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An Exploratory Study on Physical Fitness Policies Among Police Departments in North Carolina

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"An Exploratory Study on Physical Fitness Policies Among Police Departments in North Carolina."

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Abstract

The purpose of this study was to examine the existing state of physical fitness maintenance policies among police departments in North Carolina, and how those policies impact reported injuries among police officers. The research identified a sample of police departments with and without mandated physical fitness maintenance policies (n = 145) for years 2013-2015 and through collaboration with the North Carolina League of Municipalities, determined the number officer injuries per department for comparison. This information also included the cause of injury, costs, lost work days and claims by male and female for comparison. A cross-sectional analysis and purposive sampling method were used to compare agencies who self-reported their level of physical fitness maintenance. Agencies were classified as mandated fitness standards, mandated wellness standards, and no standards. Police departments with mandatory physical fitness standards (FS) were found to have significantly lower medical costs (X^2 (1) = 126.4, p = .001, C = .541) and lost work days (X^2 (1) = 6.68, p = .009, C = .980) in several analysis when compared to agencies without FS and agencies with WS alone. Police departments with mixed standards (FS or WS or both) were compared to agencies without standards and no statistical significance was found. Future studies are recommended to increase the generalizability of the study and to determine causes of the increases in medical costs observed in agencies that mandate wellness standards.

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CHAPTER 1: INTRODUCTION

Background

The question of physical fitness standards in law enforcement has intrigued me since completion of law enforcement basic training in 1989. I soon discovered that many of my more experienced colleagues had not maintained the fitness standards required of basic recruits and were in declined states of physical fitness. According to Means, Lowry & Hoffman (2011), in 98 percent of American law enforcement agencies, the only time a person has to meet physical fitness standards is when he/she is not yet an officer but trying to become one. After becoming an officer, they are permanently excused from meeting this requirement. The general public relies on and trusts the abilities of the police to provide protection and reduce crime. It seems logical that the physical abilities of the individual police officer could have an effect on overall job performance and accomplishment of the goal of protecting the public and reducing crime.

The role of a police officer is often sedentary, intermixed with moments of extreme physical exertion (Lagestad 2011). In a study from the Cooper Group that was conducted between 1983 and 1993 involving 1700 officers from across the country, it was surprising to discover that police officers were less fit than at least half of all U.S. citizens (Quigley, 2008; Kales, Tsismenakis, Zhang & Soteriades, 2009). This problem with fitness was unexpected because it would seem the physical demands of the profession would encourage officers to be in better physical condition than the average person. Physical fitness levels and overall physical appearance may also be a safety factor that can protect officers from being victims. A study of interviews conducted by the FBI

over a ten year period discussed how offenders tend to "size up" their victims before deciding what they are going to do (Quigley, 2008; Pinizzzotto & Davis 1999). If an officer displays a lack of physical ability, then the officer's chance of being judged an easy assault by an offender is thereby increased. This information leads to the speculation that officers who are less physically fit may suffer more injuries or assaults as a result.

The elevated risk factors associated with police work and increases in officer deaths from heart disease (Wright, Barbosa-Leiker & Hoekstra, 2011; Hartley et al. 2011) also support the need for increased fitness standards for incumbents. Recent studies indicate police officers have a greater risk of cardiovascular disease and obesity than the general public (Wright et al., 2011; Kales et al., 2009; Hartley et al., 2011; Ramey, Downing & Franke, 2009). A lack of physical exercise combined with the limitations of healthy food choices during shift work can contribute to this increased risk of cardiovascular disease (Kales et al., 2009). Elevated rates of heart disease are prevalent in retired law enforcement officers, suggesting a need for healthy lifestyle and behavioral changes (Ramey et al., 2009).

This dissertation proposal will discuss the need for an empirical study to identify associations between mandated physical fitness maintenance policies of police agencies and reported injuries among their respective police officers. This proposal will also discuss some of the problems associated with a lack of consistent physical fitness standards for police officers as well as the results of prior related studies. The following sections will examine the problem, goal, relevance and significance of this study along with the proposed research approach and a comprehensive review of prior related research.

Problem Statement

What the Problem is

The problem is a lack of information on the relationship between police departments' policies of physical fitness standards and relevant work-related outcomes of reported incidents of injury, sickness, and absenteeism among police officers. The study will use the presence or absence of a mandatory policy of maintaining continuing physical fitness standards in police departments as a measure of the level of physical fitness among the police officers of their respective departments. Various independent variables will be used to control for factors such as length of time that mandatory policies have been in place, different city characteristics, and various police department variables. The study will take a longitudinal view over a period of 3 years, 2013 to 2015.

Why this is a problem

The profession of the police officer in America is tough, challenging and requires many skills to do the job effectively. Most common activities in the physical requirements section of the average job description include, but are not limited to standing, running, kneeling, balancing, grasping, sitting, stooping, holding, lifting, dragging, climbing, and using bodily force to detain suspects (Bonneau & Brown, 1995). A comprehensive review of cardiovascular disease risk factors among law enforcement personnel concludes the following:

"Currently employed police personnel have a high prevalence of traditional risk factors, including hypertension, hyperlipidemia, metabolic syndrome, cigarette smoking, and a sedentary lifestyle. Obesity may be more common in police officers compared with civilians, whereas diabetes is present less frequently. Law enforcement personnel are also

exposed to occupation-specific risk factors that include sudden physical exertion, acute and chronic psychological stress, shift work, and noise." (Zimmerman, 2012, p.159)

Another recent mixed method study of Norwegian police concluded that physical skills and physical fitness are important in police work (Lagestad, 2011; Lagestad & van den Tillaar, 2014). In the 2011study, Police officers reported that "physical skills are a resource not only ensuring that the police can undertake physically demanding missions if they must…but also [they] report that having good physical skills gives them confidence and security in their interactions with the public." (Lagestad, 2011, p.69).

How the Problem Evolved or Developed

The problem of physical fitness in law enforcement is not something new to the industry and has been discussed in police literature for many years (Dillern, Jenssen, Lagestad, Nygaud & Ingebrigtsen, 2014; Boni, 2004, Wilson, 1963). Since the 1950s, New York City Police recruitment, and training films have emphasized the importance of physical fitness in law enforcement (Adams, McTernan, and Remsberg, 1980). This trend has continued today with police training academies across the country placing a great deal of importance on physical fitness and the need for officers to stay fit in order to do their job more effectively (Sheets, 2012; Boyce, Jones, Schendt, Lloyd & Boone, 2009; Bissett, Bissett & Snell, 2012). It is common practice for basic law enforcement schools across the country to have in place mandatory fitness standards recruits must pass before graduating from the training program, but there is a concern about the number of police departments in the United States that do not have physical fitness standards for incumbent police officers (Means et al. 2011).

In North Carolina and South Carolina, recruits must pass a criterion and construct validated Police Officers Physical Abilities Test or (POPAT in NC, PAT in SC) before being granted certification as a police officer. Although this admission standard is in place, local administrations, along with state and national certifying agencies, often fail to continue these fitness standards beyond the basic law enforcement entry program. While voluntary fitness programs are being recommended more often, the North Carolina Training and Standards Commission for Law Enforcement and the Commission on Accreditation for Law Enforcement Agencies do not address the issue of mandatory physical fitness standards for incumbent officers (Ness & Light, 1992; http://www.calea.org, 2015; http://ncdoj.gov).

Issues and Events Leading to the Problem

Many questions and events have led to a lack consistency of ongoing physical fitness standards policy for police officers including a possible lack of understanding of legal decisions rendered. An understanding of the reasons police administrations fail to mandate physical fitness standards may be beyond the scope of this study, but the courts have supported valid fitness standards that are shown to be a bona fide occupational qualification (Means, et al. 2011; *Easterling v. State,* 2011*; Lanning v.* SEPTA, 2002). Mental and physical job-related abilities can be tested by construct or criterion validity methods that directly compare the essential job functions to the physical or mental task at hand. To be correlated with a bona fide occupational qualification, the tests must show by acceptable methods, to be predictive of, or significantly correlated with important elements or work behavior which is relevant to the job being evaluated (EEOC, 2012). Gulino v. New York State Education Department (2006) discussed this standard. It was

cited in the case that "to demonstrate content validity, the employer must introduce data showing the content of the selection procedure is representative of important aspects of performance on the job for which the candidates are to be evaluated" (Gulino, 2006 p. 1).

According to the Equal Employment Opportunity Commission's Uniform Guidelines on Employee Selection Procedures, content and construct valid testing that shows an adverse impact on any protected group must be documented with empirical evidence (EEOC, 2012). It is important to note that although a test may have a disparate impact on a certain group, it can be proven acceptable if it measures a bona fide occupational qualification and is validated and documented according to standards. This information clarifies how despite a lacking of police participation, the courts have supported the mandating of physical fitness standards for law enforcement.

The problems in the profession are inconsistent physical fitness policies for incumbent police officers and divergent attitudes on the role of officer physical fitness in the overall goals of law enforcement. There have been some studies that examine the importance of physical fitness among public safety employees and how fitness relates to job performance measures including injuries, sickness, and absenteeism from an individual standpoint (Dillern et al. 2014; Smith, 2011). However, a review of published literature reveals a lack of research on police agency fitness policies and work-related incidents regarding injuries, absenteeism and sickness among officers.

Dissertation Goal

The goal of this dissertation was to investigate the relationship between police departments' policies on physical fitness standards for their officers and relevant work-related outcomes, of reported injury. The study looked at two types of physical fitness

policies, i.e., mandatory (usually annual) fitness requirements and no ongoing fitness requirements, and mandatory wellness requirements or no wellness requirements as the independent variables of primary interest. Mandatory fitness requirements included actual physical fitness testing (i.e., Obstacle course or POPAT), while mandated wellness policies included mandatory blood pressure, cholesterol and other health related testing.

Other independent variables were used to control for differences such as population served, the number of officers and geographic region of the police agency as determined by telephone area code. The study used a longitudinal view over a period of 3 years, 2013 to 2015 by examining existing data.

Research Questions and Hypothesis

The research questions that arise in relation to a police department's level of program fitness and officer injury are;

1. Is there an association between a police departments' fitness policies and measures of officer injuries?
2. Do police departments with mandated physical fitness maintenance policies tend to experience fewer officer injuries than police departments without mandated physical fitness maintenance policies?

These are questions for research that could be very beneficial to administrators when deciding whether to implement or not to implement, mandated physical fitness standards within their organizations.

The questions sought to be answered by this research are based on the individual comparison of the independent variable (IV) police departments in North Carolina with mandated, voluntary or no physical fitness standards and the dependent variables (DV)

output measures of reported injury. The hypothesis for this study is:

H_0: There is no significant association between police departments' physical fitness maintenance policies and measures of officer injury.

H_1: There is a significant association between police departments' physical fitness maintenance policies and measures of officer injury.

Relevance and Significance

Explanation of the problem and the groups and individuals affected

There is an assumed problem of police officers not maintaining physical fitness standards beyond the basic academy. Low fitness levels are reported to be potential problems for officer safety and officer productivity given that the police profession is acknowledged to be a very dangerous job. For example, Zimmerman (2012, p.159) points out the various kinds of occupational hazards faced by police officers including "the threat of bodily injury or death, intense physical and mental stress, and unpredictable emergencies." Other research studies have agreed with these occupational hazards of policing (Houser, Jackson, Bartis, et al. 2010; LaTourrette, 2011; Mayhew, 2001).

Not only is the police profession considered as being dangerous, but studies have shown police officers have much higher levels of occupational mortalities than workers in other occupations (Zimmerman, 2012; Maguire, Hunting, Smith et al., 2002; Tiesman, Hendricks, Bell et al., 2010). It has been reported that "recent data from 2010 reveals an occupational mortality rate of 18.0 per 100,000 workers in police and sheriff's patrol officers compared with the national average of 3.5" (Zimmerman, 2012, p.159). Additionally, research studies recommend that police personnel engage in more physical

exercise as one method of reducing risks of heart attacks, hypertension, diabetes, and obesity (Zimmerman, 2012).

The stakeholders relevant to this study are not only the administrators responsible for police organizations but the individual practitioners and the general public or customers served by the profession. Although the administrators are ultimately responsible for the development of policy and the overall success of the organization, the officers are the ones who may experience the greatest consequences for not being physically fit to do the job effectively (Lagestad, 2011; Dillern et al., 2014). The officers are the ones that may suffer from assaults and illnesses resulting from obesity and a sedentary lifestyle while using more sick leave than their healthier counterparts (Neovius, Neovius, Kark & Rasmussen. 2010). The high-stress environment of the job combined with low fitness levels can prove fatal to the working officer (Quigley, 2008; Zimmerman, 2012). Other relevant stakeholders that cannot go without mention are the individuals in the general public who are served by the officers. These customers are the beneficiaries of police service and desire the highest quality police protection.

The far-ranging effects of the problem, greatness of impact, and the benefits of solving the problem

An exploratory study on the effects of mandated physical fitness programs on work-related injury, sickness, and absenteeism will benefit the law enforcement society by providing empirical information about the programs impact. How a mandated fitness or wellness program is related to police officer injury and sickness is desirable information for administrators, officers, and the general public. Studies have demonstrated the relationship between the physical requirements of police work and the

fitness level of the officer, but there is a lack of actual examination showing the practical effectiveness of fitness programs (Dillern et al., 2014; Lagesgtad, 2011, Boni, 2004). The greatest benefit of this study will be to identify if mandated physical fitness programs for police officers impacts the incidents of officer injury, sickness, and absenteeism in a positive, negative or neutral manner.

Attempts to correct the situation and the consequences of not solving the problem

Over the years police management experts and professional associations have recommended and encouraged police departments to improve the physical fitness condition among their incumbent police officers and to adopt mandatory fitness programs (Mattos, 2010; Means et al, 2011; Collingwood, Hoffman & Smith, 2004; Moser,1996; Ness and Light, 1992). However, local administrations, as well as state and national certifying agencies, continuously fail to regulate these fitness standards beyond the basic law enforcement program. (Ness & Light, 1992; http://www.calea.org, 2015; http://ncdoj.gov;).

One possible motivation for the reluctance to implement mandated physical fitness standards among administrators is a lack of understanding of the related legal issues. An article by Moser (1996) addressed Title VII of the Civil Rights Act that prohibits discrimination on the basis of race, color, religion, sex and national origin. United States Code for unemployment practices, 42 U.S. C. 2000e-2(h) states that it is not discriminatory employment practice when a professionally developed ability test is administered, as long as that test does not have an adverse or disparate impact on a protected class. However, 42 U.S. C. 2000e-2(l) prohibits the use of different cut-off scores or other adjustments based on race, color, religion, sex or national origin. The

article also discusses how physical fitness tests must be valid and representative of the significant aspects of performance on the job for which they will be evaluated. These legal requirements may help explain why there exist confusion and a lack of consistent physical fitness standards among agencies throughout the industry. The consequences for not examining the issue is to not fully understand the impact of a mandated physical fitness policy on a police department's overall efficiency and effectiveness.

How the goal of the study address the research problem, and how the study offers promise as a resolution to the problem

An essential basis for this study is the concern related to a lack of physical fitness standards for law enforcement across the United States. The ability to arrest a resisting suspect has been shown to be dependent on the officer's level of physical fitness (Dillern et al. 2014). Making physical arrests, walking beats, and engaging in other physical activities are part of a police officer's work day indicating a logical link between performance and fitness. There is also research available that indicates how regular exercise is associated with improved overall health, lower rates of absenteeism and lower health care costs (Boni, 2004; Boyce & Hiatt, 1992; Dillern, et. al. 2014; Wattles & Harris, 1997). A quantitative study that examines relationships between physical fitness and officer injuries will supplement the available research in this area.

Prior studies have also shown how an individual's health can influence the bottom line in an organization. Harte, Mahieu, Mallett, Norville and VanderWerf (2011) reported that many employers had seen increased absenteeism as a result of an employee's individual health. Absent workers cause a direct strain on resources that reduce productivity and increase costs. In a police organization, the manpower of field units must be maintained at a minimum level, and sickness or injury can cause serious cost

overruns in overtime and sick leave reimbursements. Health insurance costs are steadily rising, and employers are paying averages of up to $13,000 per year per employee to provide health insurance (Harte et al., 2011). The results of this study will assist in showing possible relationships between mandated physical fitness programs and the outcome indicators of injury, sickness and lost work time.

How the research will add to the knowledge base

The outcomes of this comprehensive study on the relationship between police departments with and without mandatory fitness policies and measures of officer injury and sickness could impact police policy on a large scale. The International Association of Chiefs of Police (https://www.iacp.org) is a worldwide organization that shares relevant information on policy and trends in the profession that could serve as a conduit for the distribution of this information. Governing bodies that regulate mandated training and provide funding for police agencies would benefit considerably from practical information related to operational fitness measures of working officers. The North Carolina League of Municipalities is an organization that provides insurance services to municipalities and would also benefit from a study that could provide information that helps reduce costs from officer injury and sickness.

This study is significant as the results will provide valuable information to administrators who develop policy and are held accountable for mission success in the field of criminal justice. Gaining knowledge in this area may provide critical information and ultimately influence the decision-making process for law enforcement leaders and policymakers. Many organizations are moving to proactive strategies to improve the health and fitness of employees in an attempt to drive down the increasing cost of health

coverage (Finkelstein, DiBonaventura, Burgess & Hale, 2010; Leoppke et al., 2007). However, many agencies still do not address this issue. This study will greatly aid administrators in decisions related to mandatory physical fitness standards in law enforcement, corrections, and other associated public or private organizations.

The potential for generalization of the results

The external validity and generalizability to the population of police organizations as a whole should not be compromised due to the representative sample of police departments in North Carolina. The similarities between police departments across the United States can be inferred by adherence to conventional rules of search and seizure guided by the U.S. Constitution. Although not all agencies have received formal accreditation, the commonality of rules, regulations, and policy through the Commission on the Accreditation of Law Enforcement Agencies (https://www.calea.org), and other associations (i.e. Fraternal order of Police, State, Federal and International Associations of Chiefs of Police) also serve as a link between police organizations.

The potential for the dissertation to demonstrate original work

There is an evident shortage of research about the relationship between the overall physical fitness of police officers and work outcomes (Boni, 2004; Tiwana, Bass & Farrell, 2015). The review of the currently available literature produced studies that examined individual police officer fitness levels but revealed no studies that examined or compared a sample of police agencies both with and without mandated fitness standards. Possible associations between officer injury and physical fitness standards may be achieved by conducting additional empirical research in this area. A cross-sectional study of police departments that examine the relationship between physical fitness maintenance

policies and the rates of injury among police officers could make a substantial contribution to the field of criminal justice.

An extensive search and systematic review of literature pertaining to measures of police performance indicate that injuries, sickness and absenteeism are strongly associated with individual levels of physical fitness (Lisman, O,Connor, Deuster & Knapik, 2013; De Loes & Jansson 2002; Finkelstein et al., 2010). Traditional measures of performance including, crime rates, arrest rates, and clearance rates were considered for use in this study. Although advocated by many police professionals, it should be recognized that these traditional measures are sometimes scrutinized due to the possibility of manipulation by police to improve perceptions of performance (Maquire, 2003; Davis, 2012; Nicholson-Crotty & O'Toole, 2004).

Other measures of police performance like citizen surveys and personnel evaluations may provide a better view of police performance but are not widely used due to being more difficult and time-consuming to obtain (Tiwana et al. 2015). Because they are not readily available, those types of measures are not feasible or within the parameters of this study. This review also did not produce any additional recent studies associating the overall physical fitness of police agencies to output performance measures of injury, sickness, and absenteeism.

Barriers and Issues

While designing this research process, it is important to identify and minimize any potential threats or barriers that may lead to internal or external invalidity of the results thereby decreasing the effectiveness of the study (Bachman & Schutt, 2012). The design of this research is summative in nature and relies on the compilation and analysis

of secondary data associated with the variables (Bachman & Schutt, 2012). By utilizing previous data about officers injured and rates of absenteeism among a selected sample of municipal police departments in North Carolina, the threats to internal validity have been minimized.

This study explicitly states the purpose is to examine physical fitness in police departments, and an explanation is needed as to why other law enforcement organizations were excluded from the process. The similar working environments of municipal police departments serves to reduce features that may be considered intervening variables associated with other types of law enforcement organizations. I have personally observed the differences in urban and rural working environments between Police, County Sheriffs, Highway Patrol and other state agencies. The congruity between the police department environment will help to minimize these differences. All police departments in North Carolina are regulated by the NC Criminal Justice Education, Training and Standards Commission, which is a separate entity from regulating agencies of other State and County Law Enforcement (https://www.ncdoj.gov). The consistency of certification and regulation standards adds to the generalizability for a sample of police departments in North Carolina used in this study.

Consideration was given to the prospect of utilizing reported rates of crime, arrest and clearance rates as measures of performance for police departments in this proposed study. However, the available research clearly identifies how reported crime, arrest, and clearance rates can be influenced by a multitude of environmental and societal factors, and how the actual validity of reported rates may be scrutinized (Siegel, 2013: Nicholson-Crotty & O'Toole Jr., 2004). Although the use of crime, arrest and clearance rates

continues to be utilized by some agencies as an overall performance measure (Maquire, 2003), applying these as an output measure of performance will not be employed in this study. Controlling for all possible intervening variables related to reported rates of crime, arrests, and cases cleared in a community is not within the scope of this study.

Limitations and Delimitations

Because this study involves the cross-sectional examination of both published and non-published data from a sample of police departments, the limitations as to the accuracy of information regarding the data are noted. It is important to recognize the existing data on officers injured by agency are subject to collection practices of the North Carolina League of Municipalities. The League has gathered this data based on reported workers compensation claims from officers injured by individual police departments. This database is a very useful for the purpose of this study, and the League has agreed to provide the information due to a mutual desire for the study's results. Supplemental data on officer injury is also available from the North Carolina Department of Justice was used in this study (http://crimereporting.ncdoj.gov.) While individual agency recording practices may influence the accuracy of the data, and the process may not be specifically designed for research, the availability and common use make the information acceptable for this study. The protocol and record keeping of the North Carolina Department of Justice according to Uniform Crime Reporting standards produce data that has become a reliable social indicator of crime that is commonly used for criminal justice research (NC Department of Justice).

To keep the study manageable and within the scope of this project, the sample of law enforcement agencies is limited to police departments in North Carolina who are

members of the NC League of Municipalities (n = 253). This number could also be reduced if other required information from a department is not readily available or the agency does not participate in the study. Some smaller agencies listed may not keep records or have data relating to independent or dependent variables and therefore, may not be of use in this study. The majority of data to be obtained in this study is available from the North Carolina League of Municipalities and the North Carolina Department of Justice. Surveys and personal communication either face to face, via e-mail and telephone will also be used to obtain data related to the independent variable of fitness standards of each sample police department for the period relative to the study.

Definition of Terms

POPAT - Police Officers Physical Ability Test – Test adopted by the State of North Carolina to test the physical abilities of police recruits.

PAT - Physical Abilities Test – Test adopted by the State of South Carolina to test the physical abilities of police recruits.

ADVERSE IMPACT - A substantially different rate of selection in hiring, promotion, or other employment decision which works to the disadvantage of members of a race, sex, or ethnic group (EEOC, 2012).

DISPARATE TREATMENT - occurs where members of a race, sex, or ethnic group have been denied the same employment, promotion, membership, or other employment opportunities as have been available to other employees or applicants (EEOC, 2012).

BONA FIDE OCCUPATIONAL QUALIFICATION - Employment qualifications that employers are allowed to consider while making decisions about hiring and retention of employees. The qualification should relate to an essential job duty and is considered necessary for the operation of the particular business (*US Legal*, 2012).

ABILITY - A present competence to perform an observable behavior or a behavior which results in an observable product (EEOC, 2012).

EMPIRICAL EVIDENCE - evidence relating to or based on experience or observation.

CRITERION VALIDITY - demonstrated by identifying criteria that indicate successful job performance and then correlating test scores with those identified criteria (Bachman, 2011).

CONSTRUCT VALIDITY – measuring validity by showing that a measure is related to a variety of other measures as specified in a theory (Bachman, 2011).

Summary

Chapter I discussed the issue of a lack of uniformity of physical fitness standards among incumbent police officers despite the prodigious agreeance of its benefits. The goal of the study is to investigate the relationship between the work-related outcomes of injuries between agencies with and without mandated fitness maintenance standards. The hypothesis being that there will be an association between police department's physical fitness maintenance policies and measures of reported officer injury. This non-directional hypothesis is appropriate while seeking to identify trends associated with mandatory physical fitness maintenance policies of police departments. The study will be highly relevant and provide key information to administrators contemplating the implementation of a mandated physical fitness program. Barriers and limitations of this study have been examined but do not diminish the possible overall benefits to the criminal justice profession.

CHAPTER 2: LITERATURE REVIEW

Introduction

The goal of this review was to uncover all available factual information related to the research questions in this study. Information from prior research has provided a firm foundation to investigate links between mandated physical fitness programs, officer injury, sickness, and lost work time. To further support the need for this study, negative correlations between individual physical fitness levels and work performance measures of sick leave and absenteeism have been shown (Neovius et al., 2010; Jacobson & Aldana, 2001; Blair et al., 1986) along with the rising costs associated with obesity in the workplace (Finkelstein et al., 2010; Leoppke et al., 2007). Means et al, (2011) discussed the growing concerns over police administrators failure to implement mandated physical fitness standards for incumbent officers. The article mentioned as many as 98% of U.S. agencies fit into this category. This review also reinforces the conviction that a police officer's job often involves the need for physical skills, and those skills are linked to essential work performance/productivity indicators (Lagestad, 2011).

To fully explore the relationship between a police officer's physical fitness and output measures that reflect officer injury, sickness and absenteeism, an extensive search for related and quality research studies was undertaken. Research databases from Nova Southeastern University's Alvin Sherman and Shepard Broad Libraries were searched using ProQuest Criminal Justice, Academic Search Premier, Journal Finder and Google Scholar. Keywords of "police" and "law enforcement," were paired with terms that included: motor ability, health, exercise, effectiveness, physical fitness, fitness, studies, performance, productivity, safety, and crime. The words "physical," "fitness" and

"health" were also paired with terms: injury, sickness, absenteeism, presenteeism and attendance to produce significant studies. Snowball techniques were useful in discovering relevant studies by examining references sections of found articles. Although no individual studies were located that examined the research questions specific to this research proposal, the search did reveal a significant number of overall relevant and recent research. These studies provide a background and support the need for additional research on the proposed topic. Some older studies were located and were only mentioned because they serve as seminal work for the more current studies.

After a review of all found literature, the information was divided into three separate categories relevant to this study and are presented in the following order. (1) The Associations of Fitness with Injury; (2) Studies Relating Fitness to Sickness; and (3) The links between Fitness and Absenteeism. Grouping the discussion of the literature in this manner is better suited for covering the material relevant to dependent variables in this study.

Associations of Fitness with Injury

There has been substantial research showing significant associations between individual levels of physical fitness and work related injuries. The International Association of Chiefs of Police (2014) in cooperation with the Bureau of Justice Assistance conducted a cross-sectional study from eighteen police agencies tracking 1,295 self-reported injuries over a one year period. The study revealed that officers who participated in fitness training were less likely to suffer OSHA reportable injuries. Officers with healthy weights missed almost half as many days of work after an injury than overweight officers and nearly four times fewer days than officers classified as

obese. An Australian Police study conducted by Orr, Sterli, Hinton & Steele (2013) examined 219 police recruits participating in a 12-week tactical training program and found lower levels of physical fitness were correlated with an increased in injury at the $p < 0.001$ level. A prior study of 140 Australian regular army trainees also produced a significant relationship ($p < .006$) between metabolic fitness determined through a 20m run and a lower risk of injury (Meigh, Steele & Orr, 2012).

Guffey, Larson & Lasley (2015) conducted the most recent study relevant to this project that involved self-reported measures of fitness and injury over a five-year period. Among the sample of 173 male and 44 female full-time police officers from seven departments in California and one in Houston, Texas, there was a significant correlation ($p = .05$) between overweight officers and increased injuries. This study also revealed an indirect correlation between aerobic exercise and injury. Aerobic exercise was directly associated with weight ($p = .011$), and weight was directly correlated with injury. The links between exercise and weight, and weight and injury are worthy of mention for this study.

Another 2015 study revealed associations between fitness levels and back injury (McGill et al., 2015). The study followed a cohort of elite task force police officers for a five-year period to test if back injuries could be predicted from measures of fitness and found weak associations between fitness levels and back injury. Back injury was better predicted when grouping the results of multiple fitness measures (McGill et al., 2015).

A retrospective study of data from 6,298 new FBI agents from 2000-2008 conducted by Knapik et al., (2011) revealed higher injury was associated with lower performance on physical fitness tests for both men and women ($p < 0.01$). Prior studies

conducted by Knapik, Darakjy & Hauret (2006), and Knapik et al., (2001) produced similar results with military samples. The 2006 group consisted of 1174 men and 898 women in basic training at Ft. Jackson and revealed a significant ($P < .01$) highest risk of injury among those with low physical fitness scores before entering basic training. The 2001 study sampled 756 men and 474 women in US Army basic combat training and showed that fewer push-ups, slower 3.2k runs, and smoking were risk factors for time-loss injury ($p < 0.01$ and $p < 0.04$).

Relationships between fitness and injury have also been tested in the fire service. Poplin, Roe, Peate, Harris, and Burgess (2014) conducted a cohort study of 799 firefighters in Tucson Arizona from 2005-2009. The study measured aerobic physical fitness and documented injuries to determine that firefighters in the lowest fitness level category were 2.2 times more likely to sustain an injury that those in the highest fitness category with a 95% CI. This study is significant as it supports the fitness/injury relationship relevant to the profession of public safety.

Other military studies have also revealed significant correlations between physical fitness levels and injury. A cohort of 874 men in Marine Corps officer candidate training revealed candidates with slower run times were 1.7 times more likely ($p < 0.001$) to experience injury than those with faster run times (Lisman et al., 2013). Another study utilizing the same cohort of 874 male Marines revealed lower functional movement screening and lower physical training scores demonstrated higher injury risks ($p < 0.01$) across all types of injuries (O'Connor, Deuster, Davis, Pappas, & Knapik, 2011). Similar results were found in a study of 824 females who participated in Marine Corps training at Paris Island Depo in 1999. Slower run times were associated (95% CI) with an increase

in lower-extremity stress fractures (Raugh, Macera, Trone, Shaffer, & Brodine, 2006). Continuing with studies of U.S. Marine recruits, Shaffer, Brodine, Almedia, Williams, and Ronaghy (1999) randomly selected 1,347 recruits in San Diego, Ca and discovered risks of stress fractures during training are increased by poor physical fitness and low levels of physical activity. Slower run times were also associated with increased risks of stress fracture during training at the ($p<.01$) level.

Research utilizing US Army personnel have also associated low levels of physical fitness with increased risk of injury. Studies conducted by Jones, Bovee, Harris, and Cowan (1993) and Jones et al., (1993) both showed statistical associations between slower run times or lower running frequency and higher incidents of injuries. The latter study also revealed individuals with lower push up scores were also significantly related to injury ($p < .02$).

A study completed on an officer's ability to arrest a struggling suspect supports the theory that high levels of physical fitness are an important element of police work (Dillern et al., 2014). Although this study utilized police graduate students and is limited in generalizability, the ages and different levels of physical fitness among the sample were broad enough to show statistical differences in the ability to make an arrest. The fitness measures included bench-press/pull-up strength tests, long jumps for leg strength and a 3000-meter run to test aerobic capacity. The results indicated that younger students, and students with high fitness levels, subdued an actively resisting subject faster than older, less physically fit students. The relevance of the study is noted concluding that physical fitness is related to a police officer's essential job duties, as well as a safety concern.

Fitness and Sickness

Associations between fitness and sickness can affect a police department's performance, and strong associations have been shown in several studies. An interesting and recent study from Chenoweth, Rager, and Haynes (2015) involved the relationship between body mass index and workers compensation claims from municipal employees represented by the North Carolina League of Municipalities. The study examined 3951 workers compensation claims from 2000-2009 that included height and weight required for determining BMI. The study revealed that obese employees had 50% higher average indemnity claim costs, 31% higher workers compensation claims and 38% higher combined costs that those with recommended BMI's (Chenoweth et al., 2015, p. 934). Another interesting finding of the study is that 85% of the worker's compensation claims filed by the male group were considered overweight or obese. The results of the statistical analysis were at or above the $p < .05$ level.

In a similar study conducted in 2010, high levels of waist circumference were associated with twice the risk of mortality in men and women at the $p < .05$ level. The study examined waist sizes in 48,500 men, and 56,343 women aged 50 and older in a cancer prevention study and compared them with mortality rates between the years 1997 and 2006. Men and women in the highest category of waist size were more likely to be less educated, have high BMI, be physically inactive, be former smokers, and have a strong history of cardiovascular disease, cancer or respiratory disease. Relative risks associated with waist size appeared larger in the less physically active ($p = .04$), (Jacobs et al., 2010).

Greater risks of cardiovascular disease have been linked to low levels of physical fitness. A cross-sectional study of 192 former members of the Milwaukee Police Department using self-reporting measures revealed that physical inactivity was a factor in the cardio risk factor category. The main findings were that retired LEO's have a higher prevalence of cardiovascular disease compared to the general public ($p < .05$) (Ramey et al.,, 2009 p. 451). Sassen et al., (2009) conducted a cross-sectional study of 1298 Utrecht police employees and found physical activity and physical fitness was inversely related to cardiovascular risk factors ($p < .01$). Higher intensity of exercise was found to be the main characteristic of physical activity that produced an effect on cardiovascular risk factors (Sassen et al., 2009 p. 682). A follow-up study with the same cohort found 40% of those with cardiovascular risk factors had low intentions to engage in physical activity (Sassen, Kok, Schaalma, Kiers, & Vanhees, 2010). An older study also concluded with similar findings. Mittleman et al., (1993) interviewed 1228 heart patients and found that physical exertion can trigger the onset of myocardial infarction, especially in sedentary people (95% CI).

Low physical fitness levels have also been associated with back pain. A study conducted by Heneweer, Picavet, Staes, Kiers, and Vanhees (2012) examined self-reported data from 1,723 Utrecht police employees in the Netherlands and found that higher levels of physical fitness were associated with less low back pain (95% CI). On the contrary, extremes in both directions were related to LBP complaints indicating that too little or too much physical activity are both linked with LBP (Heneweer et al., 2012 p. 1267). Nabeel, Baker, and McGrail (2007) conducted a study of 332 active members of the Minneapolis Police Department and found that officers who were the most physically

active were about a third as likely to report back pain and less than half as likely to report chronic pain ($p < .0002$). The study also revealed that officers who engage in higher levels of physical activity and are more physically fit have a lower prevalence of musculoskeletal injuries and chronic pain ($p < .002$).

Associations have also been found between physical fitness and other sickness related physiological and psychological conditions including blood pressure, stress, and depression. Gerber, Kellman, Hartman and Puhse (2010) conducted a study of 533 police employees and 460 emergency response workers in Northwestern Switzerland and discovered statistical interactions of exercise that protect against stress-related health hazards. Increased stress was associated with poorer health at the $p < .05$ level. Gerber et al., (2013) also revealed that police officers with high perceived fitness scores had the highest mental health scores ($p < .01$) and BMI was significantly associated with mental health and perceived physical fitness. Norvell and Belles (1993) conducted a study of 43 male state law enforcement officers who were involved in a supervised circuit weight training program for six months. Subjects who received four months of circuit weight training demonstrated significant ($p < .01$) reductions in psychological symptoms including depression and anxiety (Norvell & Bells, 1993 p.524).

The links between Fitness and Absenteeism

An extensive search and review of available literature have produced strong evidence to support the correlation between low levels of physical fitness and increased rates of absenteeism. Neovius et al., (2010) studied a cohort of 43,939 Swedish men from prior military service from 1986-2005 and used obesity as a measure of health/fitness. Obesity was associated with an increased risk of sick-leave absences as compared to

normal weight (95% CI). The study also found disability pensions were higher in the overweight and obese categories (Neovius et al., 2010 p. 115). A cross-sectional study of a 2006 Medical Expenditure Survey and 2008 National Health and Wellness Survey by Finkelstein et al., (2010) revealed medical expenditures, absenteeism and presenteeism for businesses increased with obesity (95% CI). Kyröläinen et al., (2008) studied 7,179 male military personnel and found those with sickness absence greater than seven days displayed lower muscle fitness and shorter running distance when compared to the groups with shorter sickness absence ($p < 0.001$). BMI was also associated with increased sickness absence.

Ricci and Chee (2005) utilized existing data from a National Telephone Survey to conduct a cross-sectional study examining loss productive time associated with excess weight in the U.S. workforce. The data revealed obese workers were significantly ($p < 0.0001$) more likely to report loss productive time than normal or overweight workers (Ricci & Chee, 2005 p. 1227). In another study, one hundred forty-three individuals from various departments within a city were tested for muscular flexibility and overall fitness by Wattles and Harris (1997). The researchers found more flexible employees tended to be absent from their jobs less that non-flexible employees ($p < .07$) and the more repetitions the employees performed on the bench press test, the more productive they felt at work (Wattles & Harris, 1997 p. 29).

Other studies identified have produced similar results. Jacobson and Aldana, (2001) utilized self-reported measures from a sample of 79,070 men and women and found a statistically significant relationship ($p < .05$) between absenteeism and exercise. Lower weekly exercise frequency was associated with higher absenteeism rates (Jacobsen

& Aldana, 2001, p. 1022). A before and after study of 884 subjects from the police, chemical and banking industries found that high exercise participation groups, on average, showed a statistically significant ($p < .05$) decline of 4.8 sick days when compared to non-exercise groups (Lechner & de Vries, 1997, p. 2). Boyce, Jones, and Hiatt (1991) examined 514 police officers from a large southeastern metropolitan police department to measure fitness levels and sick leave absenteeism. They found men 35 and older with high scores on cardiovascular fitness had fewer absences than those with lower scores ($p = .01$). A sample of sworn officers ($n = 765$) in Austin Texas were tested for levels of physical fitness over a three-year period by Steinhardt, Greenhow, and Stewart (1991). The study collected rates of absenteeism not related to on the job injury or personal reasons. The results showed physical inactivity or sedentary officers were absent significantly ($p < .05$) more than officers who were occasionally active or active three times per week (Steinhardt et al., 1991, p. 1022).

Two additional older studies were found that revealed significant relationships between fitness program participation and decreased absenteeism. A study of 152 Bank of Amsterdam employees indicated taking part in an employee fitness program led to significant ($p = .04$) decreases in absenteeism among participants (Kerr & Voss, 1993). Blair et al., (1986) compared 3,846 fitness program participants to 8,290 non-participants and found improved physical fitness was associated with less absenteeism ($p < 0.0001$) for those who completed the health promotion program.

Summary of Literature

The available research has validated the need for this study and provided support for the output measures of injury, sickness, and absenteeism being related to the overall

physical fitness level of police officers, military, fire service and other professions. Direct links between injury and physical fitness levels have been demonstrated in numerous military, police and civilian studies at statistically significant levels (McGill et al., 2015; Poplin et al., 2014; Orr et al., 2013; Lisman et al., 2013). Absenteeism and lost productivity are shown to be directly impacted by individual fitness levels and can also affect the bottom line of the organization. (Neovius et al., 2001; Harte et al., 2011; Leopke et al., 2007). Mandated police physical training is supported by the courts and can negate the level of stress associated with policing (Means et al., 2011; Gerber et al., 2010; Gerber & Pühse, 2009).

Police officers have been shown to suffer from high rates of cardiovascular disease that is directly related to physical fitness (Sassen et al., 2012, 2009; Ramey et al. 2009; Mittleman et al., 1993). Back injuries, stress and other physiological and psychological conditions have also been linked to physical fitness levels (Gerber et al, 2013; Norvell and Belles, 1993; Kobasa, Maddi, Puccetti & Zola, 1985), and a lack of physical fitness standards in the New York City Police Department resulted in increased obesity and reduced job performance (Magnavita & Gabarino, 2013; Bissett et al., 2012).

CHAPTER 3: METHODOLOGY

Research Method

The approach for this study utilized a cross-sectional analysis and purposive matching to examine a sample of municipal police departments in North Carolina (n = 253) to discover any associations mandated physical fitness and wellness programs have on output measures of reported officer injury. The following sections will outline the methodology of the study to include the participants examined, the instruments used to gather data, the procedures used in analyzing the data, and the limitations of this study. The analysis of information will seek to identify associations or trends between the (IV) of a police department's level of fitness in operation (policy), and the (DV) output measures of injury that impacts performance.

As revealed in the review of the literature, a relationship between individual physical fitness and reduced injury has been shown to exist (IACP, 2014; Orr, et al. 2013; Knapik et al., 2011; Poplin et al., 2014). This study is unique as it examined possible associations between police department's policies of physical fitness maintenance and reported injuries. The output measures of injury examined in this study include:

1. The rate of workers compensation claims per agency.
2. The average medical cost per agency due to workers compensation claims.
3. The average number of lost work days per agency due to workers compensation claims.
4. The number of workers compensation claims by males per agency.
5. The number of workers compensation claims by females per agency

The additional information relevant to medical costs, lost work days, and claims by age, sex provide more insight into possible associations between fitness policies and injury. The calculations for obtaining each output measure of injury is based on actual data including the number of sworn officers and populations served per agency.

Calculating Output Measures

Rate of Claims by Department

The output measures associated with injury in this study were also calculated based on the reported worker's compensation claims and the number of total hours worked per agency. The Bureau of Labor Statistics under the United States Department of Labor provides a standardized formula to determine rates of injury (The number of reported injuries x 200,000) / number of employee hours worked = incident rate (BJS, 2016 at http://www.bls.gov/iif/osheval.htm). Because obtaining the actual hours worked per officer per agency was not available, the total number of hours worked for municipal police departments was calculated at 2080 hours per year x the total number of officers employed. The total hours worked were multiplied by 3 for a total of 6,240 hours worked during the three-year period of the study. While it is important to recognize that some officers may work more or less hours depending on individual job assignments and leave time, this estimation is based on a standard 40 hour work week and recommended by the Bureau of Justice Statistics (BJS, 2016).

Average Medical Costs per Agency

The average medical costs were calculated for each individual agency by summing the incurred costs by claim as reported by the NC League of Municipalities divided by the total number of officers employed during the years of the study. This

calculation provided an average dollar amount that was compared to all agencies as well as the matched groups associated with the independent variable. Matching departments in this category based on the number of officers assisted in maximizing the internal validity of the study (Bachman & Schutt, 2012) and created a consistent measure between departments on a 1 to 1 basis.

Average Loss Work Days by Agency and Officer

The loss days per claim for each agency was provided from the NCLM data. The total lost days were averaged by the number of reported claims and then divided by the number of officers per agency. This provided an average number of the lost work days by officer for each reporting agency. The totals were then summed by department according to each department's self-reported level of physical fitness maintenance.

The Rate of Workers Compensation Claims by Sex

Data relevant to the gender of each reported claimant was provided by the NC League of Municipalities and divided by the total number of officers by sex to give a number for data analysis. The number of claims according to sex were totaled for each agency and then summed according to their reported level of physical fitness maintenance. The individual names of agencies were coded, and individual claimants not presented to the researcher in the data, thereby minimizing the risk of harm due to the possible identification of individual claimants in this study.

Participants

This study employed a purposive sampling method to examine data from municipal police departments in North Carolina over a three (3) year period of 2013 - 2015 (Bachman & Schutt, 2012). Data for this study was made available from the North

Carolina League of Municipalities from a sample of municipal police departments in North Carolina (n = 253) (Appendix 1 and 2). The NC League of Municipalities (NCLM) Claims Management System compiles pre-existing information related to workers compensation claims due to injuries for each department for the period of the study. This data provided an excellent source for this research, and the staff of the NCLM was very interested in providing assistance. The NCLM will benefit from the results of this study as they seek to partner with police organizations to reduce officer injuries and resulting workers compensation claims.

Due to similarities of working urban environments, and the types of communities served, the sample for this study is limited to municipal police departments. This limitation is an attempt to minimize control variables such as urban vs. rural and department locations. Other law enforcement entities such as Sheriff's Offices and State Law Enforcement agencies often work in more rural environments, the data is not collected by the NCLM, and those agencies were excluded from the study. Individuals were not directly utilized as participants in this study except for being contacted to obtain department related information relevant to the study and to complete survey information for each police department sample.

Procedures and Instruments for Data Collection and Matching

The approach employed both nonequivalent control groups and a repeated cross-sectional design (Bachman & Schutt, 2012) in obtaining the most recent reported annual data relevant to this study for each sampled police department over a three-year period for the years 2013 - 2015. Information was first obtained relevant to the (IV) of police departments with or without mandated physical fitness standards. The departments were

then individually and purposively matched (Bachman & Schutt, 2012) and categorized into either mandatory or non-mandatory physical fitness maintenance policies according to similarities including population and geographic region of the state. Matching the experimental group (departments with mandated standards) to the control group (departments without mandated standards) is an accepted way to achieve causal validity for this study (Bachman & Schutt, 2012).

Information for the dependent variable pertaining to injury for each of the identified municipal police departments was obtained from the database of the NCLM. Alphabetical coding of each agency was used to protect the identity of the individual agency and the number and type of reported workers compensation claims. Among the sample of organizations, information was obtained relevant to their individual policy related to physical fitness maintenance. Specific information about mandatory and no physical fitness standards for each sample department was then linked up to the alphabetized data by NCLM personnel thereby protecting the individual police department from the release of claims information.

Other data relevant to injuries used to supplement this study was available from a combination of public web sources (https://www.ncdoj.gov) or via direct communication with research analysts of the North Carolina State Bureau of Investigation NCSBI. This information consisted of individual department data on the number of officers employed and the population served. The specific link to this information at the North Carolina Department of Justice is found at (http://crimereporting.ncdoj.gov/Reports.aspx), and was used to obtain relevant information on these output measure dependent variables for this study. Other data was available related to injuries classified as assaults and are broken

down into knife, hands/feet, and other weapons. This information could also be sorted into serious and non-serious injury categories but was not used in this study. The information could be utilized for future studies that expand on this topic.

Population, Age, and Gender Data

The amount of population served, and the total number of officers for each police department was collected and used in the analysis through the data services of the NCDOJ at (http://crimereporting.ncdoj.gov). Other control variables including the number of male and female officers and the average age of officers were also collected and proved relevant in the analysis process. The sources of this pertinent information were also located with the NCDOJ at (http://crimereporting.ncdoj.gov).

Independent Variable Data

Identified samples of police departments were classified as having either mandated physical fitness policies, mandated wellness policies or no mandated policy of physical fitness or wellness program. This information was obtained by distribution of a survey and personal communications with police department administrators or staff who routinely share policy information with other agencies. My current position as a Chief of Police and a member of the North Carolina Association of Chiefs of Police assisted greatly in this matter. Department policy is also available as a public record under state and federal law and was obtained from participating agencies without resistance. The information was also gathered as to how long the physical fitness standards or lack of physical fitness standards have been in place. The date a department's fitness policy was implemented and relevant when applying to the analysis and comparing the output measures across agencies.

Table 1 shows the independent and dependent variables used in this study.

Table 1

Independent and Dependent Variables for use in the study.

Outcomes (DV)	**Mandatory Fitness/Wellness Maintenance Policy (IV)**	**No Fitness/Wellness Maintenance Policy (IV)**
The rate of workers compensation claims per agency.		
The average medical cost per agency.		
The average number of lost work days per agency.		
The rate of claims by males per agency.		
The rate of claims by females per agency.		

Survey Questions

To obtain information relevant to the independent variables in the most efficient manner, survey questions were distributed to each sample police organization. Follow up communications became necessary with samples to determine the length of time fitness policies have been in place and to obtain information from non-responding agencies. A statement was included specifying the identification of individual organizations will not be included in the study and all information relating to the names of organizations will be kept strictly confidential. An example of the survey questions utilized in obtaining the independent variable information is as follows:

1. Does your agency have a mandated (all officers annually) physical fitness maintenance policy and what year was the policy implemented?

2. Does your agency have a mandated (all officers annually) wellness program and what year was the program implemented?

Please provide a copy of the policy to jay.fortenbery@edenton.nc.gov or fax to 252-482-4999.

To assist in providing the necessary information for this study, physical fitness, and wellness programs may be thought of independently and therefore both questions were asked. A participation letter was included in the survey as required by the IRB of Nova Southeastern University (Appendix 3).

Data Analysis

The research questions were used to identify if trends or associations exist between mandated physical fitness maintenance policies and indicators of injury.

1. Is there an association between a police departments' fitness policies and measures of officer injuries?
2. Do police departments with mandated physical fitness maintenance policies tend to experience fewer officer injuries than police departments without mandated physical fitness maintenance policies?

These questions look at the relationship between police departments in North Carolina both with and without mandated physical fitness standards and reported officer injuries, and were examined by using a Pearsons Chi-Square goodness of fit test. The nonparametric Chi-Square goodness of fit test is an appropriate method to test if the observed amounts for a nominal variable differ from what is expected (www.ats.ucla.edu). The Chi-Square test will enable the researcher to either accept or reject the null hypothesis in a study utilizing nominal independent variables and totaled or averaged numbers of dependent variables (Salkind, 2011).

To determine if the observed number of reported officer injuries from a sample of police departments either with or without mandatory physical fitness standards differ from the expected outcome, a level of significance less than .05 was used as a basis for rejecting the null hypothesis. The degrees of freedom for the nominal independent variable was (1) producing a critical value of 3.84 to be used as a cut off comparison for the Chi-Square value produced. (Salkind, 2011).

To examine if the observed value of police departments with and without mandated physical fitness maintenance policies differs greater than what is expected by chance, the Chi-Square formula $X^2 = \sum \frac{(0-E)^2}{E}$ was utilized. The data was computed both manually and by using CHITEST formula in Microsoft Excel© to assist in the process. The CHITEST formula produced the exact level of significance which was of great value to assess any possible associations. The effect size for each output measure was calculated using both Phi φ = ($\sqrt{\frac{X^2}{N}}$)and contingency coefficient C =($\sqrt{\frac{X^2}{X^2+N}}$). Cohens standard effect size was applied and a (.1) small, (.3) medium, and (.5) large was used in the analysis.

An example of the data for observed and expected lost work days and the chi-square goodness of fit test is presented in Table two.

Table 2. (*From matched agencies with and without standards*)

Category	**Observed total lost work days per agency**	**Expected total lost work days per agency**	**$(O – E)^2$**	**$(O – E)^2 / E$**
With Mandated Physical Fitness Standards	0.07	3.47	11.59	3.34
Without Mandated Physical Fitness Standards	6.88	3.47	11.59	3.34
Total	**6.94**			
Chi-test results			**6.68**	**P = 0.0098**

Formats for Presenting Results

The quantitative data obtained and results of the data analysis completed by Excel software will be presented in both paragraph and visual table illustrations. All tables are in accordance with APA guidelines and show the test used, relevant data, and statistical significance obtained. Because of the large amounts of data involved, some tables were shortened for publication and the information is preserved for inspection or follow-up studies upon request.

Resources Requirements

The resources required for successful completion of this study were currently available, accessible and usable. The computing requirements of word processing and data analysis programs Excel (© Microsoft) were obtained and sufficient for the task. Internet access was available to provide data communications with the dissertation

committee and to obtain information relevant to this study. Other resources used in the sample selection process included comprehensive police information services provided by the International Association of Chiefs of Police (IACP) and the National Association of Chiefs of Police (NACP), both of which this researcher is currently a member. Membership in these organizations also includes access to peers who provided more detailed information that assisted in the data collection.

Data from the North Carolina Department of Justice (http://ncdoj.gov) was available and contained relevant data for output measures related to officers injured, population, the number of sworn personnel and other police department information that was used in this study. The North Carolina League of Municipalities provided data on the sample (n = 253) of police departments and information about injuries related to workers compensations claims per department. Officials with the NCLM have expressed an interest in this research project and will benefit from relevant data produced by this study.

The members of the dissertation committee, research and educational staff of NOVA Southeastern University, Elizabeth City State University, and Methodist University were significant assets in providing guidance and recommendations to assist in this study. Although the discovery of additional data may reveal increased need, there were no other resources currently anticipated for the successful conclusion of this dissertation process.

Limitations

Because this study utilized pre-existing data from years 2013 -2015 to search for trends or associations between police departments both with and without mandated physical fitness standards, the threats to internal and external validity are low. It should be recognized the matching of agencies in both groups according to department size, population and the geographic region was thoroughly documented for follow-up and examination purposes. While the study is limited to agencies in North Carolina, the similarities of policing increases the generalizability across state and national boundaries.

Summary

Chapter three describes this dissertation as a repeated cross-sectional quantitative study utilizing both nonequivalent control groups of pre-existing and self-reported data to determine statistical associations between a police department's level of physical fitness and output measures of injury (Bachman & Schutt, 2012). The study covers a period of three years, 2013 - 2015 and utilized a purposive sampling method to examine existing data from a group of municipal police departments in North Carolina (n = 145). The existing data was collected from the NC League of Municipalities, the NC Department of Justice, and from individual surveys of police administrators and record keepers. Once collected, the data was analyzed using Chi-Square nonparametric testing using Excel (© Microsoft) software and displayed in both paragraph and table forms.

CHAPTER 4: RESULTS

Data Analysis

The data relevant to the independent variable of police departments with or without fitness standards, and with or without wellness standards, was collected by both survey and telephone communication. A link to participate in the survey at (www.surveymonkey.com) was distributed to through e-mail by the North Carolina Association of Chiefs of Police and the North Carolina League of Municipalities. A participation letter was included in the study that outlined the purpose, contacts, and risks involved for participation (Appendix 3).

A total of 67 responses were recorded from the internet survey with 64 listed in the sample of departments to be used in the study. Telephone and personal communications were made with administrators of an additional 85 agencies for a total of 149 agencies identified for their level of mandated physical fitness or wellness standards and the date of implementation. The survey included agencies with reported claims for the years 2012-2015. Upon eliminating claims from 2012, a total of 4 agencies were removed due to only having claims in that year leaving the total number at (n = 145). A form was used to document the information from each department and to inform each participant of any privacy issues associated with the study (Appendix 4). Table 3 illustrates the breakdown of how the responding agencies reported their level of physical fitness maintenance.

Table 3

Total of agencies reporting the level of physical fitness maintenance with claims for the years 2013-2015.

	With Fitness Standards	Without Fitness Standards	With Wellness Standards	Without Wellness Standards	Total Departments Reporting
Police Departments	15	130	39	106	145

The self-reported data pertaining to all participating police departments (n = 145) was inserted into an Excel© spreadsheet and contained the following information for each agency in the following by columns.

A. Name of Agency
B. Physical Fitness Standards (yes or no)
C. Date Implemented
D. Wellness Standards (yes or no)
E. Date Implemented
F. Population Served
G. Total number of officers
H. Number of Male Officers
I. Number of Female Officers
J. Telephone Area Code of agency

The spreadsheet was sent to North Carolina League of Municipalities where the data was combined with information on reported workers compensation claims for each agency. The combined spreadsheet was returned to the researcher with the individual police department names removed and replaced with an alphanumeric code to protect the

identity of each agency. Among the 145 police departments, the spreadsheet contained a total of 2,212 claims for the years 2012-2015. The claims for the year 2012 were redacted leaving a total of 1,580 reported claims during the years of study (2013-2015). The following information was included in the combined spreadsheet in the following columns.

A. Claim Number
B. Loss Description
C. Cause of Loss
D. Nature of Injury
E. Incident Type
F. Department type
G. Incurred Loss
H. Sex
I. Height
J. Weight
K. Incident Date
L. Age
M. Loss Days
N. Agency (alphanumeric coded)
O. Physical Fitness Standards (yes or no)
P. Date Implemented
Q. Wellness Standards (yes or no)
R. Date Implemented

S. Population Served

T. Total number of officers

U. Male Officers

V. Female Officers

W. Area Code of agency

The researcher then added the following columns for computing the totals associated with each dependent variable per agency or unit of analysis.

Y. Total Claims per Agency

Z. Number of Claims per Officer

AA. Number of Claims per Population

AB. Rate of Claims by Officer and Total Hours Worked*

AC. Average Medical Costs per Agency*

AD. Average Lost Work Days per Officer per agency*

AE. Number of Claims by Male Officers*

AF. Number of Claims by Female Officers*

AG. Average age of Claims

AI. Average BMI per Agency

*Only dependent variables to be used in this study. The remaining dependent variables are recommended for future studies.

To examine the research questions, the data for each DV was calculated for each of the 145 police departments and averaged according to the IV of agencies with or without fitness and wellness standards. The research questions as presented in Chapter I were; (1) is there an association between a police departments' fitness policies and

measures of officer injuries? (2) Do police departments with mandated physical fitness maintenance policies tend to experience fewer officer injuries than police departments without mandated physical fitness maintenance policies?

Four different analysis were conducted using the data to obtain the most information to answer the research questions. The various categories are:

1. Departments with mandated fitness policies (including those with mandated fitness and wellness combined) compared to similar departments without mandated policies.
2. Departments with mandated fitness policies only compared to similar departments with no fitness or wellness standards.
3. Departments with mandated fitness standards compared to similar departments with mandated wellness standards only.
4. Departments with mixed mandated policy (fitness or wellness or both) compared similar departments with no physical fitness or wellness policy.

For each separate analysis, three individual tests were conducted redacting outlying data that could influence the overall results. The redacted data consisted of claims in excess of $100,000.00 and injuries that could be considered to be not directly related to physical fitness. A breakdown and the results from each category is presented in the following sections.

Analysis of Police Departments with and without Mandated Fitness Standards

To specifically examine the data from departments both with and without mandated fitness standards from a 1 to 1 perspective, a purposive sampling method was used (Bachman & Schutt, 2012). There was a total of 15 agencies that self-reported

mandated physical fitness policies during the years 2012-2015. Because five of the agencies implemented their fitness standards during or after 2013, they were eliminated from the sample. The remaining sample of 10 police departments with mandated fitness policies was purposively matched to 10 agencies without mandated fitness standards. For this test, police departments with both mandated fitness and mandated wellness were included in the sample.

The departments matched with agencies that reported not having physical fitness policies according to similar populations served and geographic region of the state. The geographic region of the state was determined by the area code of the agencies telephone number. The entire telephone number was not included in the spreadsheet to avoid identification of the agency. A map of the North Carolina Area Codes displays how regions are set across the state, and the list of matched coded agencies displays the agencies that were purposely selected (Appendix 5 and 6).

The totals and averages in all DV categories were computed using the Excel © spreadsheet with both manual calculations and CHITEST functions. The significance level was set at the .05 level with a critical value of 3.84 and 1 degree of freedom. The Chi-Square goodness of fit test revealed the average medical costs were significantly higher in agencies with mandated standards ($279.21) than the matched agencies without standards ($222.61) ($X^2$ (1) = 6.384, p = .011), (C = .112). The remaining DV's of rate of claims, lost work days, claims by males and claims by females were all higher among agencies with mandated standards but not significant. Table 4 illustrates the results of the tests in each category.

Table 4

Average Totals with Agencies Matched by Population and Area Code (Fitness Standards). Including agencies with both fitness and wellness combined.

Outcomes	With Standards	Without Standards	P value	Phi φ	C
Rate of Claims	12.53	10.33	0.645	0.096	0.094
Medical Costs	$279.21	$222.61	0.011*	0.112	0.112
Lost work days	4.52	4.01	0.861	0.059	0.057
Claims by Males	3.66	3.48	0.946	0.025	0.023
Claims by Females	5.49	4.31	0.704	0.121	0.117

Note: *p < .05. Total agencies with fitness standards (n = 10), without fitness standards (n = 10). Police departments purposively matched by area code and population. The total claims among agencies with FS (n = 116), total claims among agencies without FS (n =177).

A further examination of the matched sample of police departments with and without fitness standards was conducted by redacting claims with medical costs in excess of $100.000.00. This eliminated seven claims among the sample that could influence the overall results. The DV of medical costs was very close to a significant finding (p = .057) and was lower with the IV of departments with mandated standards. Police departments with mandated standards averaged medical costs at $165.74 while departments without averaged $202.15 ($X^2$ (1) = 3.602, p = .057, C = .098).

The number of lost work days per officer for agencies with standards were also lower at 1.58 whereas the no FS category was 3.65 but not significant (X^2 (1) = 0.82, p = .365, C = .395). The rate of claims, claims by males and claims by females were all higher from the sample with FS but also not significant. The data is presented in Table 5.

Table 5

Average Totals of Agencies with and without fitness standards (including wellness standards) matched by population, area code, and redacted claims >$100,000.00

Averages	With Fitness Standards	Without Fitness Standards	P value	Phi φ	C
Rate of Claims	12.33	10.19	0.651	0.095	0.093
Medical Costs	$165.74	$202.15	0.057	0.098	0.098
Lost work days	1.58	3.65	0.365	0.395	0.382
Claims by Males	3.60	3.45	0.954	0.021	0.020
Claims by Females	5.37	4.08	0.675	0.136	0.131

Note: *p < .05. Total agencies with fitness standards (n = 10), without fitness standards (n = 10). Police departments purposively matched by area code and population. The total claims among agencies with FS (n = 113), total claims among agencies without FS (n =173).

Continuing with the comparison of matched agencies with and without mandated fitness standards, further testing was completed by redacting all claims more than $100,000.00, and all claims that could be disassociated with fitness related tasks (Appendix 7). The non-fitness related tasks were selected from the causes of loss (column C) of the workbook based on descriptions that may be considered accidental or not directly related to a person's level of physical fitness and were based on the opinion of the researcher. A disassociated relationship between physical fitness and injuries related to vehicle accidents, insect/animal bites, slips, falls, chemical exposure, etc. can be acknowledged and a separate analysis not including those claims is reasonable to provide more accurate results. A total of 117 claims were redacted from the previous analysis

with 61 reported claims from agencies with fitness standards and 108 reported from agencies without fitness standards.

The averaged medical costs remained significantly lower for agencies with FS in this analysis (X^2 (1) = 126.4, p = .001, C = .541). Both Phi φ and Contingency coefficient tests resulted in small effect levels of .000. The total costs for agencies with fitness standards was $99.14 as compared to agencies without standards were $332.91. There were no other significant associations identified in this sample although several are worth a mention. The DV's of rate of claims, lost work days, claims by males, and claims by females were all lower (not significant) in agencies with FS. The findings from all analysis are supportive of accepting H_1 in this study. Table 6 displays these results.

Table 6

Average Totals of agencies with mandated fitness standards (including wellness) matched by population, area code, redacted claims >$100,000.00, redacted all other non-fitness related.

Outcomes	With Fitness Standards	Without Fitness Standards	P value	Phi φ	C
Rate of Claims	5.78	6.23	0.895	0.037	0.036
Medical Costs	$99.14	$332.91	0.001*	0.541	0.541
Lost work days	2.48	6.72	0.161	0.461	0.457
Claims by Males	1.76	2.01	0.898	0.065	0.059
Claims by Females	2.48	3.31	0.732	0.143	0.135

Note: *p < .05, total agencies with fitness standards (n = 10), without fitness standards (n =10). Police departments purposively matched by area code and population. The total claims among agencies with FS (n = 61), total claims among agencies without FS (n =108).

Analysis of Police Departments with Mandated Fitness Standards only matched with Departments with No Standards

The survey results produced a small number of police departments (n = 5) that mandated fitness standards only during the years 2013-2015 used in the study. Further examination was necessary to determine if a relationship existed between these agencies and similar agencies without any fitness standards. A purposeful matching strategy was again employed to pair these agencies with comparable agencies according to population and geographic location (Bachman & Schutt, 2012). This provided a total of (n = 10) agencies for comparison. See Appendix 7 for a list of the matched agencies and table 7 displays the results of this analysis.

The data was again analyzed using the Chi-Square goodness of fit test in Excel © spreadsheet with both manual and CHITEST functions. Although no significant associations were found, the DV's of medical costs, lost work days, and claims by males were lower among agencies with fitness standards and rate of claims and claims by females were higher in the same category.

Table 7

Totals of agencies with mandated fitness standards only matched to agencies without any standards by population and area code.

Outcomes	With Fitness Standards	Without Fitness Standards	P value	Phi φ	C
Rate of Claims	10.08	8.71	0.752	0.072	0.071
Medical Costs	$359.68	$385.97	0.335	0.035	0.035
Lost work days	2.07	3.79	0.478	0.292	0.281
Claims by Males	1.47	1.62	0.933	0.047	0.041
Claims by Females	1.98	0.00	0.159	1.000	0.961

Note: *p < .05, total agencies with fitness standards (n = 5), without fitness standards (n = 5). Police departments purposively matched by area code and population. The total claims among agencies with FS (n = 47), total claims among agencies without FS (n =49).

To remove the threat of limited high costing claims impacting the data, the same procedures were again used (as in Table 5) to redact claims in excess of $100.000.00. The identical matched samples of agencies with and without mandated fitness standards were used in this analysis. There were 2 claims found to be above the $100.000.00 threshold and were removed from the data.

In this examination, the average medical costs were significantly lower in police departments with mandated fitness standards. The average medical costs in departments with FS were $222.10 and without FS were $385.97, ($X^2$ (1) = 44.16, p = .001). The effect size according to both Phi φ and Contingency Coefficient tests were close to medium at (C =.269). The DV of lost work days were lower among the sample of agencies with FS (0.07) than agencies without FS (3.79) but just below the level of significance. (X^2 (1) = 3.58, p = .058). The rate of claims and claims by females were

higher among the agencies with FS, while the claims among males were lower. These findings were not significant. Table 8 displays the results.

Table 8

Totals of agencies with mandated fitness standards only matched to agencies without standards by population and area code, redacted claims > $100,000.00.

Outcomes	With Fitness Standards	Without Fitness Standards	P value	Phi φ	C
Rate of Claims	9.82	8.71	0.798	0.059	0.058
Medical Costs	$222.10	$385.97	0.001*	0.269	0.269
Lost work days	0.07	3.79	0.058	0.963	0.956
Claims by Males	1.44	1.62	0.918	0.058	0.051
Claims by Females	1.85	0.00	0.173	1.000	0.956

Note: *p < .05, total agencies with fitness standards (n = 5), without fitness standards (n =5). Police departments purposively matched by area code and population. The total claims among agencies with FS (n = 45), total claims among agencies without FS (n =49).

The third test in this category utilized the same agencies for comparison and again redacted all claims that could be considered non-fitness related causes of loss (Appendix 10). A total of 35 claims were removed from this sample for analysis. Police Departments with mandated FS had significantly lower medical costs and lost work days among the matched samples. The medical costs for agencies with mandated standards were $42.18 and the costs for agencies without standards $647.68 ($X^2$ (1) = 531.45, p = .001, C = .877). In the lost work day's category, agencies with fitness standards averaged .07 and agencies without averaged 6.88 during the years of the study (2013-2015). The Chi-Square goodness of fit significance level for this category produced a probability value .009, (X^2 (1) = 6.68, p = .009, C = .980).

The rate of claims and claims by males were also lower in the DV with FS category but not significant. The claims by females were higher in the agencies with FS but were due to being non-existent in the without FS group. The results of this analysis are again supportive of accepting H_1 and are displayed in Table 9.

Table 9

Totals of agencies with mandated fitness standards only matched to agencies without any standards by population and area code, redacted claims > $100,000.00, redacted all non-fitness related.

Outcomes	With Fitness Standards	Without Fitness Standards	P value	Phi φ	C
Rate of Claims	3.11	5.81	0.366	0.302	0.296
Medical Costs	$42.18	$647.68	0.001*	0.877	0.877
Lost work days	0.07	6.88	0.009*	0.980	0.976
Claims by Males	0.44	1.06	0.608	0.417	0.352
Claims by Females	0.96	0.00	0.327	1.000	0.863

Note: *p < .05, total agencies with fitness standards (n = 5), without fitness standards (n = 5). Police departments purposively matched by area code and population. The total claims among agencies with FS (n = 22), total claims among agencies without FS (n =37).

Analysis of Police Departments with Mandated Fitness Standards vs. Police Departments with Mandated Wellness Standards.

The third category for answering the research questions and testing the hypothesis of this study is to compare agencies with mandated fitness standards only to agencies with mandated wellness standards only. A purposive sampling method was again used by the researcher to match agencies with mandated FS to agencies with mandated WS only. Population and area code were used to produce the matched samples (Appendix

8). A total of 5 agencies were identified as having mandated FS implemented prior to the years of 2013-2015 and were then matched to 5 agencies with mandated WS prior to that same period.

The first analysis (Table 10) revealed significantly higher medical costs in police departments with mandated fitness standards (X^2 (1) = 162.26, p = .001, C = .600). The average claims for the sample with FS were $359.68 while the average for agencies with WS were $89.65. The rate of claims and claims by males were lower in the agencies with FS but not significant. The DV's of lost work days and claims by females were higher in the FS group but also not significant.

Table 10

Totals of agencies with mandated fitness standards only matched to agencies with mandated wellness standards only by population and area code.

Outcomes	With Fitness Standards	With Wellness Standards	P value	Phi φ	C
Rate of Claims	8.40	9.86	0.733	0.079	0.078
Medical Costs	$359.68	$89.65	0.001*	0.600	0.600
Lost work days	2.07	0.36	0.270	0.706	0.670
Claims by Males	1.47	1.60	0.940	0.042	0.037
Claims by Females	1.98	0.67	0.420	0.495	0.460

Note: *p < .05, total agencies with fitness standards (n = 5), with wellness standards (n = 5). Police departments purposively matched by area code and population. The total claims among agencies with FS (n = 47), total claims among agencies with WS (n =53).

The same data sample was again examined by redacting all claims exceeding $100,000.00. This resulted in eliminating 2 claims from the FS category while still producing similar results. Also supportive of H_1, but in the opposite direction, the

medical costs remained significantly higher among agencies with mandated FS ($222.10) than mandated WS ($89.65) ($X^2$ (1) = 56.26, p = .000, C = .424). Also not significant, the rate of claims, lost work days, and claims by males were lower in the FS group and the claims by females were higher. Table 11 displays the results.

Table 11

Totals of agencies with mandated fitness standards only matched to agencies with mandated wellness standards only by population and area code, redacted claims >$100,000.00.

Outcomes	With Fitness Standards	With Wellness Standards	P value	Phi φ	C
Rate of Claims	8.18	9.86	0.693	0.092	0.091
Medical Costs	$222.10	$89.65	0.001*	0.424	0.424
Lost work days	0.07	0.36	0.661	0.669	0.419
Claims by Males	1.44	1.60	0.926	0.053	0.046
Claims by Females	1.85	0.67	0.455	0.470	0.432

Note: *p < .05, total agencies with fitness standards (n = 5), with wellness standards (n = 5). Police departments purposively matched by area code and population. The total claims among agencies with FS (n = 45), total claims among agencies with WS (n = 53).

Following the pattern of prior testing, a data set was prepared for the same matched agencies by redacting all non-fitness related claims (Appendix 10). A total of 43 claims were removed from the dataset among the sample agencies. This analysis also produced significant differences in medical costs between agencies with FS and agencies with WS but in the opposite direction from the previous data. The averaged medical costs for departments with mandated FS declined to $42.18, and the departments with mandated WS were $92.49. ($X^2$ (1) = 18.79, p = .001, C = .373).

The rate of claims, lost work days, and claims by males were all lower in the FS group, and the claims by females were lower in the WS group. However, none of these findings were significant. The results are displayed in Table 12.

Table 12

Totals of agencies with mandated fitness standards only matched to agencies with mandated wellness standards only by population and area code, redacted claims >$100,000.00, redacted all non-fitness related.

Outcomes	With Fitness Standards	With Wellness Standards	P value	Phi φ	C
Rate of Claims	2.60	5.45	0.314	0.354	0.348
Medical Costs	$42.18	$92.49	0.001*	0.373	0.373
Lost work days	0.07	0.42	0.615	0.722	0.479
Claims by Males	0.44	0.87	0.703	0.332	0.267
Claims by Females	0.96	0.50	0.703	0.314	0.258

Note: *p < .05, total agencies with fitness standards (n = 5), with wellness standards (n = 5). Police departments purposively matched by area code and population. The total claims among agencies with FS (n = 22), total claims among agencies with WS (n =33).

Analysis of Police Departments with Mixed Fitness Policies compared to Departments with No Fitness Policies.

A final purposively matched sample was completed to assist in answering the research questions in this study. This independent variable sample consisted of police departments with either mandated fitness standards, mandated wellness standards or both. A total of 31 agencies were identified in this category and matched with 33 agencies without any FS or WS by population and area code. One agency with mandated standards

was matched with three smaller agencies due to being the best possible match within that area code (Appendix 9).

The rate of claims, medical costs, and claims by females were higher among the agencies with mixed standards but not significant. Lost work days and claims by males were lower in the standards group but also not significant. The results of this analysis supports H_0 for this study and are shown in Table 13.

Table 13

Totals of agencies with mixed fitness and wellness policies matched to agencies without any fitness or wellness policy.

Outcomes	With Standards	Without Standards	P value	Phi φ	C
Rate of Claims	13	10	0.508	0.139	0.138
Medical Costs	$244.84	$230.76	0.518	0.029	0.029
Lost work days	11.55	14.32	0.585	0.107	0.105
Claims by Males	10.24	11.67	0.760	0.065	0.064
Claims by Females	12.11	11.07	0.828	0.044	0.044

Note: *p < .05, total agencies with fitness standards or wellness standards (n = 31), without any standards (n = 33). Police departments purposively matched by area code and population. The total claims among agencies with standards (n = 329), total claims among agencies without standards (n =337).

The same data set was analyzed after redacting claims in excess of $100,000.00, and a total of 10 claims were eliminated from the sample. The Chi-Square goodness of fit test did not produce any significant results. The total medical costs, lost work days and claims by males were lower but not significant among the group with standards while rate

of claims and claims by females remained higher (not significant). The results are shown in Table 14.

Table 14

Totals of agencies with mixed fitness and wellness polices matched to agencies without any fitness or wellness policy, redacted claims > $100,000.00.

Outcomes	With Standards	Without Standards	P value	Phi φ	C
Rate of Claims	13	10	0.507	0.140	0.138
Medical Costs	$173.58	$190.68	0.370	0.046	0.046
Lost work days	7.13	10.67	0.401	0.198	0.196
Claims by Males	10.14	11.58	0.757	0.066	0.065
Claims by Females	12.11	10.72	0.771	0.060	0.059

Note: *p < .05, total agencies with fitness standards or wellness standards (n = 31), without any standards (n = 33). Police departments purposively matched by area code and population. The total claims among agencies with standards (n = 326), total claims among agencies without standards (n =330).

The final analysis in this group utilized the same matched sample with redacted claims more than $100,000.00 and also redacted the same all non-fitness related claims as in the prior analysis (Appendix 10). This test again produced no significant differences in the agencies and supports H_0 in this study. Table 15 displays the results from this test.

Table 15

Totals of agencies with mixed fitness and wellness policies matched to agencies without any fitness or wellness policy, redacted claims > $100,000.00, redacted all non-fitness related.

Outcomes	With Standards	Without Standards	P value	Phi φ	C
Rate of Claims	8	5	0.201	0.212	0.209
Medical Costs	$199.49	$165.82	0.078	0.092	0.092
Lost work days	11.41	11.05	0.939	0.015	0.015
Claims by Males	6.42	6.02	0.908	0.032	0.031
Claims by Females	6.37	7.26	0.808	0.065	0.063

Note: *p < .05, total agencies with fitness standards or wellness standards (n = 31), without any standards (n = 33). Police departments purposively matched by area code and population. The total claims among agencies with standards (n = 22), total claims among agencies without standards (n =33).

CHAPTER 5: CONCLUSIONS, IMPLICATIONS, RECOMENATIONS and SUMMARY

Conclusions

The results of the data analysis are supportive of accepting $H_1$with significant associations found between police departments' physical fitness maintenance policies and measures of officer injury in two out of four examinations. Based on the sample of police departments in North Carolina (n = 145), the outcomes indicate policies of mandated fitness standards are significantly associated with reduced medical costs and reduced lost work days when compared to agencies with no standards. The analysis of agencies with mandated fitness standards (including wellness standards) (n = 10) and the analysis of agencies with fitness standards only (n = 5), both revealed significant associations ($p < .05$) of lower medical costs and reduced lost days for the IV of mandated standards in the redacted comparisons. The hypothesis for this study were:

H_0: There is no significant association between police departments' physical fitness maintenance policies and measures of officer injury.

H_1: There is a significant association between police departments' physical fitness maintenance policies and measures of officer injury.

The first analysis of matched police departments with and without mandated fitness standards initially revealed higher medical costs among the agencies with mandated standards (Table 4). The sample size for each group was (n = 10), and the total number of claims were (n = 293) among both groups. After redacting seven claims in excess of $100.000.00, the average medical costs was lower in the agencies with fitness standards and near the significant level (p =.057) (Table 5). The third analysis in this

sample eliminated 117 non-fitness related claims and revealed significantly lower medical costs for agencies with fitness standards (p = .001) (Table 6). Using Cohen's effect size standards, the effect size for the final comparisons was in the large range at (C = .541).

The second comparison group consisted of police departments with mandated fitness policies only compared to matched agencies with no standards. The sample size was again small with only five agencies who self-reported having mandated fitness standards only before 2013. This test did not include agencies with both mandated fitness and wellness standards. The first overall comparison of agencies produced no significant results among the DVs. After redacting two claims in excess of $100,000.00, the second analysis indicated significantly lower medical costs among the agencies with mandated fitness standards (p = .001, C = .269) (Table 8). The third analysis redacted 35 non-fitness related claims and revealed significant associations in both medical costs and lost work days (p = .001, C = .877 and p = .009, C = .980) (Table 9).

The third comparison group compared departments with mandated fitness standards only to departments with mandated wellness standards only. The sample size was small with this group as only five police agencies with mandated fitness standards could be matched and compared to 5 agencies with mandated wellness standards. The first and second analysis revealed significantly higher medical costs among the police departments with mandated fitness standards (p = .001) (Table 10 and 11). The third analysis redacted both claims in excess of $100,000.00 and 43 non-fitness related claims and revealed significantly lower medical costs among the departments with fitness standards (p = .001, C = .373).

The fourth comparison group examined a sample of departments with mixed fitness maintenance policies (fitness or wellness or both) purposely matched to agencies with no fitness or wellness policy. Although the sample size was larger with 31 agencies with standards, there were no significant findings in the analysis. The data in this comparison group is supportive of the null hypothesis in the study.

Implications

This study provides significant data in three out of four analysis that agencies with mandated fitness standards had lower medical costs than agencies with no standards. This included lower medical costs than agencies with mandated wellness standards when non-fitness related injuries were redacted from the data. Significant associations in lost work days were also found among the sample of agencies with mandated fitness standards when compared to agencies with no standards. The results are supportive of H_1 in both directions showing significant associations in measures of injuries between agencies with mandated FS and WS when compared to agencies with no standards.

The data is inverse in several comparisons until claims in excess of $100,000.00 and non-fitness related injuries are redacted from the data. The effect size in all significant categories was medium to large indicating a strong magnitude of the association (Salkind, 2011). The breakdowns of the data by purposive matching of agencies and the redacting of outlying excessive medical claims as well as possible non-fitness related claims provided the significant data to support the conclusions of this study.

Based on the results, the statistical associations found in this study are more related to departments with mandated fitness standards. Three of the four tests that

provided significant associations in lower medical costs involved departments with mandated fitness standards. Although these tests produced significant results, the small number of agencies in the sample reduce the generalizability and validity of the results.

The results showing associations with mandated physical fitness standards and reduced injury costs are consistent with prior studies that link poor physical fitness to increased risks of injury. Studies conducted by Meigh, et al. (2012), Orr, et al. (2013), Knapik et al. (2011), and Poplin, et al. (2014) all revealed significant associations between lower fitness levels and increased risk of injury. Mandatory wellness standards have become increasingly popular among agencies as a way of reducing health care costs (Harte et al., 2011; Finkelstein, et. al., 2010; Leoppke et al., 2007), but the data from this study reveals that wellness standards alone may not be as effective as mandated physical fitness programs.

Possible explanations for the significant increases in medical costs among agencies with mandated fitness standards in tables 10 and 11 could be due to several reasons. The small number of claims (n =47 and n = 53) over the three-year period did not provide a large enough sample size. The outliers that were related to non-fitness related injuries were more severe injuries. This is reinforced with the data from Table 12 that reveals significantly lower medical costs after 43 claims were removed from the data.

The final analysis supports H_0 , and that no statistical difference was found among the agencies with mixed mandatory fitness and wellness policies when compared to agencies without fitness standards. The sample size was larger for this analysis and the results more generalizable.

Recommendations

As found in the review of the literature, this is the first known study to utilize individual police departments and their policy of physical fitness maintenance as an independent variable for comparison. This research creates opportunities for future studies that examine police departments across wider areas including other states and countries. Future replicated studies will assist in determining the overall relevance of this data and can also improve the generalization across other regions and populations.

This study provided significant data to support H_1 which was designed as a non-directional hypothesis, but the data in the final analysis also supports H_0. There were no statistical differences among the sample of agencies with mixed fitness and wellness standards when compared to agencies with no standards. This data conflicts with prior studies that revealed lower rates of injury, sickness, and absenteeism among police officers who participated in programs that focused on improving fitness (Wattles & Harris, 1997; Steinhardt et al., 1991; Gerber, et. al., (2010).

The significant findings of this study related to medical costs and lost work days centered on the agencies with mandated fitness standards. The total number of agencies with mandated fitness standards were lower (n = 10) than the number of agencies with mandated wellness standards (n = 26), and this could have affected the outcome when comparing the total number of mixed agencies (n = 31). Future studies should delve deeper into this data for more comparisons.

Additional analysis using this same data set should be undertaken to look for other significant associations with alternate testing procedures. The statistical software available from SPSS © IBM should be utilized to examine other possible independent

samples testing. The Mann-Whitney U Test or configuring the data for independent samples t- test (Salkind, 2011) may result in additional identified areas of statistical significance.

The additional DV's identified but not used in this study could be expanded into further research. The average total claims per agency should be examined and used with an accepted formula for comparing among different sized agencies. The average BMI can be calculated from height and weight information provided in the data and compared among the agency unit of analysis. Other information provided by the NCLM could be broken down and compared in more detail to include, loss description, the cause of loss, incident type, and incident date. Time and day of the week of the incidents may also be obtained from the league and compared to determine any associations among the injuries.

Another side note found while conducting this study were the number of chiefs of police who recognized the importance of physical fitness standards but failed to mandate implementation. During the telephone and personal interviews to determine the level of physical fitness maintenance among agencies, many chiefs stated they did not currently have standards but were planning on implementing mandatory fitness standards in the future. The thoughts of police executives could be the subject of an in-depth future qualitative study on why departments do not mandate physical fitness policies.

Summary

The importance of good physical fitness and the job of a police officer has been recognized for years, but administrators consistently fail to mandate fitness standards for incumbent officers (Ness & Light, 1992; http://www.calea.org, 2015; Sheets, 2012; Bissett, Bissett & Snell, 2012). Research has been shown that supports how improved

physical fitness can reduce injury, absenteeism, and sickness in police, military, and civilian studies (McGill et al., 2015; Poplin et al., 2014; Orr et al., 2013; Lisman et al., 2013). There were no other studies found that compared rates of injury as determined by workers compensation claims that used individual police departments fitness maintenance policies as the independent variable.

The goals of this study were to determine; (1) if there was an association between a police departments 'fitness policies and measures of reported officer injuries, and (2) do police departments with mandated physical fitness maintenance policies tend to experience fewer officer injuries than police departments without mandated physical fitness policies. An extensive examination of a sample of police departments (n = 145) with a total of (n = 1,580) workers compensation claims related to injury produced significant results to reject the null H_0 and support the hypothesis H_1 in 3 out of 4 tests conducted. The comparison of departments with mixed fitness policies did not produce significant results and failed to reject H_0.

Police departments that mandated physical fitness policies, including those with wellness policies, were shown to have significantly lower medical costs than departments that did not mandate standards ($p < .05$) when claims in excess of 100,000.00 and non-fitness related injuries were redacted from the data. After redacting outlying claims greater than $100,000.00 and non-fitness related claims, police departments with mandated fitness standards only displayed statistically lower medical costs and lost work days when compared to departments without standards ($p < .05$).

This information is valuable for police administrators who are seeking information and evidence-based solutions to reduce reportable injuries among police officers. Additional and repeated studies are recommended to increase the generalizability and effect size of the results produced.

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Appendix 1

Example of Data Sheet from NC League of Manipulates (70 of 4971 total)

Member	NatureofInjury	DescriptionOfLoss	Date	Month	Incurred
A5	Contusion/Concussion	EE responding to an emergency call was in an accident and car is totaled.	7/1/2009 0:00	July	$35,811
T2	Sprain/Strain	EE in foot pursuit of suspect EE lost balance tried to break fall.	7/5/2009 0:00	July	$2,008
B10	Contusion/Concussion	at traffic stop, slammed index and middle finger in car door	7/1/2009 0:00	July	$821
J5	Sprain/Strain	EE searching for a B& E suspect, stepped into a hole twisted R foot.	7/5/2009 0:00	July	$1,969
R2	Sprain/Strain	EE correcting issue with computer in vehicle stand , pushed stand with R hand.	7/4/2009 0:00	July	$335
Y6	Contusion/Concussion	ee was chasing an offender and swirled to miss a picnic table but caught the corner of the t	7/4/2009 0:00	July	$6,298
A6	Sprain/Strain	ee got out of his vehicle and planted his left foot to stand up and felt a pop in his left ankle	7/3/2009 0:00	July	$972
T8	Fracture/Crush/Dislocation	Car door struck EE's right shoulder.	7/9/2009 0:00	July	$0
D10	Stress	EE was participating in physical assessment testing. EE was feeling ill. EE rested and felt be	7/8/2009 0:00	July	$227
B7	Contusion/Concussion	EE was arresting a wanted person. EE had to wrestle suspect to the ground.	7/2/2009 0:00	July	$0
Y10	Sprain/Strain	EE sprained right ankle while arresting a suspect.	7/12/2009 0:00	July	$1,602
X5	Contusion/Concussion	EE was going down stairs in parA5 lot and Ee slipped and fell.	7/5/2009 0:00	July	$38,249
U5	Laceration/Puncture/Rupture	EE was bitten by dog on left & right hands.	7/13/2009 0:00	July	$316
P2	Sprain/Strain	EE was kicked in left ankle while attempting to arrest a suspect.	7/14/2009 0:00	July	$2,477
F	Contusion/Concussion	EE inside rear of van slid off bench and hit thumb.	7/15/2009 0:00	July	$191
U9	Sprain/Strain	EE was running to his patrol car when he felt a sharp pain in the inner part of left thigh.	7/15/2009 0:00	July	$142
Z2	Laceration/Puncture/Rupture	EE was attempting to take a subject in custody. Subject struggled with EE.	7/17/2009 0:00	July	$359
H4	Laceration/Puncture/Rupture	EE conducting search drug warrant was punctured by used hypodemic needle.	7/14/2009 0:00	July	$2,718
A6	Laceration/Puncture/Rupture	EE catching a stray cat it bit thru EE's gloves.	7/18/2009 0:00	July	$159
R2	Sprain/Strain	EE crossing grassy ditch, leaping over landed, felt pain in R knee.	7/4/2009 0:00	July	$203
B	Occupational Disease/Illness	EE was spit in the eye by a HIV positive arrestee.	7/18/2009 0:00	July	$907
S4	Occupational Disease/Illness	ee responded to a fight call, suspect was bleeding and officer was exposed to suspects blo	7/18/2009 0:00	July	$278
R4	Laceration/Puncture/Rupture	bitten on hand by U9 PD K-9 during training	7/21/2009 0:00	July	$683
N4	Other Trauma	EE was pursuing suspects through a wooded area and was stung by yellow jackets.	7/13/2009 0:00	July	$108
N4	Contusion/Concussion	on foot patrol ee approached a car and ee got tangled in the seat belt of the car when the c	7/15/2009 0:00	July	$2,655
L10	Contusion/Concussion	A vehicle ran over EE's foot.	7/22/2009 0:00	July	$0
C5	Fracture/Crush/Dislocation	EE sitting in patrol vehicle, Fire Pager fell from sunviser struck EE's mouth, cracked front to	7/21/2009 0:00	July	$181
E7	Contusion	EE releasing baby Deer back to the wild, it kicked while in car, EE stepped in ditch after ste	7/16/2009 0:00	July	$919
J5	Occupational Disease/Illness	pregnant female at Citgo had MRSA ee was possibly exposed	7/13/2009 0:00	July	$0
F8	Fracture/Crush/Dislocation	EE was closing a door during training and finger was caught in door frame.	7/27/2009 0:00	July	$153
P6	Laceration/Puncture/Rupture	EE responding to Alarm Call, using knife blade on edge of door, blade closed on EE cutting f	7/24/2009 0:00	July	$787
F	Laceration/Puncture/Rupture	EE using Taser on suspect, taser not turned off barbs embedded in palm of EE's hand.	7/25/2009 0:00	July	$544
T8	Sprain/Strain	a scuffle resulted when arresting suspect EE falling pulling muscle.	7/16/2009 0:00	July	$0
H2	Infection/Inflammation	EE was searching a wooded area and developed a rash due to chiggers.	7/18/2009 0:00	July	$132
U7	Other Trauma	while performing physical training (defensive tatics and boxing), he was struck which caus	7/29/2009 0:00	July	$188
A4	Sprain/Strain	EE Attempting to arrest a suspect for an assault on a police officer.	7/23/2009 0:00	July	$0
E3	Contusion/Concussion	EE delivering a warrant on Hwy 109 S, turned in front of oncoming car, hit on passenger side	7/29/2009 0:00	July	$288
X8	Laceration/Puncture/Rupture	EE was scratched by a struggling suspect.	7/28/2009 0:00	July	$1,038
K6	Burn	EE @ the scene of fire temp was 90 degree exposure to high heat.	7/28/2009 0:00	July	$1,474
T8	Laceration/Puncture/Rupture	ee was testing a substance w/a nark kit, glass broke and cut his finger	7/31/2009 0:00	July	$1,184
X7	Sprain/Strain	EE on foot pursuit of suspect when knee gave out.	8/4/2009 0:00	August	$978
M7	Laceration/Puncture/Rupture	EE was searching the effects of a suspect. EE's right thumb was struck by a used syringe.	8/4/2009 0:00	August	$1,441
W9	Burn	ee was trying to put coolant in patrol car radiator and was burnt trying to open the cap	7/15/2009 0:00	July	$348
W6	Laceration/Puncture/Rupture	EE was involved in a struggle with a suspect. EE was bitten, headbutted and slammed.	7/26/2009 0:00	July	$1,549
T	Sprain/Strain	EE slipped and fell down steps, hurt lower back.	8/5/2009 0:00	August	$759
K4	Other Trauma	ee was bitten by a female	8/6/2009 0:00	August	$513
M7	Laceration/Puncture/Rupture	EE was moving a storage unit and the corner cut EE's hand.	8/5/2009 0:00	August	$632
C	Contusion/Concussion	EE was attempting to control combative subject. They fell to the ground and EE struck nose	7/30/2009 0:00	July	$515
C	Fracture/Crush/Dislocation	EE and others attempting to make an arrest, suspect hit EE with fist in jaw.	8/2/2009 0:00	August	$13,746
N2	Other Trauma	EE was @ training range for qualifications ear plug fell out while discharging firearm.	7/31/2009 0:00	July	$73
F	Laceration/Puncture/Rupture	EE attempting to retrieve a dog from trap caught finger on wire cage.	8/7/2009 0:00	August	$249
O4	Laceration/Puncture/Rupture	EE noticed loose power wire to printer power cable cutting finger with knife to trim tie.	8/7/2009 0:00	August	$471
X9	Contusion/Concussion	EE was @ residence going down motor loose steps, falling to ground.	8/10/2009 0:00	August	$1,184
K5	All Other	EE was treated on 08-06-09 for a bee sting while on duty @ Program on 08-04-09.	8/4/2009 0:00	August	$230
U9	Laceration/Puncture/Rupture	EE tried to catch a pipe and glass struck EE's right ring finger.	8/8/2009 0:00	August	$824
X	Stress	EE suffered heat exhaustion while on firing range.	8/9/2009 0:00	August	$0
T8	Contusion/Concussion	while attempting to handcuff a patient, officer fell to the floor injuring left wrist	8/11/2009 0:00	August	$182
M8	Fracture/Crush/Dislocation	EE was chasing suspect, fell on right hand - 5th Metacarpal fracture.	8/11/2009 0:00	August	$813
F9	Sprain/Strain	EE assisting a deputy and stepped into a hole in parA5 lot, causing him to twist ankle.	8/9/2009 0:00	August	$994
U4	Other Trauma	ee was standing in the hallway waiting to start training and passed out	8/11/2009 0:00	August	$1,620
M5	Sprain/Strain	EE tracA5 robbery suspects thru heavily wooded area, stepped into large hole.	8/16/2009 0:00	August	$1,284
U9	Laceration/Puncture/Rupture	EE was tased in back of right arm, puncture wound left index finger.	8/17/2009 0:00	August	$1,613
Q5	Occupational Disease/Illness	EE arrested suspect injured in fight, putting him in patrol car spit blood, saliva in EE's face.	8/11/2009 0:00	August	$263

Appendix 2

Example of Agency List (n = 253)

Agencies
1. Aberdeen
2. Ahoskie
3. Albemarle
4. Andrews
5. Apex
6. Asheboro
7. Atlantic Beach
8. Ayden
9. Badin
10. Bald Head Island
11. Beaufort
12. Beech Mountain
13. Belhaven
14. Belmont
15. Bessemer City
16. Beulaville
17. Biltmore Forest
18. Biscoe
19. Black Creek
20. Black Mountain
21. Bladenboro
22. Blowing Rock
23. Boone
24. Brevard
25. Brookford
26. Bryson City
27. Burgaw
28. Burnsville
29. Butner
30. Cameron
31. Candor
32. Canton
33. Cape Carteret
34. Carolina Beach
35. Carrboro
36. Carthage

37. Caswell Beach
38. Catawba
39. Chadbourn
40. Chapel Hill
41. Cherryville
42. China Grove
43. Claremont
44. Clayton
45. Cleveland
46. Clinton
47. Clyde
48. Coats
49. Columbus
50. Conover
51. Conway
52. Cornelius
53. Cramerton
54. Creedmoor
55. Dallas
56. Davidson
57. Denton
58. Dobson
59. Drexel
60. Duck
61. East Spencer
62. Eden
63. Edenton
64. Elizabeth City
65. Elizabethtown
66. Elkin
67. Emerald Isle
68. Enfield
69. Erwin
70. Fairmont
71. Farmville
72. Fayetteville
73. Fletcher
74. Forest City
75. Four Oaks
76. Foxfire Village
77. Franklin
78. Franklinton

79. Fremont
80. Fuquay-Varina
81. Garner
82. Garysburg
83. Gastonia
84. Glen Alpine
85. Goldsboro
86. Graham
87. Granite Falls
88. Granite Quarry
89. Hamlet
90. Havelock
91. Haw River
92. Henderson
93. Hendersonville
94. Hertford
95. Highlands
96. Hillsborough
97. Holden Beach
98. Holly Springs
99. Hope Mills
100. Hot Springs
101. Huntersville
102. Indian Trail
103. Jacksonville
104. Kill Devil Hills
105. King
106. Kitty Hawk
107. Knightdale
108. Kure Beach
109. Lake Lure
110. Lake Waccamaw
111. Landis
112. Laurel Park
113. Laurinburg
114. Leland
115. Lenoir
116. Lillington
117. Lincolnton
118. Locust
119. Long View
120. Louisburg

121. Lowell
122. Madison
123. Maggie Valley
124. Magnolia
125. Maiden
126. Manteo
127. Marion
128. Mars Hill
129. Marshall
130. Marshville
131. Matthews
132. Maxton
133. Mayodan
134. Mebane
135. Middlesex
136. Mint Hill
137. Misenheimer
138. Mocksville
139. Morehead City
140. Morganton
141. Mount Airy
142. Mount Gilead
143. Mount Olive
144. Murfreesboro Murphy
145. Nags Head Nashville
146. Navassa
147. Newland
148. Newport
149. Newton Grove
150. Norlina
151. North Topsail Beach
152. Northwest Norwood
153. Oak Island
154. Oakboro
155. Ocean Isle Beach
156. Old Fort
157. Oxford
158. Parkton
159. Pembroke
160. Piedmont
161. Pikeville
162. Pilot Mountain

163. Pine Knoll Shores
164. Pine Level
165. Pinehurst
166. Pinetops
167. Pineville
168. Pittsboro
169. Plymouth
170. Polkton
171. Princeton
172. Princeville
173. Raeford
174. Raleigh
175. Ramseur
176. Randleman
177. Ranlo
178. Red Springs
179. Reidsville
180. Rhodhiss
181. Richlands
182. River Bend
183. Robbins
184. Rockingham
185. Rolesville
186. Rose Hill
187. Rowland
188. Roxboro
189. Rutherfordton
190. Saluda
191. Sanford
192. Scotland Neck
193. Seaboard Selma
194. Seven Devils
195. Shallotte
196. Sharpsburg
197. Shelby
198. Siler City
199. Simpson
200. Smithfield
201. Southern Pines
202. Southern Shores
203. Southport
204. Sparta

205. Spindale
206. Spring Hope
207. Spring Lake
208. Spruce Pine
209. St. Pauls
210. Stallings
211. Stanfield
212. Stanley
213. Stantonsburg
214. Star
215. Stedman
216. Stoneville
217. Sugar Mountain
218. Sunset Beach
219. Surf City
220. Swansboro
221. Sylva
222. Tarboro
223. Taylorsville
224. Thomasville
225. Topsail Beach
226. Trent Woods
227. Triad Airport
228. Troutman
229. Troy
230. Valdese
231. Vass
232. Wadesboro
233. Wagram
234. Wake Forest Wallace
235. Walnut Cove
236. Warrenton Warsaw
237. Waxhaw Waynesville
238. Weaverville
239. Weldon
240. Wendell
241. Whispering Pines
242. Whitakers
243. White Lake
244. Whiteville
245. Williamston
246. Wilson's Mills

247.	Winfall
248.	Wingate
249.	Winterville
250.	Woodfin
251.	Woodland
252.	Wrightsville Beach
253.	Youngsville

Appendix 3

Document-Participation Letter

Title of Study: An Exploratory Study on Physical Fitness Policies among Police Departments in North Carolina.

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Description of Study: Jay Fortenbery is a doctoral student at Nova Southeastern University engaged in research for the purpose of satisfying a requirement for a Doctor of Education degree. The purpose of this study is to examine existing physical fitness maintenance policies among police departments in North Carolina and determine if there are any associations or trends in these polices and reported officer injuries.

If you agree to participate, you will be asked to complete the attached questionnaire. This questionnaire will help the writer identify the existing physical fitness maintenance policy of your agency. The questionnaire will take approximately five 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 associated with policies on physical fitness and associated rates of injuries. 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 secured in a locked filing cabinet. 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.

Appendix 4

Telephone Survey Form

Explanation of Study

My name is Jay Fortenbery and I am the Chief of Police in Edenton, NC. I am a doctoral student at NOVA Southeastern University and am conducting a study examining the existing state of physical fitness standards among police agencies. I would like to ask you a couple of questions about your existing policy on physical fitness. Your individual department name will not be mentioned in the study but is needed for data analysis and comparative purposes. The results of the study will be made available for you upon completion.

Agency Name _____ Date _____

Name of Administrator _____

1. Does your agency have a mandated (all officers annually) physical fitness maintenance policy and what year was the policy implemented?

   _____

2. Does your agency have a mandated (all officers annually) wellness program and what year was the program implemented?

   _____

Please provide a copy of the policy to jay.fortenbery@edenton.nc.gov or fax to 252-482-4999.

Appendix 5

Area code map retrieved from,
https://www.nationalnanpa.com/area_code_maps/ac_map_static.html

Appendix 6

Coded police agencies with fitness standards matched with agencies without fitness standards. This sample includes agencies with both mandated fitness and wellness combined.

Number	Agencies with Standards	Population Served	Area Code	Matched agency without standards	Population served	Area Code
1	D2	9,996	704	M4	10,487	704
2	F5	23,905	704	A5	28,403	704
3	F9	15,000	828	K4	17,905	828
4	I5	9,123	252	R9	9,403	252
5	H9	1,602	252	G	1,500	252
6	J	162	910	S8	387	910
7	K5	10,383	336	H3	14,158	336
8	N	9.756	704	V3*	50,141	704
9	S3	26,525	919	A9	31,786	919
10	C3	26,748	919	K7	28,670	919

*Closest possible match without fitness standards in area code.

Appendix 7

Coded police agencies with mandated fitness policy matched to agencies with no fitness policy. This sample does not include agencies with wellness standards.

Number	Agencies with Standards	Population Served	Area Code	Matched agency without standards	Population served	Area Code
1	I5	9,123	252	R9	9,403	252
2	H9	1,602	252	G	1,500	252
3	J	162	910	S8	387	910
4	K5	10,383	336	Y6	14,293	336
5	C3	26,748	919	K7	28,670	919

Appendix 8

Coded police agencies with mandated fitness policy matched to agencies with mandated wellness policies. This sample does not include agencies with no standards.

Number	Agencies with Standards	Population Served	Area Code	Matched agency without standards	Population served	Area Code
1	I5	9,123	252	Y3	6,880	252
2	H9	1,602	252	O5	2,791	252
3	J	162	910	G1	2,127	252
4	K5	10,383	336	N3	13,294	828
5	C3	26,748	919	E	39,768	919

Appendix 9

Coded police agencies with mixed mandated fitness or wellness standards matched with agencies without fitness or wellness standards.

Number	Agencies with Standards	Population Served	Area Code	Matched agencies without standards	Population served	Area Code
1	B4	3,345	252	O2	3,717	252
2	C	15,932	704	M4	10,487	704
3	E	39,768	919	G3	36,000	919
4	G1	2,127	252	O3	2,154	252
5	K2	4,975	252	H	4,992	252
6	N3	13,294	828	W	12,553	828
7	O5	2,791	252	V7	2,795	252
8	O8	2,680	828	U4	3,350	828
9	Q7	20,179	704	A5	28,403	704
10	T	8,011	828	U2	7,360	828
11	Y3	6,880	252	P8	11,255	252
12	F5	23,905	704	V3*	50,141	704
13	S3	26,525	919	K7	27,670	919
14	D2	9,966	704	Q1	5,782	704
15	F9	1,500	828	Q	1,364	828
16	H9	1,602	252	G	1,500	252
17	I5	9,163	252	R9	9,403	252
18	J	162	910	S8	387	910
19	K5	10,383	336	Y6	14,293	336
20	N	9,756	704	C2	4,667	704
21	X	7,769	828	V2	7,427	704
22	X6	3,454	910	V8	3,294	910
23	Y8	5,717	704	U8	2,479	704
24	W4	8,181	828	S9	6,286	828
25	B	4,954	252	S2	4,695	252
26	C3	26,748	919	I1	20,510	919
27	D5	11,970	919	C6	8,494	919
28	E9	11,311	704	W6,X5,J3**	8,844	704
29	J5	16,743	828	K4	17,905	828
30	P5	5,373	252	N9	5,414	252
31	T8	4,131	252	O6	3,777	252

*Closest possible match in area code. **Agencies W6 pop 3,478, X5 pop 2,368 and J3 pop 2,998 were used together for a closer match with E9. Total population 8,844.

Appendix 10

Possible fitness and non-fitness related causes of loss

Possible Fitness Related Causes of Loss	Possible Non - Fitness Related Causes of Loss
Apprehension/Arrest/Struggle	Absorption/Ingestion/Inhalation
Caught in/Under or Between	Animal/insect
Cumulative Trauma	Broken Glass
Cut, Punch	Burns or Scalds
Exercise/training	Carpel Tunnel
Get in-off	Chemical Exposure
Jumping/lifting	Collision or Sideswipe M/V
Overexertion	Contact with Other Cause
Gunshot	Dust, Gas Fumes or Vapor
Hand Tool	Exposure to Temperature Extremes
Holding Carrying	Fire or Flame
Person Act of Violence	Fall, slip, trip
Pushing/Pulling	Foreign Matter/Object in eye/body
Reaching	Hot Objects or Substances
Repetitive Motion	Infections Disease
Stooping/Bending	Miscellaneous Causes
Strain or Injury by	Mold
Stress	Motor Vehicle Collision
Striking Against	On Ice or Snow
Twist	On Stairs
Twisting	Plants, trees, vegetation
	Rubbed or Abraded by
	Slip, Trip, Fall
	Slipped
	Stepped into Hole
	Stepping in and out
	Temperature Extremes
	Transfer of Body Fluids
	Traumatic Event
	Unknown
	Using Tools/Machinery