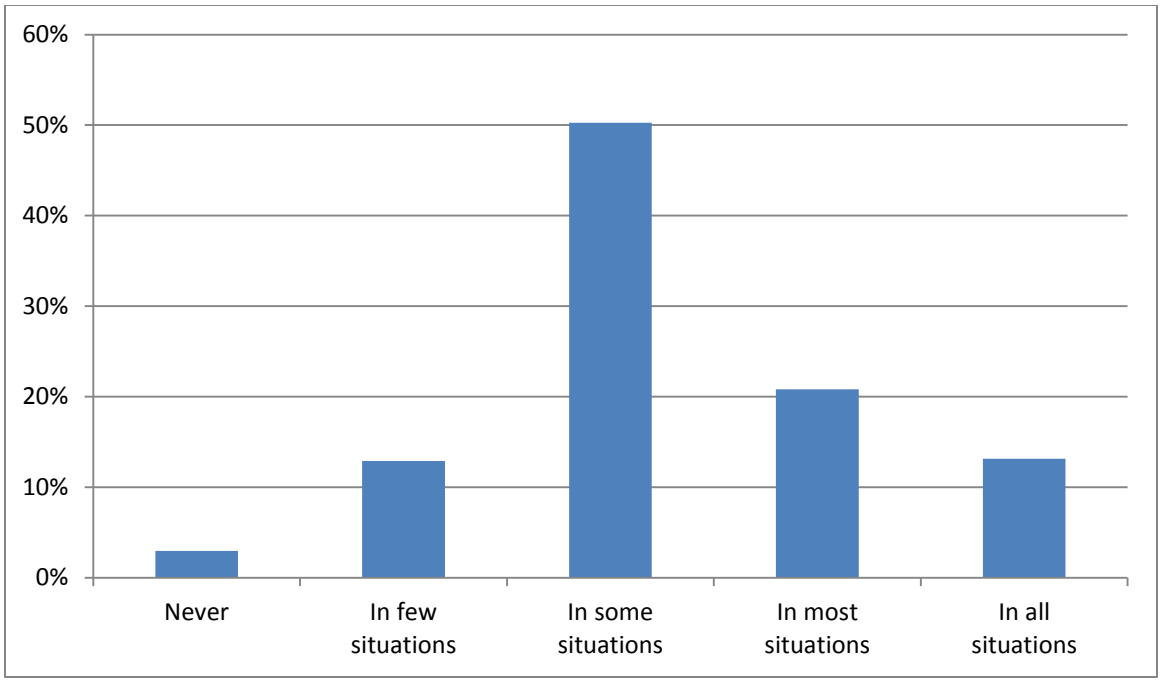

Figure 12. Frequency of handling digital evidence - All respondents (n = 404).

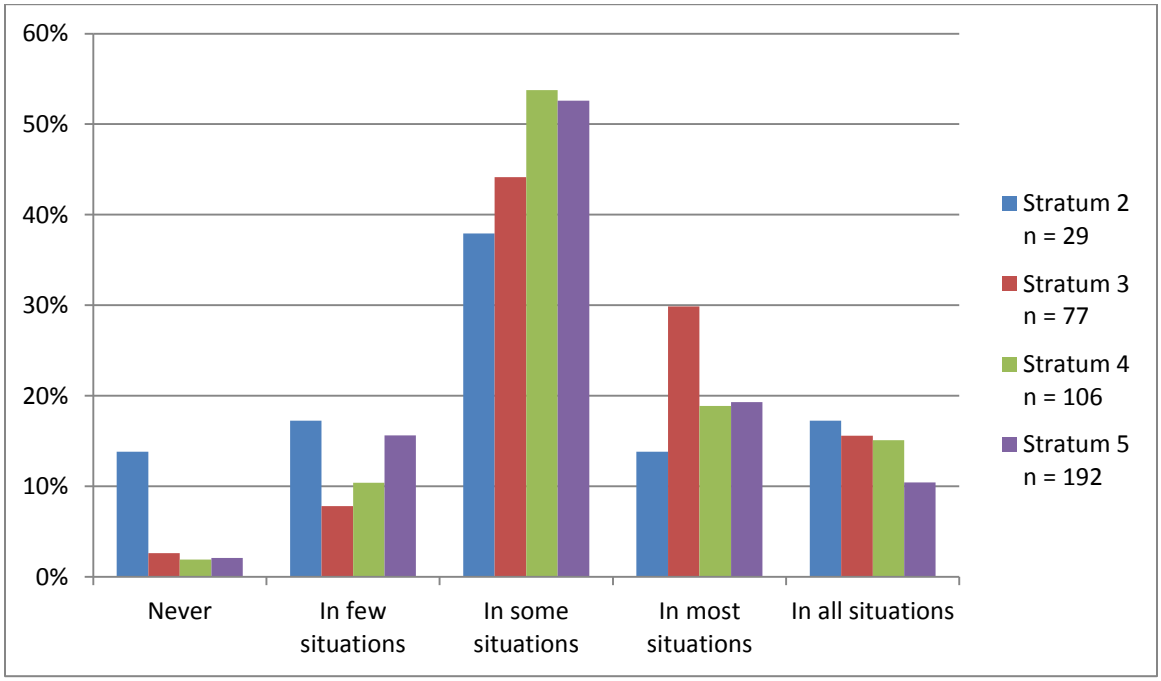

Figure 13. Frequency of handling digital evidence - Strata.

The increased use of technology in criminal activities as well as in everyday lives of individuals means there is a high likelihood of patrol officers encountering digital evidence at a crime scene since it could belong to a victim, suspect, or witness. As law enforcement agencies may have different processes or procedures for handling digital evidence, it is understandable that while a majority of officers may have handled digital evidence others may not have done so. Stratum 2 has the highest level of respondents who have not handled digital evidence. Since Stratum 2 includes smaller departments that serve small populations, it is possible that the agencies have a process to secure the scene but leave the evidence handling to another agency as was stated by some respondents in their additional comments.

There remains a need for additional training because technology is constantly changing and the requirements for handling digital evidence will evolve; however, funding may limit opportunities for such training. Respondents noted the need for additional funds and training to keep up with the technology changes represented in Survey Questions 13 and 15, as well as in respondents' comments for Survey Questions 17 and 18. The percentage of patrol officers who believe they have insufficient training to meet management expectations is low (see Figure 8 for opinions on whether management expectations for handling digital evidence are understood and realistic - all respondents and Figure 9 for opinions on whether management expectations for handling digital evidence are understood and realistic - strata). Regardless, patrol officers must receive appropriate training in handling digital evidence and in the policies and procedures of the agency, to help ensure officers continue to be confident in their abilities to meet management expectations as handling of digital evidence becomes more prevalent. While

there may be other reasons, these officers and those who responded that they neither agreed nor disagreed may lack training, an understanding of the management expectations related to the handling of digital evidence by patrol officers, or confidence in their knowledge and skills for handling digital evidence in an applied setting such as at a crime scene. The rapid pace of technological change creates a need for ongoing, specialized training for those who use technology to carry out investigations, or are involved in handling digital evidence. A majority of respondents believe they need additional training, but it appears the respondents recognized that the department needs additional funding for such training (Survey Questions 13 and 15).

Survey and Response Strengths

Web-based surveys have numerous strengths. There are reduced costs associated with the data collection, and since the study survey was conducted at the convenience of the survey taker, there was no pressure to respond, which could occur in a face-to-face survey; however, technology issues can negatively affect web-based surveys. A couple of departments contacted the researcher to request additional time to complete the survey when officers needed to obtain approvals to allow local computer systems to access the SurveyMonkey site; the flexibility of the researcher's timing allowed modifications to the requested completion date. The researcher provided telephone and email contact information to the departments in the email invitation and in the survey to ensure potential respondents could make inquiries or request clarifications easily.

The survey closed with 144 department responses out of a sampling of 243 for a department response rate of 59.26%. Typical response rates of Internet based surveys are

lower than other survey modes, averaging around 35%, or 42% when including partial responses (Lozar Manfreda, Bosnjak, Berzelak, Haas, & Vehovar, 2008; Lozar Manfreda & Vehovar, 2002). Other studies of patrol officers focused on a smaller number of departments, such as Bossler and Holt (2012) and Holt and Bossler (2012a, 2012b), which included two departments and Senjo (2004), which included 12 departments. While individual input varied from officer to officer, the 407 responses from the 144 departments support the results as found in the current research.

The responding sample in this research reflects gender distribution common to other known law enforcement studies. Bossler and Holt's (2012) survey respondents were approximately 85% male; Senjo (2004) reported 83% male respondents. Law enforcement is a male-dominated field, as is indicated by the FBI's *Uniform Crime Reports* data. Overall, male respondents comprised 86.2% of all respondents in this study, ranging from 82.3% to 88.7% in the different strata. This percentage of officers by gender in Georgia for the 2009 through 2013 reflects the broader population as noted in the *Uniform Crime Reports*' data (U.S. Department of Justice, FBI, CJIS Division, 2010, 2011, 2012, 2013, 2014), and thus reflects the Georgia statewide composition of the current police officer population.

The inclusion of ethnicity in the current research (Table 7) helped to validate the overall respondents as representative of the population of patrol officers in Georgia. Ethnicity is an area that has lacked focus in other research of patrol officers. Holt and Bossler (2012a, 2012b) and Bossler and Holt (2012) identified percentages of white and African American respondents as the two largest ethnicities represented by their respondents. Senjo (2004) included demographic information on race, specified as black,

white, Hispanic, and other. Demographic information was not included in the Davis (2012), North Carolina Governor's Crime Commission / Criminal Justice Analysis Center (2010), or Hinduja (2004) studies. Additionally, data from FBI's *Uniform Crime Reports* also excludes ethnicity. The current research provides broader details on respondents' ethnicity. The inclusion of ethnicity in the current research is a strength that supports future research as a potential comparison.

The high department response rate, and demographic representation of respondents that corresponds to law enforcement officers and prior research, provides a stronger argument for the applicability of the results to departments across the State of Georgia.

Limitations

Research studies have limitations based on the methodology and research participants. The recent research has been limited to a particular state or set of departments within multiple states but none has addressed patrol officers across the United States. To assess the level of officers' perceived knowledge and skills in comparison to their perceptions of management expectations for handling digital evidence, future researchers should include a broader scale survey to examine a cross section of states or representative departments from all states. Additionally, as this is exploratory research with little prior research for comparison, it provides a starting point but does not allow for any type of causal assessment.

While the current research uses a specific definition of a patrol officer, other studies may define patrol officer differently. The current research defined a patrol officer

as an officer who spends at least 50% of his or her time on patrol duties. Bossler and Holt (2012) defined "patrol" based on officer rank, whereas Bossler and Holt asked those with the rank of Sergeant or below to participate. As the current study encompassed the very small to large departments, it was important not to define patrol officer strictly based on an officer's rank as this might have excluded some officers within smaller departments who may perform regular patrol duties but have a higher rank.

The majority of respondents shared a common demographic background, that is, male and white/Caucasian. While the researcher was unable to find other Georgia patrol officer demographics related to ethnicity, age, or experience, the gender of the officers completing the survey corresponded to the gender differences identified in the *Uniform Crime Reports* data for the State of Georgia (U.S. Department of Justice, FBI, CJIS Division, 2010, 2011, 2012, 2013, 2014). While the respondents appear to represent the overall patrol officer population at local law enforcement agencies in Georgia, the responses may not represent the views of minority patrol officers, including women or non-white/Caucasian patrol officers. Based on the analysis of demographic results, while there were fewer respondents in some demographic categories, there were few differences in overall response distribution.

While there were surveys returned without responses to some or many of the questions, the researcher reviewed the data for incomplete responses and continued data collection until the surveys received were substantially complete. Respondents' failure to complete the survey may indicate a lack of knowledge about digital evidence handling, which the survey results do not reflect. Additionally, respondents may have felt overly burdened by the request to complete the survey. During the data collection, the researcher

received a limited number of responses from department representatives stating that their patrol officers would not participate due to prior involvement in other surveys, lack of time, or department policy. Individuals requested to complete the survey by a manager, such as the department chief, may have felt duty-bound to complete the survey, but since the researcher stated that all responses would remain private, some respondents may have put little effort into completion of the survey leading to higher levels of neutral responses or skipped questions. The extended data collection allowed additional time to collect responses from reluctant respondents. The researcher included explanations in the email messages and survey to clarify that experience with digital evidence was not required. The aim was to reduce the potential for concern about a lack of knowledge on the topic**.**

Patrol officers' memory or perception limitations can also cause concern. Patrol officers may have encountered this constraint when responding to some of the questions; however, the majority of the questions focused on their opinions of the present, rather than past events. Perception limitations are more problematic since patrol officers may perceive management expectations, policies, procedures, or technical skills in different ways depending on frame of mind at the time the officer was completing the survey. Minority patrol officers may also view management expectations, policies, procedures, or technical skills differently than non-minority patrol officers based on different experiences. The number of individuals and departments completing the survey helped to reduce the perception effect.

The possibility exists that at least some of the individuals who responded to the survey may represent different opinions than those individuals who chose not to respond, leading to volunteer bias. This could lead to a misrepresentation of overall opinions since

those individuals may have chosen not to respond due to less knowledge about the topic. This is generally believed to lead respondents to express stronger opinions and therefore fewer responses of neither agree nor disagree (Holt & Bossler, 2012).

Implications

Prior research identified a lack of training and a lack of resources (Bossler & Holt, 2012; Burns et al., 2004; Davis, 2012; Goodman, 1997; Hinduja, 2004; Holt & Bossler, 2012a; North Carolina Governor's Crime Commission / Criminal Justice Analysis Center, 2010; Senjo, 2004; U.S. DOJ, Office of Justice Programs, NIJ, 2001, 2010). The goal for this research was to determine whether a gap existed between patrol officers' opinions on digital evidence handling preparedness and their opinions of management expectations for handling digital evidence at local law enforcement agencies in the State of Georgia. While Bossler and Holt (2012) found that patrol officers had little experience in handling or responding to computer crime, the current research found that most officers believe they now have sufficient training to meet the current management expectations for handling digital evidence as was indicated in the results for Research Question R4, which focused on Survey Questions 21 and 22. While a belief that the patrol officers can meet expectations and have sufficient training is useful information, it does not confirm whether the patrol officers are able to apply their training on the job. This may be a result of the increased use of technology and additional training opportunities for law enforcement through internal and external sources. Holt and Bossler (2012a) also found that patrol officers stated they rarely responded to computer crime

calls and therefore Holt and Bossler (2012a) concluded that personal experience about computer crimes was likely not the basis of the responses.

The pace of change of technology is a concern for all law enforcement agencies due to the impact that technology now has on crime. It is important for law enforcement management to understand the challenges that patrol officers may encounter, particularly in relation to handling digital evidence, as this type of evidence is increasingly prevalent in many types of crimes. The current exploratory research helps to fill a gap in the literature related to patrol officers' opinions of their preparedness for handling digital evidence and provides insight into possible changes that have occurred in the last few years through an improved understanding of how patrol officers in Georgia perceive handling of digital evidence. The results of the survey provide a broader understanding of the current state of patrol officers' opinions in the State of Georgia. Departments across Georgia may be able to apply the results to gain further understanding of departmental expectations in comparison to their own. Outside of Georgia, departments may be able to use the results of this research as an additional point of comparison for future research within their own state or region.

Recommendations

When compared to prior research, the current study appears to indicate that there are changes occurring for patrol officers in their handling digital evidence. The increase in patrol officers' involvement in handling digital evidence is an area that merits further examination, particularly on a broader scale, to determine if other states -- or other agencies, particularly those at the state or federal level -- find results similar to the current

study. A recommendation for future research would be to expand upon the current study using other states or including other types of agencies beyond the local level examined in this research, such as Sheriff's offices, and university or transit police departments. Additionally, future research could modify the sampling frame to focus on minorities to determine whether the results found in the current research are also representative of minority patrol officers. The results of ethnicity analysis were inconclusive for most ethnicities as there was insufficient data, therefore, further research in this area may find differing conclusions (Table 13). The current study did not focus on minorities; such study would provide more detail. The current study did not find significant differences as many of the ethnicities did not include sufficient results for analysis. It would be beneficial for law enforcement management, such as chiefs of police, police academy training coordinators, and others, to gain a broader understanding of the current opinions of officers in their state and across the country to be able to compare broader-based results to their own department. This could assist with planning for future training or policy updates, as well as budgeting for training and equipment. The current research demonstrates that Georgia's local police departments are generally successful in rolling out changes needed to support the handling of digital evidence. The participants' opinions that they can meet management expectations for handling digital evidence support this belief (see Figure 1 for achievability of management expectations for handling digital evidence with existing training - all respondents and Figure 2 for achievability of management expectations for handling digital evidence with existing training – strata). Departments whose patrol officers do not believe they can meet

management expectations may require additional training or the department may require an updated rollout plan that better supports officers' acceptance of change.

A second recommendation for future research is further analysis of the training, education, and equipment needs of patrol officers handling digital evidence. The pace of change in technology and its adoption by criminals means that law enforcement must be familiar with handling the latest digital devices. Many officers indicated that additional training should be a priority (Survey Question 15) but a more in-depth assessment of patrol officers' current training, and an examination of skills deficits and possibilities for additional training would provide departments with a clearer understanding of their training needs and patrol officers' interest in additional training beyond the minimum to meet department requirements. There are many training opportunities available for law enforcement; some are available free of charge or at a nominal cost for law enforcement; others are more expensive.

Some respondents commented on a lack of resources, including equipment, to support their handling of digital evidence. An in-depth examination of these needs would allow departments to compare their needs with available resources and training opportunities to develop an appropriate training and education plan that addresses specific needs, for example a focus on computer or mobile devices. This would allow for creation of a budget to support the plan and the inclusion of required equipment to support the patrol officers' in their handling of digital evidence. Departments need this type of examination on a regular basis to keep patrol officers abreast of technological changes and to ensure they have the required equipment to keep pace. Such an

assessment might correspond with the annual budgeting that occurs in most organizations and agencies.

Future research should focus on more in-depth assessment such as determination of the potential reasons associated with the current or future levels of patrol officer knowledge and skills in relation to its effect on potential viability of evidence or prosecution of cases. It would also benefit future research to examine actual applied knowledge and skills in comparison to the police officers' perceptions of their knowledge and skills to determine whether a gap exists. Exploratory research is limited in the types of data analysis as it explores a topic where researchers know little and the goal is to advance the topic for subsequent research. Causal research may determine the effect that patrol officers' knowledge and skills for handling digital evidence has on the prosecution of cases.

Summary

The goal of the current research was to identify whether a gap exists between local Georgia law enforcement patrol officers' perceptions of their knowledge related to handling digital evidence versus the expectation of their management. This research represents the first known statewide examination of patrol officers' opinions of digital evidence handling. Studies performed in other states differed in their goals as well as having limited focus of the role of patrol officers in digital evidence handling (Hinduja, 2004; North Carolina Governor's Crime Commission / Criminal Justice Analysis Center, 2010; Senjo, 2004). Recent studies focused on two police departments, one in Georgia and the other in North Carolina (Bossler & Holt, 2012; Holt & Bossler, 2012a, 2012b).

The Bossler and Holt (2012) and Holt and Bossler (2012a, 2012b) lacked statewide coverage as well as a comprehensive examination of the opinions of local agencies' patrol officers.

The researcher defined four research questions that formed the basis of this research. These research questions focused on identifying the patrol officers' opinions for handling digital evidence regarding (1) their level of expertise, (2) management expectations, (3) the basis of management expectations, and (4) the gap between their level of expertise and management expectations.

Existing research on changes affecting patrol officers had found officers tend to resist change, particularly when it may result in an increased workload (Morabito et al., 2012; Skogan, 2008; Sparrow et al., 1990). Little research focused on patrol officers' opinions. Previous research on police officer perceptions and opinions focused on topics such as responses to persons with mental illness, crisis intervention, community policing, and job satisfaction (Compton et al., 2008; Engel & Worden, 2003; Johnson, 2012; Morabito et al., 2012; Wells & Schafer, 2006).

While research has addressed law enforcement and digital evidence, much of the work has related to the officers or civilians whose primary responsibilities include handling and investigation of digital evidence. Makin (2012) found that the CSI effect has created an environment in law enforcement where evidence is collected to appease a victim but is never processed or intended for processing. The lack of research into patrol officers' opinions on digital evidence has left a gap in the understanding of their role in the handling of this type of evidence. Research on digital examinations has focused on cases involving child exploitation and pedophilia (Burns et al., 2008; Krause, 2009;

Marcum et al., 2010; Perez et al., 2010). As technology integrates into people's everyday lives, criminals have begun to use technology in the commission of traditional crimes in addition to crimes that evolved from the advent of the technology (Montoya et al., 2013).

When LEOs first began using digital evidence, the individuals responsible for examining it were those individuals within the department who had an interest in computers or were simply more experienced than others in the department (Beauprez, 2002). This type of assignment was not necessarily a benefit to the department, as the individual often had no experience in this type of examination. As collection, handling, and examination of digital evidence became more complex, it has required a higher level of knowledge and skills, supported by appropriate training and tools to complete examination of the evidence.

The researcher intended to use a disproportionate stratified random sample; however, the survey failed to achieve the necessary response level. As such, the researcher attempted to contact all local level police departments within the state. Email was the primary contact and, where the researcher did not find a valid email address on the Internet, telephone contact with a representative of the department to request an individual's contact information was attempted so that the survey information could be emailed. Despite these efforts, the researcher was unable to obtain a sufficient number of responses from departments with one to five officers, forcing removal of this stratum (Stratum 1) from the study. The researcher planned to include interviews with the stratum lacking responses but due to the low number of responses in the one to five officers stratum, it was determined that interviews would not result in the required level of responses. The remaining samples achieved sufficient responses from the state's

department population. It includes Stratum 2, Stratum 3, Stratum 4, and Stratum 5, which represents the smallest through the largest strata, respectively, based on the number of officers in the department. The 144 departments included 29 in the stratum of 6 to 10 officers (Stratum 2), 45 in the stratum of 11 to 24 officers (Stratum 3), 44 in the stratum of 25 to 74 officers (Stratum 4), and 26 in the stratum of 75 or more officers (Stratum 5).

The researcher began data collection on January 19, 2015 and completed the collection on May 12, 2015. An examination of the overall responses and by stratum is included in the analysis. After removing responses from non-patrol officers, surveys with extensive incomplete data, and the responses from the one to five officers stratum, the researcher had responses from 144 departments (407 individual responses) within the four remaining strata. The sampling frame for the four strata included 243 departments; this resulted in 95% confidence with a precision of ±5.22% based on a response rate of 59.26%. The typical survey respondent was a white/Caucasian male, aged 35 to 49, with some college credit but no degree. The survey is representative of the broader population of departments based on gender statistics. Few studies include demographics. The *Census of State and Local Law Enforcement Agencies, 2008* does not include demographics (U.S. Department of Justice, Office of Justice Programs, BJS, 2011). The *Uniform Crime Reports* data from the FBI had similar percentages of officers by gender in Georgia as were found in this survey's responses (U.S. Department of Justice, FBI, CJIS Division, 2010, 2011, 2012, 2013, 2014).

The researcher used one or more survey questions to examine each of the research questions. Research Question, R1 examined the level of perceived expertise for handling digital evidence and the results indicated that the majority of respondents in the total

responses and the strata responses agreed or strongly agreed that management expectations were achievable with the patrol officers' existing training. Research Question, R2 assessed the patrol officers' opinions of management expectations for handling of digital evidence. A majority of respondents indicated that they agreed or strongly agreed that they understood management expectations and that their awareness of the management expectations for handling digital evidence came from their departments' policy or SOP. A majority of respondents also indicated that, in their opinions, management expectations were realistic. The third Research Question, R3, attempted to gather information regarding the respondents' basis for understanding management expectations related to the handling of digital evidence. The respondents specified that their knowledge was the result of the departments' policy or SOP, followed by department training. Some respondents identified the department's management explanation as the source of understanding expectations. The last Research Question, R4, aimed to identify whether a gap existed between the patrol officers' opinions of their level of expertise for handling digital evidence and their opinions of management's expectations for officers' handling of digital evidence. The current research results did not indicate a significant gap between the patrol officers' opinions of their preparedness and management's expectations for handling digital evidence. While this research concludes that patrol officers want additional training (Survey Question 15), the respondents indicated that they felt capable of handling digital evidence according to their departments' policy or SOP. This clarifies a concern raised by earlier research regarding whether law enforcement was adapting to accommodate crimes involving the use of technology (Davis, 2012; North Carolina Governor's Crime Commission /

Criminal Justice Analysis Center, 2010). Law enforcement may not be changing as quickly as technology but patrol officers are concerned about keeping up with the needs of handling criminal activities that may involve digital evidence.

Appendix A

Subject Matter Experts Participation Request

Subject: Dissertation Advisory Committee Request

[Potential Committee Member],

As you may be aware, I am currently pursuing my PhD in Information Systems from Nova Southeastern University. I have completed all of my course work and am currently working on my dissertation. This is a three-report process, first is the idea paper where my academic committee must approve my idea for a dissertation. This first step has been approved. I am now working on the proposal phase where I must provide all of the details related to how I will implement my planned research. I presented a plan that includes the use of an advisory committee comprised of subject matter experts to assist with design and review of my survey.

My topic title is "Police perceptions of digital evidence response handling in the State of Georgia: An examination from the viewpoint of local agencies' patrol officers." I am contacting you to find out if you would be available to participate as a member of my advisory committee. The responsibilities would be to review and make recommendations related to my survey that will be administered online to patrol officers at randomly sampled local police departments across the State of Georgia. I do not anticipate that this will require any travel. Most of the recommendations could be sent via email. If needed, I could host an online meeting of the committee to make final recommendations or resolve any conflicting input.

If you feel that you would have time to assist me with this, I would greatly appreciate it; however, I do understand if you have other obligations or time constraints that would restrict you from participating in this advisory committee. I would appreciate if you could let me know of your availability to participate by Wednesday, May 7.

Thank you for your consideration,

Tanya MacNeil

Appendix B

Patrol Officer Survey

Title of Study: Police Opinions of Digital Evidence Response Handling in the State of Georgia: An Examination from the Viewpoint of Local Agencies' Patrol Officers

Principal investigator
Tanya MacNeil. M.I.T.E.
235 Cedarhurst Drive
(770) 213-4709

Co-investigator
Steven Zink, Ph.D.
Las Vegas, NV 89119
(702) 522-7030

Institutional Review Board
Nova Southeastern University
Office of Grants and Contracts
(954) 262-5369/Toll Free: 866-499-0790
IRB@nsu.nova.edu

Site Information
SurveyMonkey.com

Description of Study: Tanya MacNeil is a doctoral student at Nova Southeastern University engaged in research for the purpose of satisfying a requirement for a Ph.D. in Information Systems degree. The purpose of this study is to survey local law enforcement agencies' patrol officers on their opinions of digital evidence response handling in the State of Georgia.

If you agree to participate, you will be asked to complete the attached questionnaire. This questionnaire will help the writer understand the opinions of digital evidence response handling in the State of Georgia. The data will be used to gain insight into how patrol officers view their preparedness to handle digital evidence as well as their opinions on administrative expectations regarding patrol officers' abilities to handle digital evidence. It will also focus on identifying the potential gap between patrol officers' opinions of digital evidence and the patrol officers' view on what administrative expectations are for patrol officers handling digital evidence. The questionnaire will take approximately ten to fifteen minutes to complete.

Risks/Benefits to the Participant: There may be minimal risk involved in participating in this study. There are no direct benefits to for agreeing to be in this study. Please understand that although you may not benefit directly from participation in this study, you have the opportunity to enhance knowledge related to opinions of local law enforcement digital evidence response handling in the State of Georgia. If you have any concerns about the risks/benefits of participating in this study, you can contact the investigators and/or the university's human research oversight board (the Institutional Review Board or IRB) at the numbers listed above.

Cost and Payments to the Participant: There is no cost for participation in this study. Participation is completely voluntary and no payment will be provided.

Confidentiality: Information obtained in this study is strictly confidential unless disclosure is required by law. All data will be kept secure through the SurveyMonkey.com Web site upon collection, and then moved to a secure, offline

storage. Your name will not be used in the reporting of information in publications or conference presentations.

Participant's Right to Withdraw from the Study: You have the right to refuse to participate in this study and the right to withdraw from the study at any time without penalty.

I have read this letter and I fully understand the contents of this document and voluntarily consent to participate. All of my questions concerning this research have been answered. If I have any questions in the future about this study they will be answered by the investigator listed above or his/her staff.

I understand that the completion of this questionnaire implies my consent to participate in this study.

For purposes of this survey, all data found on computers, networks, mobile devices, storage devices, and other electronic devices will be referred to as digital evidence.

1. Police Department agency name:
   - Agency name will only be used to determine where follow-up is required to ensure adequate data for the survey. It will not be included in the final report or any publicly available information.

2. My position requires me to respond to incidents during at least 50% of my time (this includes all types of incidents, not just those involving digital evidence):
   a. Yes
   b. No

3. What is your gender?
   a. Female
   b. Male

4. What is you ethnicity (Please specify all that apply)?
   a. American Indian or Alaskan Native
   b. Asian or Pacific Islander
   c. Black or African American
   d. Hispanic or Latino
   e. White / Caucasian
   f. Prefer not to answer
   g. Other (please specify)

5. What is the highest level of education you have completed?
    a. Some high school, no diploma
    b. High school graduate or equivalent
    c. Some college credit, no degree
    d. Trade/technical/vocational training
    e. Associate degree
    f. Bachelor's degree
    g. Master's degree
    h. Professional degree
    i. Doctorate degree

6. What is your age?
    a. Under 25
    b. 25-34
    c. 35-49
    d. 50-60
    e. Over 60

7. Number of sworn officers in your agency:
    a. 1-5
    b. 6-10
    c. 11-24
    d. 25-74
    e. 75 or more

8. Years of service as a sworn officer at your current agency:
    a. Less than 2
    b. 2-5
    c. 6-10
    d. 10-20
    e. More than 20

9. Total years as a sworn officer:
    a. Less than 2
    b. 2-5
    c. 6-10
    d. 10-20
    e. More than 20

10. As a first responder, I am required to handle digital evidence:
    a. In all situations
    b. In most situations
    c. In some situations
    d. In few situations
    e. Never

11. How many total investigations did your agency conduct in 2014 (including both those that involved and did not involve digital evidence components)?
    - Actual
    - Estimate
    a. Please specify the actual or estimated value

12. How many of your agency's investigations contained a digital evidence component in 2014 (regardless of whether digital evidence was a component in the prosecution)?
    - Actual
    - Estimate
    a. Please specify the actual or estimated value

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
13. Increased funding is needed for digital evidence handling training for law enforcement agencies.					

Why do you feel the way you do about increased funding?
[text box]

14. Hours of training for handling digital evidence in past two years:
    a. None
    b. 1-4
    c. 5-8
    d. 9-16
    e. 17-24
    f. 25-48
    g. 49-100
    h. More than 100

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
15. Additional digital evidence handling training should be a top priority for our agency.					

16. What type of training have you completed within the past two years? (choose all that apply)
    a. None
    b. Basics of digital evidence
    c. Handling of evidence
    d. Handling of digital evidence
    e. Collection and documentation of evidence
    f. Collection and documentation of digital evidence
    g. Other [text box]

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
17. In my opinion, a lack of awareness of the importance of digital evidence has resulted in a lack of funding for training and resources for handling digital evidence.					

Why do you feel this way about a lack of awareness of the importance of digital evidence's effect on funding for training and resources for handling digital evidence?
[text box]

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
18. A lack of awareness of the importance of digital evidence has resulted in less training available for first responders.					

Why do you feel this way about a lack of awareness of digital evidence's effect on training for first responders?
[text box]

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
19. Digital evidence has dramatically changed my job as a first responder.					

How has the job changed because of digital evidence?
[text box]

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
20. As a first responder, I am aware of the standard operating procedures within my agency for handling of digital evidence.					

Briefly describe the standard operating procedures.
[text box]

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
21. As a first responder, I understand what management expects of me when handling digital evidence.					

What are the expectations?
[text box]

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
22. As a first responder, I feel the expectations of management related to digital evidence handling are realistic.					

Why do you feel the way you do about management expectations?
[text box]

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
23. As a first responder, I feel the expectations of management related digital evidence handling are achievable with my existing training.					

Why do you feel the way you do about management expectations related to your existing training?
[text box]

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
24. As a first responder, it would be helpful for me to participate in professional associations that focus on digital evidence handling and investigation.					

25. Do you currently belong to any professional associations that focus on digital evidence handling and investigation?
    a. None
    b. High Technology Crime Investigation Association (HTCIA)
    c. American Society of Digital Forensics and e-Discovery (ASDFED)
    d. Digital Forensics Association (DFA)
    e. InfraGard
    f. Other [text box]

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
26. As a first responder, I believe there is sufficient technical expertise within my agency for handling digital evidence.					

Why do you think this way about the technical expertise with your agency for handling digital evidence?
[text box]

27. My knowledge as a first responder, of the expectations for the collection and handling of digital evidence are based on … (choose all that apply):
    a. I do not know what my department's expectations are for the collection and handling of digital evidence
    b. My departmental training
    c. An explanation provided to me from my department's management
    d. My department's policy or standard operating procedure
    e. Other (please list): _____

Appendix C

Initial Email to Chief of Police

Subject: Georgia Patrol Officers Survey Support Request

Dear Chief,

My name is Tanya MacNeil, I am a resident of Georgia, and a member of the Atlanta/Georgia chapters of InfraGard, the High Technology Crime Investigation Association (HTCIA), and the American Society of Digital Forensics and E-Discovery (ASDFED). I am currently pursuing my PhD in Information Systems at Nova Southeastern University, Fort Lauderdale, FL. The topic of my doctoral dissertation is "Police Opinions of Digital Evidence Response Handling in the State of Georgia: An Examination from the Viewpoint of Local Agencies' Patrol Officers." I would like to request your permission and assistance to have your patrol officers complete an online survey. The survey would take approximately 10 minutes, will be confidential, and will not request any contact information. Some demographic information is included but will only be used in aggregate. A copy of the planned survey is attached for your review. The Institutional Review Board of the university has approved this survey. I am not asking you to send the survey at this time. I wanted to share the survey with you in hopes that you will support my research when the survey is ready to launch on [date].

If you are not the person who would need to approve this type of request, please forward to me the name and contact information of the person with whom I should communicate. I welcome the opportunity to discuss any questions you may have if that would be helpful.

Thank you for your time.
Sincerely,

Tanya MacNeil
macneil@nova.edu
(770) 213-4709

Appendix D

Survey Emails to Chief of Police and Patrol Officers

Subject: Georgia Patrol Officers Digital Evidence Handling Survey

Dear Chief,

As you may recall from my email on [date], I was contacting you to support distribution and completion of my survey by your patrol officers on the handling of digital evidence. I have gained approval from my university for implementation of the survey. Today, I am writing to you to request your support in distributing this survey. The survey is brief and will only take the patrol officers approximately 10 minutes to complete. The URL where the survey can be located is provided in the attached message to patrol officers. The survey will be available until [date].

Your department's participation is voluntary and all of the responses will be kept confidential. The name of the department will only be used to identify departments that have not completed the survey so that I may follow-up with a reminder. The demographic information will be used as part of the aggregate data. I will make a copy of the aggregate results available to all interested departments.

Thank you very much for your time and support of my doctoral research.

Sincerely,

Tanya MacNeil
macneil@nova.edu
(770) 213-4709

Message to Patrol Officers

Subject: Georgia Patrol Officers Digital Evidence Handling Survey

Patrol Officer,

Thanks to your Chief for agreeing to send this email to you today. My name is Tanya MacNeil, I am a resident of Georgia, and a member of the Atlanta/Georgia chapters of InfraGard, the High Technology Crime Investigation Association (HTCIA), and the American Society of Digital Forensics and E-Discovery (ASDFED). I am currently pursuing my PhD in Information Systems at Nova Southeastern University, Fort Lauderdale, FL. The topic of my doctoral dissertation is "Police Opinions of Digital Evidence Response Handling in the State of Georgia: An Examination from the Viewpoint of Local Agencies' Patrol Officers."

I would like to request your assistance by completing an online survey. The survey will not request any contact information. Some demographic information is included but will only be used as a part of the aggregate data. Your participation is voluntary and all data will be kept confidential. The name of the department will only be used to identify departments that have not completed the survey so that I can follow-up. The survey is brief and will only take you approximately 10 minutes to complete. Please click on the link below to go to the survey Web site (or copy and paste the link into your Web browser) [URL to survey]. The survey will be available until [date].

I welcome the opportunity to discuss any questions you may have if that would be helpful. Thank you for your time and support of my doctoral research.

Sincerely,

Tanya MacNeil
macneil@nova.edu
(770) 213-4709

Appendix E

Follow-Up Survey Emails to Chief of Police and Patrol Officers

Subject: Georgia Patrol Officers Digital Evidence Handling Survey Follow-Up

Dear Chief,

As you may recall from my email messages on [date] and [date], I contacted you to support distribution and completion of my survey by your patrol officers on the handling of digital evidence. Today, I am writing to you to follow-up on completion of the survey by patrol officers in your department. The survey is brief and will only take the patrol officers approximately 10 minutes to complete. The URL to locate the survey is provided in the attached message to patrol officers. The survey will be available until [date].

Your department's participation is voluntary and all of the responses will be kept confidential. The name of the department will only be used to identify departments that have not completed the survey. The demographic information will be used as part of the aggregate data. I will make a copy of the aggregate results available to all interested departments.

Thank you very much for your time and support of my doctoral research.

Sincerely,

Tanya MacNeil
macneil@nova.edu
(770) 213-4709

Message to Patrol Officers

Subject: Georgia Patrol Officers Digital Evidence Handling Survey

Patrol Officer,

Thanks to your Chief for agreeing to send this email to you today. My name is Tanya MacNeil, I am a resident of Georgia, and a member of the Atlanta/Georgia chapters of InfraGard, the High Technology Crime Investigation Association (HTCIA), and the American Society of Digital Forensics and E-Discovery (ASDFED). I am contacting you to follow-up on my request for you to complete a survey in support of my PhD in Information Systems at Nova Southeastern University, Fort Lauderdale, FL. The topic of my doctoral dissertation is "Police Opinions of Digital Evidence Response Handling in the State of Georgia: An Examination from the Viewpoint of Local Agencies' Patrol Officers."

I would like to request your assistance by completing an online survey. The survey will not request any contact information. Some demographic information is included but will only be used as a part of the aggregate data. Your participation is voluntary and all data will be kept confidential. The name of the department will only be used to identify departments that have not completed the survey so that I can follow-up. The survey is brief and will only take you approximately 10 minutes to complete. Please click on the link below to go to the survey Web site (or copy and paste the link into your Web browser) [URL to survey]. The survey will be available until [date].

I welcome the opportunity to discuss any questions you may have if that would be helpful. Thank you for your time and support of my doctoral research.

Sincerely,

Tanya MacNeil
macneil@nova.edu
(770) 213-4709

Appendix F

IRB Approval

NOVA SOUTHEASTERN UNIVERSITY
Office of Grants and Contracts
Institutional Review Board

MEMORANDUM

To: Tanya MacNeil

From: Ling Wang, Ph.D.
Institutional Review Board

Date: Jan. 13, 2015

Re: *Police Opinions of Digital Evidence Response Handling in the State of Georgia: An Examination from the Viewpoint of Local Agencies' Patrol Officers*

IRB Approval Number: wang01151501

I have reviewed the above-referenced research protocol at the center level. Based on the information provided, I have determined that this study is exempt from further IRB review. You may proceed with your study as described to the IRB. As principal investigator, you must adhere to the following requirements:

1) CONSENT: If recruitment procedures include consent forms these must be obtained in such a manner that they are clearly understood by the subjects and the process affords subjects the opportunity to ask questions, obtain detailed answers from those directly involved in the research, and have sufficient time to consider their participation after they have been provided this information. The subjects must be given a copy of the signed consent document, and a copy must be placed in a secure file separate from de-identified participant information. Record of informed consent must be retained for a minimum of three years from the conclusion of the study.

2) ADVERSE REACTIONS: The principal investigator is required to notify the IRB chair and me (954-262-5369 and 954-262-2020 respectively) of any adverse reactions or unanticipated events that may develop as a result of this study. Reactions or events may include, but are not limited to, injury, depression as a result of participation in the study, life-threatening situation, death, or loss of confidentiality/anonymity of subject. Approval may be withdrawn if the problem is serious.

3) AMENDMENTS: Any changes in the study (e.g., procedures, number or types of subjects, consent forms, investigators, etc.) must be approved by the IRB prior to implementation. Please be advised that changes in a study may require further review depending on the nature of the change. Please contact me with any questions regarding amendments or changes to your study.

The NSU IRB is in compliance with the requirements for the protection of human subjects prescribed in Part 46 of Title 45 of the Code of Federal Regulations (45 CFR 46) revised June 18, 1991.

Cc: Protocol File

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