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THE MAXIMUM HIRING AGE AND MANDATORY RETIREMENT AGE FOR POLICE OFFICERS IN THE NEW YORK CITY POLICE DEPARTMENT

by

Joseph E. Pascarella

A dissertation submitted to the Graduate Faculty in Criminal Justice in partial fulfillment of the requirements of the degree of Doctor of Philosophy, The City University of New York Graduate Center.

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This manuscript has been read and accepted for the Graduate Faculty in Criminal Justice in satisfaction of the dissertation requirement for the degree of Doctor of Philosophy.

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Abstract

THE MAXIMUM HIRING AGE AND MANDATORY RETIREMENT AGE FOR POLICE OFFICERS IN THE NEW YORK CITY POLICE DEPARTMENT

by

Joseph E. Pascarella

Advisor: Dr. F. Warren Benton

The New York Police Department (NYPD) as a requirement for employment as police officers requires that applicants are below the age of thirty-six (36) and requires incumbent police officers employed by the NYPD to retire prior to age sixty-three (63). Although these age restriction policies are discriminatory, they may be necessary for large, complex urban police and law enforcement agencies to achieve the missions and objectives such as organizational administration and public safety. This issue in policing and law enforcement is particularly acute in contemporary policing and law enforcement in large urban areas such as New York City given the increased scrutiny and accountability placed on police and law enforcement agencies and the threat of terrorism in a post-September 11, 2001-world. A longitudinal cohort analysis consisting of three thousand twelve (3,012) police officers hired by the New York Police Department (NYPD) was conducted spanning the years 1985 through 2000 to determine the correlation between policing performance and aging to determine the necessity for age restriction policies.

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J.E.P., September, 2003
Brooklyn, New York

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I. INTRODUCTION

Age Restriction Policies in Policing and Law Enforcement

Police and law enforcement agencies have traditionally restricted employment opportunities as police officers to applicants who are within certain chronological age parameters. There are three (3) primary age restrictions in obtaining and maintaining employment in police and law enforcement agencies as police and law enforcement officers, minimum appointment ages, maximum appointment ages and mandatory retirement ages. Minimum and maximum appointment ages affect police applicants while mandatory retirement ages affect incumbent police officer and law enforcement officers working in police and law enforcement agencies. The minimum appointment age is the age that must be attained (usually between the ages of eighteen (18) to twenty-one (21)), the maximum appointment age is the oldest possible age a prospective applicant can attain to be eligible for appointment and a mandatory retirement age is the oldest possible age an incumbent officer can attain prior to involuntary retirement. Age restrictions have existed since the advent in the middle 1800's of organized policing and law enforcement in the United States (Alfers, 1975; Alpert & Dunham, 1997). The reasoning behind minimum appointment ages is due to the basic operational characteristics of policing and law enforcement. Police officers are encumbered with the responsibilities of possessing and using a firearm and the constitutionally endorsed power to seize a person's liberty (ranging from temporary questioning and detainment to the justifiable use of deadly physical force) based upon levels of proof as low (and seemingly ambiguous) as "reasonable suspicion" and "probable cause." These responsibilities, privileges and powers demand that a person has achieved an acceptable degree of

maturity reached only by attainment of a certain age and expectation of maturity commensurate with that age. These conceptions are generally agreed upon by police policy planners, analysts, managers, and organizational administrators, political officials and the general public has prompted policy decisions to mandate minimum appointment ages. Mandatory minimum appointment age policies have remained virtually unchallenged. The actual age and how young police and law enforcement agencies set their minimum appointment age is the only debatable policy issue related to minimum appointment ages. Police and law enforcement agencies vary. Some minimum appointment ages are usually between the ages of eighteen (18) and twenty-two (22) but every police agency has a minimum appointment age and historically there has been little variance in the United States (President's Commission on Law Enforcement and Administration of Justice, 1967).

The maximum appointment age a person may be appointed and the age that an incumbent officer must retire (mandatory retirement age) are also based on intersubjective concepts but the policies are not generally agreed upon nor easily applied in practice. The necessity of police and law enforcement agencies maintaining a maximum appointment age is perhaps the most controversial of the three (3) age restriction policies (Fennel, 1982). The maximum appointment age as an age restriction policy has endured a dramatic and significant change during the last forty (40) years. In a survey conducted in 1961 by O'Connor (1962) for the International Association of Chiefs of Police, nearly all police agencies (98.9%) serving populations over twenty-five thousand people (25,000) *had* a maximum appointment age and in 1977, eighty-four percent (84%) of State police agencies had a maximum appointment age (O'Connor,

1962: International Association of Chiefs of Police, 1977). In 1981, all police agencies serving jurisdictions populated by 500,000 people or more had a maximum appointment age (Bartell Associates & The City of New York Corporation Counsel, 1981). However over ninety percent (90%) of the largest one hundred (100) local police agencies and the forty-nine (49) states (the state of Hawaii does not have a state police agency) police agencies ***currently do not*** have a maximum appointment age. Regarding mandatory retirement ages, over eighty percent (80%) of the largest one-hundred (100) local police agencies and over sixty percent (60%) of state police agencies do not have a mandatory retirement age. All federal law enforcement agencies, however, have a maximum appointment age and mandatory retirement age.

The reasoning that has historically necessitated maximum appointment ages is the occupational specifications of policing and law enforcement. Policing and law enforcement is physically, physiologically, mentally, and emotionally challenging and young, physically fit persons may be more adaptable to this type of work. This paradigmatic view within (and outside) the policing and law enforcement profession has a substantial degree of construct validity to the realities of the working police patrol and law enforcement officers. Therefore, police and law enforcement agencies have been legally allowed to discriminate against older persons with impunity throughout the history of organized policing in the United States. In fact, the most renowned police organization practitioner and scholar, O.W. Wilson, recommended age restrictions of twenty-one (21) as a minimum appointment age and twenty-nine (29) as a maximum appointment age for new police applicants (Wilson & McLaren, 1972).

This same structured paradigm that became accepted practice in the policing community has fostered a certain degree of age discrimination, and to a certain extent, gender discrimination because age restriction policies may effect childbearing decisions. External societal and legal influences and internal influences within police and law enforcement agencies have raised issues over the last two decades questioning the utility and legal legitimacy of maximum appointment ages and mandatory retirement ages.

There are specific laws that prohibit age discrimination but police and law enforcement agencies are not always legally bound by these laws. The most eminent law regulating age discrimination in the workplace is the federal Age Discrimination in Employment Act (ADEA). The ADEA, which was initially signed into law by the United States Congress in 1967, prohibits discrimination based upon a person's age in hiring, promotion, and retirement decisions. Legislatures, political officials, and police administrators perpetually grapple with the complex legal and policy implications of the ADEA. The original bill that was signed into law in 1967 was intended explicitly for the private workforce. The ADEA has since been amended and modified several times and the scope of the ADEA has also expanded and contracted several times. The ADEA effectively presumes that all age restriction policies within the forty (40) to seventy (70) year old range are *de facto* discriminatory and the employer has the burden of proving that the age restrictions applied and enforced by the specific employer are not discriminatory. To overcome this presumption, a government entity (or police or law enforcement agency considering the extant research) must prove that age is a "bona fide occupational qualification" (BFOQ) for the job of police officer, meaning that age is a critical factor in police performance. The BFOQ defense entails an admission that age is

an important factor in determining employment but the discrimination can be justified. This proposition was incorporated directly from the federal Civil Rights Act of 1964 (Vance, 1986; Wicks, 1986).

In 1974, the ADEA was applied to employers and employees of state and local governments, and hence, police and law enforcement agencies and these new amendments became effective January 1, 1978 (ADEA, 1974). The 1974 amendments to the ADEA represented the beginning of a perilous and confusing relationship police and law enforcement agencies have with the ADEA. The confusion is centered on application of the ADEA to local police and law enforcement agencies. Can police and law enforcement agencies legally impose age restriction policies? Does the ADEA protect individual applicants for police and law enforcement officer positions and incumbent police and law enforcement officers from age discrimination? Further muddling the relationship between the ADEA and police and law enforcement agencies were the 1974 ADEA amendments that specifically provided for a mandatory retirement at age fifty-five (55) exclusively for *Federal* law enforcement officers *only* such as Special Agents of the Federal Bureau of Investigation and Drug Enforcement Administration. Essentially, the Federal government exempted Federal police and law enforcement agencies from Federal law and mandated age restriction policies for Federal police and law enforcement officers but did not allow state and local police agencies to impose age restriction policies on state and local police officers.

After the 1974 amendments became effective in 1978, it was unclear if the ADEA applied to state and local police and law enforcement agencies and how it would be enforced. There were two (2) major United States Supreme Court cases involving (one

specifically questioning the application of the ADEA to local and state governments) age restriction polices and police and law enforcement agencies during this time period. The first case, *Massachusetts Board of Retirement et al. v. Murgia* (1976) involved the mandatory retirement age restriction policy at age fifty (50) of the Massachusetts State Police. A Massachusetts State Trooper that was involuntarily retired, Robert Murgia, argued that the age restriction policy violated the Equal Protection Clause of the 14th Amendment to the United States Constitution because age was a suspect class that should be protected. The United States Supreme Court, however disagreed holding that the government has a legitimate state interest by ensuring the physical preparedness (the Supreme Court recognized the decline of physical fitness with age) of State Police Officers and age alone is not a suspect class that warrants government protection. The second case, *Equal Employment Opportunity Commission (EEOC) v. Wyoming et al* (1983) dealt specifically with the legal validity when applying the ADEA to state and local government agencies. The State of Wyoming imposed an age restriction policy of age fifty-five (55) for game and fish wildlife wardens, a state law enforcement officer position. The Equal Employment Opportunity Commission (EEOC) sued the State of Wyoming on the grounds that the mandatory retirement policy violated provisions of the ADEA. The State of Wyoming argued that application of the ADEA on state governments' represented an illegal imposition of the Commerce Clause as contained in Article I, Section 8, subsection 3 of the United States Constitution that grants the United Stated Congress power to regulate commerce between and within states and the application of the ADEA violates Tenth Amendment protections of states' rights. Essentially, the Tenth Amendment protects state sovereignty and the United States

Congress cannot legally impose Federal laws (such as the ADEA) that impede state government operations such as mandating age restriction policies in police and law enforcement agencies. The United States Supreme Court held in *EEOC v. Wyoming* that application of the ADEA was not an illegal imposition of federal congressional laws on state and local governments and therefore, police and law enforcement agencies must adhere to the ADEA's provisions.

The United States Supreme Court's decision in *EEOC v. Wyoming* in 1983 left police and law enforcement agencies' age restriction policies vulnerable to Federal lawsuits. Public safety officials and administrators began vigorously lobbying federal legislators to insert a "public safety exemption" into future amendments to the ADEA. According to the public safety exemption, state and local police and law enforcement agencies are permitted to impose maximum appointment ages and mandatory retirement ages and not violate the ADEA or any other Federal law related to age discrimination. The first public safety exemption was inserted into the 1986 amendments to the ADEA and became effective on January 1, 1987. According to the 1986 amendments, the Federal government was commissioned to conduct a study to lastly conclude the necessity (based on quantitative and empirical evidence of the relationship between age and work performance) of age restriction policies in public safety (ADEA, 1986). Theoretically, the study would achieve the Federal government's mandates and with that, the public safety exemption was a temporary provision to the ADEA, expiring on December 31, 1993. A study was conducted, however the study's conclusion apparently caused added controversy to the debate and did not achieve the goals of determining the necessity of age restriction policies. Therefore, state and local government agencies were

in the same position after the *EEOC v. Wyoming* decision in 1983. Once again, the necessity for the public safety exemption was repeatedly debated and challenged in various venues (United State Senate Hearings, March 29, 1994). To further complicate matters, an "'exception'" to the public safety exemption was proposed at this time by then Republican Senator James Jeffords of Vermont that would allow individual police officer and law enforcement officers to physically prove their physical fitness and capabilities upon involuntary retirement (Schneider, 1996). However, the 'exception' to the exemption was never passed by Congress. The public safety exemption was most recently restored upon an Executive Order (attached to the Department of Defense Appropriations Act) and signed into law on September 30, 1996 (ADEA, 1996). The "new" public safety exemption was made *retroactive* to January 1, 1994, meaning that police and law enforcement agencies were not bound to the provisions of the ADEA from January 1, 1994 until September 30, 1996. The bill's authors, United States Representatives Major Owens and Harris Falwell wanted to make the public safety exemption a permanent provision of the ADEA however, they also requisitioned *another* study (to be conducted by the National Institute of Safety and Health) to determine the impact of age on public safety and alternatives to age based personnel selection-criteria. Thus far, the federal government has not yet conducted the study and the public safety exemption is still inserted in the ADEA.

Although the public safety exemption within the ADEA is still intact, state and local police and law enforcement agencies are not currently bound to the ADEA based upon the United States Supreme Court ruling on January 11, 2000 of *Kimel et al. V. Florida Board of Regents et al.* (2000). The *Kimel* decision held that individuals could

no longer sue state and local employers for violations of Federal laws, such as the ADEA. Although the case did not directly involve police or law enforcement officers or police applicants, the decision in *Kimel* has ramifications to police and law enforcement agencies with respect to the ADEA. The United States Supreme Court squarely addressed the applicability of the ADEA to state and local governments and the power of the ADEA to abrogate the states' rights of immunity against lawsuits for violations of Federal law granted by the Eleventh Amendment to the United States Constitution. The United States Supreme Court ruled in *Kimel* that the ADEA did purposely abrogate states' rights of immunity against federal lawsuits; however, this abrogation was an illegal action under Section 5 of the Fourteenth Amendment to the United States Constitution that grants the United States Congress the power to enforce federal laws. The United States Supreme Court did rule in *Kimel* that individuals could commence lawsuits alleging age discrimination in state and local courts.

The *Kimel* decision is a culmination of a political and legal "New Federalism" policy debate that is currently being adjudicated and mediated by the United States Supreme Court (Levy, 2000; Senkbeil, 2000; Royer, 2001; Noonan Jr., 2002). Federalism is essentially the relationship between individual states and the federal government. More succinctly, the functioning of two (2) separate governments, state and federal. Central to the federalism debate is the power of the federal government to intervene and regulate state government functions such as the administration and operation of police agencies. Police and law enforcement agency age restriction policies are adjoined to the federalism debate because they represent the imposition of federal laws (such as the ADEA) on state and local government operational functions. For

example, should the Federal government (via legislation enacted by the United States Congress) be allowed to regulate age restriction policies of a state or local government agency? The federalism debate is historically cyclical and is often based on the contemporary political ideology of the United States Congress and the appointed Supreme Court justices. The present composition of the United States Supreme Court is slightly favored toward allowing states' expanded rights and diminishing the role of the federal government in state and local government functions (Levy, 2000) by narrowly interpreting Federal legislation, such as the ADEA. The United States Supreme Court held a completely opposite opinion in a case similar to *Kimel* over twenty-five (25) years ago. The United States Supreme Court held in *National League of Cities v. Usery* (1976) that the United States Congress *may* enact legislation that regulates state and local government functions such as fire prevention, police protection, and public health.

The composition of the United States Supreme Court may eventually change and the *Kimel* decision may be overturned. The federalism debate may also be refined and reinterpreted in a different manner and context in the future, granting the federal government power to impede on state and local government functions. Additionally, the public safety exemption is currently in a suspended state, languishing in a federal law that is no longer applicable to state and local government and since 1978, not applicable to federal law enforcement officers. Thus far, a study idealized by the federal government to conclusive settle the issues involved scientifically and without political bias has not yet been realized. This analysis will attempt to achieve a part of that goal by conducting an externally valid and reliable quantitative analysis directly addressing the significant issues with respect to aging and police and law enforcement officers. This dissertation

will examine the primary and ancillary policy issues involved regarding age restriction policies and police and law enforcement officers, review the relevant background research on aging and aging and policing, present a historical overview of the maximum appointment age and mandatory retirement age in the New York Police Department, consist of an original research endeavor containing a quantitative and empirical results of a longitudinal cohort analysis involving three thousand twelve (3,012) New York Police Department (NYPD) police officers that were hired in 1985 and entered NYPD Police Academy and analyze their physical and police performance over a fifteen (15) year period and discuss policy implications based upon the findings and results of the research.

II. REVIEW OF THE LITERATURE

Chapter One

The Competing Policy Interests of Age Restrictions in Policing: Public Safety, Individual Rights, and Organizational Administration

Age restrictions in policing and law enforcement present a delicate balancing of competing policy interests; the safety of the public, individual rights of potential police and law enforcement applicants and incumbent police and law enforcement officers and the efficient organizational administration of police and law enforcement agencies. Age restriction policies are discriminatory because they purposely exclude persons whom are over a specific age. In effect, age restriction policies are legitimized institutional age discrimination. One of the arguments prior to the 1980's in favor of age restriction policies in policing and law enforcement was the belief that younger officers are more malleable to police training, more easily disciplined and were more likely to make better employees (Wilson, 1972). These factors, some of which were (or can be) proven by empirical reasoning, justified the argument that age restriction policies granted greater dexterity to the often-complex day-to-day organizational administration of police and law enforcement agencies. These three (3) competing policy interests, public safety, individual rights, and organizational administration are continually balanced and often reflect political ideologies of federal, state and local legislatures and the courts interpreting relevant age discrimination laws. The competing policy interests are also balanced and may be determined by the will and amount of power police officials and administrators may have in imposing age restriction policies or the amount of power a particular lobby (e.g., individuals, class action) may have in overturning these policies.

Public Safety

Police officers must remain physically fit for reasons of personal safety as well as the security interests of the public. The need for physically fit police officers has the intersubjective agreement of most reasonable people. The primary reason for the existence of police officers and police and law enforcement agencies is to protect and ensure the safety of the public. Police officers are required to engage in strenuous activity and to react quickly under pressure. Life threatening events may happen without warning at any time of day and under any condition. Police officers must also have superior eye-hand coordination to fire their weapons.

Police work is mentally and physically demanding. Younger persons are generally more physically fit than older persons and there is a substantial amount of empirical support that correlates age with physical fitness. There are occupation-specific tasks within policing and law enforcement that require young, physically fit police officers. A younger police officer may be more likely to apprehend a fleeing suspected criminal and overcome physical resistance than an older police officer due to superior cardiovascular and (or) muscular strength. Although the actions of a criminal suspect based on perceived physical preparedness of the confronting police officer is impossible to test quantitatively, it is a strong perception that may psychologically affect the demeanor of a criminal suspect *or* the police officer and prevent an escape or attempted assault.

Physically fit police officers are less likely to suffer line of duty injuries, work-related disabilities, and early death (Connaughton, Hausenblas, Danneker and Lovins, 2000). Connaughton et al. (2000) also found that younger police officers are superior in

cardiovascular fitness when compared to older police officers. Older and (or) less physically fit officers may also have "firearms dependency" (Garrick, 1997). Firearms' dependency is a false sense of safety perceived by a police officer when a police officer posses a firearm. For example, in the 2nd Federal Circuit Court case entitled *Parker v. District of Columbia* (1988), a Washington D. C. police officer was attempting to arrest a fleeing, dangerous felon wanted on an outstanding arrest warrant. The police officer involved in the pursuit testified that he was so physically unfit that he could not physically overcome the suspect and became "firearms dependent", meaning that the police officer could not physically overcome the suspect to arrest him and take him into custody, forcing the police officer to shoot the suspect, seriously wounding him. The court ruled that the jurisdiction (Washington D. C.) that employed the police officer was liable because they had not maintained an adequate fitness program. Many police and law enforcement officers may consider themselves invincible *because* they are police or law enforcement officers and the fact that *they posses a firearm* will resolve all potentially violent confrontations (Ness, 1992).

In 1974, a Memphis, Tennessee police officer responding to a burglary shot and killed the suspect, a fifteen (15) year old in the back as the suspect was attempting to flee by climbing over a six-foot fence (*Tennessee v. Garner*, 1985). This was deemed a "justified use of force" by existing Tennessee state laws and Memphis Police Department policies. The police officer involved testified that it "...was apparent to me for the little bit that I knew about the area at the time that he was going to get away because, I couldn't get to him, I couldn't get to him because of the fence..." (*Tennessee v. Garner*, 1985, p. 1697). Although the actions of the police officer was legal by Tennessee State

Statutes and Memphis Police Department use of force policies, eleven (11) years later in 1985, the United States Supreme Court ruled that this type of seizure (shooting a fleeing felon) was unreasonable under the Fourth Amendment to the United States Constitution. Therefore, an additional onus is placed on the police to apprehend criminals using what are termed "less than lethal" alternatives such as physical restraint thereby diminishing "firearms dependency." "Less than lethal" alternatives demand that police officers maintain superior physical fitness and agility.

The issue of public safety is dependent on the safety of the police officer. If the officers are at risk, the public is vulnerable from criminals. Unfit police and law enforcement officers may also have to "earn respect" not immediately afforded them due to their old age or lack of physical fitness (Hoffman, 1993). The court has actually ruled in *Arrit v. Grisell* (1977), a case that upheld a maximum appointment age of thirty-two (32) for West Virginia police officers, that even a minimal risk to public safety is enough to justify a maximum appointment age to maintain a physically fit police department.

Police officers and law enforcement age, but demographically, violent criminals do not age. The overwhelmingly majority of persons in the United States that commit violent crimes are between the ages of sixteen (16) and twenty-four (24), and that figure has remained relatively stable since the 1960's (Uniform Crime Reports, 1995) for most violent crime. However, violent crime involving the most violent criminals, persons using firearms to commit murder and serious assaults has been getting younger and younger (Uniform Crime Reports, 1999, 2000). This presents a perennial mismatch between a young person with a propensity for physical violence and an aging police officer. To conceptualize and quantify the prevalence of danger in policing and law

enforcement, consider that there was an average of fifty-six thousand six hundred and eighty-three (56, 683) felonious assaults on police and law enforcement officers *per year* from 1987 through 1996 (FBI, 1996). Given that there were approximately 663,535 local police and law enforcement officers in the United States as of June 1996 (Office of Justice Programs, 1998), a police or law enforcement officer *has approximately a one in eleven (9%) chance annually of being assaulted feloniously in the line of duty*. This figure only counts criminal assaults and not injuries suffered while restraining emotionally disturbed persons, during rescue missions, or automobile accidents in the performance of duty. To further accentuate the prevalence of violence and the demographic mismatch, the average age of six hundred (600) police officers feloniously-slain in the line of duty from 1987 through 1996 was aged thirty-six (36) years old (FBI, 1996). Sixty-seven percent (67%) of the slain officers were over the age thirty (30). In contrast, the average age of nine hundred fifty-eight (958) offenders who murdered a police officer in the line of duty during that same time period was age twenty-eight (28), of which sixty-five percent (65%) were less than age thirty-one (31). Twelve percent (12%) of persons who murdered a police officer in that time period *were less than eighteen years old.*

Individual Rights

The demographics of the United States, along with the advancing medical sciences are changing the quality of life and how we view aging and old age in this nation. Older persons are living longer and healthier and they are a very influential political lobby. When former astronaut and United States Senator John Glenn endured a flight mission into space in 2001 at the age of seventy-seven (77), he symbolized the

dramatic change in the way the United States' society now views older citizens (St. Amour, 2001). Furthermore, the "Civil Rights Revolution" of the 1960's granted some protections to older Americans, racial minorities, and women. The 1960's and 1970's were also an era that encouraged and empowered the individual citizen to seek recourse when they were perceived to have been discriminated against by any powerful (and previously unquestioned) authority, albeit their employer, whether a private corporation or a government entity. Many individuals sought protections from their employers through passage of various federal civil rights' laws. One such law from that era was the Age Discrimination in Employment Act (ADEA). The ADEA, initially enacted in 1967, was intended to protect the individual worker against discrimination in the workplace. In fact, "age" was originally a protected class but ultimately was removed from the final draft version of the Civil Rights Act of 1964 (Finklestein, 1964). Title VII of the Civil Rights Act of 1964 was the first federal law directly addressing employment inequities by creating the Equal Employment Opportunity Commission (EEOC) (Civil Rights Act of 1964). The ADEA is a direct descendent of the Civil Rights Act of 1964 and has been termed "the first child of the Civil Rights Act of 1964" (Martin, 1999, p. 70). The dispute whether to include age as a protected class with race, gender or even physical or mental impairment (Americans With Disabilities Act (ADA), 1990) is centered on the status of "age" as a distinct class. Age is continuous and fluid and everybody will eventually age, therefore, there is no discrimination as opposed to distinct groups of people, such as racial minorities and women, that remain the same race and gender their entire lives. According to the opinion of the United States Supreme Court in *Kimel*, age

discrimination should not be subject to the same scrutiny as discrimination based upon race or gender.

The argument from the individual rights perspective is that a person should not be discriminated against solely because of their age if it is proven they can perform their job properly. The burden should be placed on the employer to prove the employee cannot perform the job properly. The original ADEA was meant explicitly for the private work force; however, it was modified several times since the original enactment. In 1974, the ADEA was applied to state and local governments, and hence, local police and law enforcement agencies. According to the ADEA, the employer (police and law enforcement agency), must prove that the police officer cannot perform the job properly, a difficult task in the complex profession of policing and law enforcement. As noted previously, police and law enforcement agencies are not currently bound to the provisions of the ADEA.

The Civil Rights Act of 1964 and subsequent amendments do allow for age discrimination if the employer can prove that age is a "bona fide occupational qualification" (BFOQ) necessary to the normal operation of a particular business. Establishing a BFOQ "business necessity" is a "heavy burden" (Sauls, 1992) that requires employers to prove that performance at the required level has a "manifest relationship to the employment in question" (Sauls, 1992). The BFOQ defense entails an admission that age is an important factor in determining employment but the discrimination can be justified. This defense was incorporated into the ADEA (upon initial enactment in 1967) from the Civil Rights Act of 1964 (Vance, 1986; Wicks, 1988). According to Wicks (1986), it was the intent of the legislature to narrowly interpret the BFOQ exception. The

court has interpreted in a Seventh Circuit District Court ruling entitled *Equal Employment Opportunity Commission (EEOC) v. City of Janesville* (1980) that "particular business" meant the entire police department. For example, a police officer working in administrative capacities working on primarily clerical tasks is in the same "particular business" as a police officer in a patrol function responding to calls for service and apprehending violent felons. However, in *EEOC v. City of Minneapolis* (1982), the Minnesota Federal District Court ruled a police captain performing primarily administrative duties should not be forced to retire at age fifty-five (55).

The central theme from the individual rights perspective is that persons who are physically fit and able to do the job should not be discriminated against solely because of their age. The courts have recognized that there is a nexus between age and physical fitness therefore allowing police and law enforcement agencies to discriminate against older persons. However, older persons feel they should not be discriminated if they are physically able to perform the job adequately and each person should be assessed on a case-by-case basis. Proponents advocating individual rights favor application of Federal employment discrimination law to local and state employers and assessments of each employee on "case-by-case basis", meaning each individual employee should be judged separately. Standardized age restriction policies, according to individual rights advocates, are inherently discriminatory because they generalize against an entire class of people and should be abolished.

Organizational Administration

Police officials and administrators have usually been the staunchest advocates of implementing age restriction policies. From the standpoint of senior police managers,

age restriction policies are organizational necessities. O. W. Wilson (1972, p. 254-256) wrote that younger applicants provide more years of potential service, provide a longer period of profitable return on the recruitment investment, present lighter burdens on pensions, have greater physical endurance and disease resistance and are more easily trained and motivated. The needs of police and law enforcement agencies regarding personnel performance have not lessened since Wilson's research, in fact, demands placed upon police and law enforcement agencies and consequently police officers have expanded dramatically. The work police officers do have become increasingly difficult and complex as the nation's citizenry has socially and economically diversified and communities have become increasingly urban and suburban.

Police and law enforcement agencies and individual officers have also become increasingly scrutinized, first by the federal government. Former United States President Herbert Hoover's created the National Commission on Law Observance and Enforcement (commonly referred to as the "Wickersham Commission", a commission that followed) in 1929 to study and evaluate problems with the criminal justice system (National Commission on Law Enforcement and Observance, 1931). Although age restriction policies were not specifically mentioned, the National Commission concluded that police and law enforcement officers were under educated, brutal and corrupt and that police and law enforcement agencies must recruit higher quality applicants. Specific evaluation of police and law enforcement personnel selection policies gained prominence and primacy after the civil disorders and criminal procedural revolutions of the 1960's and 1970's (President's Commission on Law Enforcement and Administration of Justice, 1967; National Advisory Commission on Criminal Justice Standards and Goals: Task Force

Report, the Police, 1973; *Mapp v. Ohio* (1964); *Miranda v. Arizona* (1966)), notorious police corruption scandals of the 1980's (Hollman, 1987; Klein, 1989; McAlary, 1989; Mollen Commission, 1994; Jeffe, 2000) and infamous brutality and use of force incidents of the 1990's (Christopher Report, 1991; Bandes, 2001). Police and law enforcement officers are also held to higher levels of accountability (Skolnick & Fyfe, 1994) and a greater role is expected of them in to disentangle communities' social conditions and crime problems with the slow evolution of modern policing that consists of policing models such as problem, community oriented, proactive, and rewards-based policing (Kelling, Pate, Diekman and Brown, 1971; Sherman, Milton & Kelley, 1973; Goldstein, 1979; Wilson & Kelling, 1982; Skolnick & Bayley, 1986; Kelling & Moore, 1988; Trojanowicz & Bucqueroux, 1990; Goldstein, 1990; Goldstein, 1991; Toch & Grant, 1991; Kelling & Coles, 1997; Kelling, Coles and Wilson, 1998; Silverman, 1999).

These were issues facing police officials and managers ***prior*** to the terror attacks on September 11, 2001. In addition to the new responsibilities added with the modern evolution of policing, police officers are now required to thwart future domestic terror attacks to ensure homeland security by gathering criminal intelligence from the community. These new expectations complicate an already difficult job. Recruiting quality applicants to meet these new demands can be a frustrating endeavor. Police recruitment, selection and training are extremely costly. The estimated costs of selection and training range from $10,000 in Detroit (Esparaza, 1997) to $55,000 in New York City. Police and law enforcement agencies need to realize a return on this "investment" in terms of quality police performance. They must not only recruit and train qualified

and effective police officers, they must also retain them within the agency to utilize their experience and maintain a return on their initial recruitment and training investment.

Younger police officers may offer a better financial investment because they are generally healthier and have fewer family obligations. However, older police officers with a substantial amount of experience are more likely to enhance the "quality of policing" because of their experience. But how will older police officers obtain this experience if they are hired at older ages? Advocates of hiring older police officers may fail to realize the benefits of police experience. The courts specifically addressed this issue in upholding a maximum appointment age of age thirty-two (32) for Missouri State Highway Patrol officers in the case of *EEOC v. Missouri State Highway Patrol* (1984). In upholding the maximum appointment age, the Eighth Circuit Court ruled that it takes a certain amount of time for a police officer to become proficient and the average "street life" of a police officer is ten (10) years, therefore, to maintain a quality police agency, police officers should be hired when they are relatively young. The International Association of Chiefs of Police (IACP), in making recommendations to the President's Commission on Law Enforcement and Administration of Justice (1967) articulated this point. The IACP recommended younger applicants because they were more likely to work their best *physical years* working in the arduous tasks of the street patrol police officer. Although the value of patrol experience may be impossible to validly quantify, most persons would agree that a person aged forty (40) with ten (10) or fifteen (15) years of experience is probably more of an asset to the police or law enforcement agency and the relevant constituency as opposed to a thirty-eight (38) year old rookie police officer.

Older police officers, however, may be less inclined to use force, are involved in fewer violent confrontations and generate fewer citizen complaints than younger police officers (White & Bloch, 1975). This concept has never been tested empirically while controlling for years of experience. Older police officers are less likely to be involved in automobile accidents while on duty, but younger police officers are generally more productive in terms of arrests and summonses and use less sick time. Are older police officers less likely to be involved in police automobile accidents because they are better drivers of vehicles or less motivated (or less willing to "test fate") than younger police officers to chase and apprehend criminals? In an empirical analysis (New York Police Department Personnel Bureau, 1997) of six thousand four hundred fifty-four (6,454) line of duty injuries suffered during physical encounters by New York City police officers and detectives in the New York Police Department (NYPD), police officers and detectives over the age of thirty-five (35) were found to lose approximately 8.6 days of work per line of duty injury while police officers and detectives aged twenty-two (22) to twenty-eight (28) were found to lose only 4.9 days of work per line of duty injury. The cost of a line of duty pension is New York City is estimated to be worth $1,356,720 for a police officer entering the New York City Police Academy at age twenty-five (25) and suffering a line of duty injury resulting in a disability pension at age forty (40). This is also not a new issue in the NYPD. As early as 1916, the City of New York conducted a study on disability pensions awarded to police officers as the result of line of duty injuries because city administrators were concerned at the young age (age thirty-seven (37)) police officers were awarded the disability pensions (City of New York, Commission on Pensions, 1916).

There are other "latent" (not so obvious) and "not-so-latent" (obvious) policy issues regarding age restriction policies such as political lobbies and financial considerations are also, to a lesser extent, part of the competing policy interests of age restriction policies. "Political Action Committees" such as the American Association of Retired Persons (AARP), the American Civil Liberties Union (ACLU) and to certain degree the United States Equal Opportunity Commission (EEOC) may object to any age restriction policy, creating political lobbies that are perpetual opponents to any policy that legitimizes age discrimination.

Financial considerations represent a latent, if not surreptitious policy concern that cannot be ignored. This policy concern is faced by all municipalities and government entities with finite financial resources, budget concerns and human resource issues. Municipalities and government entities generally have the most glaring financial restrictions; therefore, policies are often formulated within an economic "cost/benefit" analysis. More succinctly, police agencies often must decide if younger police officers are less expensive to employ than older police officers. There are actuarial considerations dependent on the funding sources of the pension benefits of individual police officers, albeit the municipality or an external financial source such as the Federal government or a private retirement plan or fund. Certain municipalities may benefit, depending on the pension system, from hiring older police officers because they will be collecting pension benefits for a shorter period of time.

The three (3) primary and other ancillary policy interests coalesce and ultimately contend when municipalities, government entities, police and law enforcement agencies attempt to justify the imposition or absence of age restriction policies. Public safety is

tantamount and police and law enforcement agencies need to operate as efficiently as possible because of scarce resources, however, individuals do have a right not to be discriminated based solely upon their age. This is the root of the competing policy concerns. Often, these policy concerns clash and the reconciliation of the competing interests is meted out by the courts. Unfortunately, the historical decisions of the courts have failed to establish clear and firm guidelines for police and law enforcement agencies. The 1996 amendments to the ADEA have specifically mentioned that police and law enforcement agencies are allowed to impose age restriction policies, if the policies are base on empirical, quantifiable evidence related to job performance (ADEA, 1996).

The applied, quality research in the field of policing and law enforcement and aging relative to these policy issues is very limited. Recognizing the correlations between youth and physical fitness sounds plausible, but why? How has this been proven? How *can* this be proven? Although several police and law enforcement agencies have conducted internal studies addressing these issues, the results have been inconclusive. No single published study has articulated a persuasive argument for the imposition or elimination of age restriction policies. The existing studies are generally unconvincing due to weak research designs and methodologies and legal, political, and agency-specific biases. The policing and law enforcement profession, in order to meet the challenges (of which there are many) of the new millennium, cannot endure with critical, job-specific personnel requirements that are steeped in bias, personal notions, and ideas that are neither based nor supported by sound methodological empirical research directly addressing the effect of age and aging on police and law enforcement officers.

Chapter Two

The Study of Aging and Aging Research

The justifications for age restriction policies in police and law enforcement agencies are generally based on "common sense" notions and concepts of aging and the correlations between advancing age and an inevitable decline in physical fitness. Despite a rigorous training regimen, physiological and physical decline are inevitable with advancing age (Panton et al., 1995; Proctor, Sinning, Walro, Sieck and Lemon, 1995; Trappe, Costill, Vukovich, Jones and Melham, 1996; Lambert et al., 2002). Attainment and maintenance of adequate levels of physical fitness are occupational necessities for police officers. Police officers and law enforcement officers are expected to instantaneously engage in potentially life-threatening physical encounters without any prior mental or physical preparation. The mere uncertainty of these unforeseen threats is a stress factor unique to policing and law enforcement. Police and law enforcement officers are expected to perform these necessary physical tasks to protect their own lives, the lives of their co-workers and the lives of the public they are chartered to protect. Generous pensions available (usually after only twenty (20) or twenty-five (25) years of service) to police and law enforcement officers are tantamount to the inherent and uncertain dangers prevalent in police work. Some, but not all, lawmakers and police officials and administrators believe that maximum appointment ages and mandatory retirement ages are occupational necessities based upon a physically demanding job. Notions and concepts, to be considered valid, must entail a certain degree of scientific intersubjectivity. These beliefs, however reasonable, must be empirically validated or police and law enforcement agencies are in jeopardy of violating individual civil rights

by discriminating on the basis of age against a particular class of incumbent employees or potential employees.

An examination into the physiological, (and biological), social and psychological constructs of aging must be conducted prior to any acceptable operational definitions of age can be used for future research. The epistemology of how a particular society defines age and aging is essential prior to any intensive investigation involving age as a performance predictor.

Aging must be studied from an interdisciplinary perspective. Aging integrates biology, physiology, psychology, sociology, anthropology, and ecology into an encompassing, inherent and environmentally formed, chronological occurrence. "Age" as a modern phenomenon is usually measured in calendar years and is accompanied by physiological changes determined by nature and by social and psychological changes based upon societal norms and mores and individual free will. The age "Decrement Model", investigated by Arthur and Fuentes (1989) and Shephard (1999), essentially states that with advancing age, there is a corresponding decrease in a wide range of physical abilities. This is a very general model of the human life span and applies (although not exclusively) to the biological, physiological, and physical declines with advancing age. For example, a finding by Backman and Molander (1986) consistent with a decrement model found that older golf athletes are less proficient in coping in high-stress conditions in competition, due to an age-related decline in task-relevant cognitive abilities. Lehman's (1953) seminal studies on aging place the athletic prime of most individuals in the late twenties. This "athletic prime" is consistent within a decrement

model and has been confirmed in numerous replication studies (Schulz & Curnow, 1988; Over & Thomas, 1995; McCaffrey & Orlick, 1989).

Aging is a broad, general yet complex, subjective concept that has various meanings to different people across different cultures and at during different historical eras. Perhaps even the same person, depending on what particular junctures they are at in their life, will have differing viewpoints and opinions about aging. Regardless of the juxtaposition, complexity, and perplexity of the concept of aging, aging itself is an inevitable event in everyone's life. People "grow up and then get older"; biologically, physiologically, sociologically and psychologically and the interpretations and exact meanings of aging are contemplated only within a specific context the meanings are solicited. The level of subjectivity rises to an acceptable level of objectivity and intersubjectivity as the context in which aging is more properly defined. Biological or physiological definitions have more of a consensual agreement of what constitutes aging than do psychological, sociological and even "legal" definitions (such as the age you must attain before you can vote or purchase alcohol) of aging. Aging as a psychological or sociological concept varies while aging, as a biological or physiological concept is usually defined within acceptable and valid scientific paradigms. In social frameworks, there is wide disagreement on exactly what is considered "old." There is also considerable disagreement concerning psychological development and aging. These variations and subjective concepts are germane to the debate of age restriction policies in policing and law enforcement. Personnel employed in occupations responsible for protecting the public must maintain adequate levels of physical fitness to ensure public safety. Therefore, before the question of "What is too old to embark on a career that is

physically demanding, particularly a career that is endeavored toward public safety?" the concept of aging must be adequately investigated.

Everybody chronologically ages. More succinctly, almost everyone agrees that people are born, they grow into childhood, adolescence, adulthood, become elderly and then, unfortunately, perish. However, is there a valid construct between age and levels of fitness?

Analyzing the biological causes of aging and extrapolating the concepts of aging police officers is an important task because it is necessary to determine whether biological reasons hinder police performance as police officers and law enforcement officers age. Policy considerations need quantitative and empirical support to justify concepts of what "aging" and old is or police and law enforcement agencies risk viable claims of employment discrimination. As noted previously, there may be common sense notions on what aging and old is, but what are these notions based upon? Who determines what old is? The United Nations World Health Organization broadly defines "older" as those persons over the age of age sixty (60) (World Health Organization, 2002). However, what can serve as constructively valid operational definitions of aging and old?

The measure of aging, or "senescence" is defined as the progressive deterioration and pathology of virtually every bodily function over a period of time (Austad, 1997). Although there is no precise definition of senescence, there is general agreement that aging or senescence refers to changes, albeit good, bad, or indifferent, in the human body as time progresses (Finch & Rickels, 1995).

A consensual way in the scientific community to quantitatively measure aging is by measuring life span of human beings. The life span in the United States (and other Industrialized Nations) increased dramatically throughout the 20th Century. The expected life span has increased from age forty (40) in 1900 to about age seventy-five (75) in 1990 and has been steadily increasing throughout the world. In the United States alone, the life expectancy for males born in 1997 was age seventy-three (73) and seventy-nine (79) for females and the life expectancy also increased for both males and females increases as we age (World Health Organization, 2002). Genetic engineering and other methods of recreating and manipulating the human genome may place the average human life expectancy well beyond age one hundred (100) by the end of the 21st Century.

Austad (1997) argued that increases in the average human life expectancy during the 20th Century is somewhat of a statistical phenomena because the life expectancy rate has increased due to decreases in premature deaths from infectious diseases. Austad has also theorized that shorter rates of life expectancies throughout history may have been the result of harsher environments rather than any significant changes or improvements in the human anatomy. Humans also have a very high life expectancy rate when compared with other similarly sized mammals or large primates (Hill & Kaplan, 1999). While senescence is the study of aging from the perspective of biologists and pathologists, evolutionary theorists and anthropologists consider aging and the extended life span in human history as a process of human adaptation to harsh environments, adequate nurturing of their off-spring, better nutrition, and development of superior cognitive skills (Kaplan, Hill, Lancaster and Hurtado, 2000; Carey & Judge, 2001; Angier, 2002).

Austad defines aging as "the point in life in which the probability of dying is at its lowest" (p.10, 1997), which in most Industrialized Nations is the point just before puberty (Austad, 1997). The rate of death in human beings in the pubescent state (ages ten (10) to fifteen (15)) is one (1) in two thousand (2,000) or .05% (Finch & Rickels, 1995). The death rate begins to increase steadily after puberty and Finch and Rickels (1995) hypothesize that this is when the aging process commences. The change in the probability changes over time at a rate called "mortality-doubling time" (MRDT), that is, the time it takes for the probability of death to double (Finch, Pike and Witten, 1990). The rate of MRDT in Industrialized Nations varies from seven (7) to ten (10) years. For example, a twenty-seven (27) year old is twice as likely to die between the ages of thirty-four (34) to thirty-seven (37), four times as likely between the ages of forty-three (43) and forty-seven (47), and eight times as likely between sixty-four (64) and sixty-seven (67). Austad (1997) suggests that this ***rate*** of human mortality has remained consistent since the Stone Age and is generally reliable and valid in all cultures, regardless of the infant mortality or life expectancy.

Another aspect related to aging and aging research is the probability of sudden death from specific diseases such as a heart attack or stroke and other diseases such as cancer or accidents. The heart becomes less efficient with age. Aging is injurious to the outside structure of the heart (increase in fat, collagen, lipofuscin, amyloid, decrease in myocyte) and the internal structure such as the aortas and ventricles (Limacher, 1994). According to data compiled by Woloshin, Schwartz & Welch (2002), four (4) out of one thousand (1,000) males aged thirty (30) and two (2) out of one thousand (1,000) females aged thirty (30) in the United States will die from a cardiovascular incident such as a

heart attack or a stroke. According to the American Heart Association (2003), two percent (2%) of men and nearly three (2.8%) of women aged twenty-five (25) to forty-four (44) in the United States suffer from cardiovascular disease. The percentage of the population that suffers from cardiovascular disease increases to nearly seven percent (6.7%) for men and six percent (5.8%) for women aged forty-five (45) to fifty-four (54) and then to over thirteen percent (13.2%) for men aged fifty-five to sixty-four (64) and approximately nine and one half percent (9.4%) for women aged fifty-five (55) to sixty-four (64) (American Heart Association, 2003). The probability of cardiovascular death for males increases by four hundred percent (400%) by age forty (40) for males and three hundred percent (300%) for females. By age fifty (50), fifty-five (55) out of one thousand males (1,000) will die from a cardiovascular incident, an increase in the probability of death from age thirty (30) of nearly one thousand four hundred percent (1,400%). Twenty-five (25) females out of one thousand (1,000) females will die from a cardiovascular incident, an increase in the probability from age thirty (30) of over eleven hundred percent (1,100%). One (1) out of one thousand (1,000) males age thirty (30) will die from lung, colon, or prostate cancer but forty-one (41) out of one thousand (1,000) males aged fifty (50) will die from lung, colon or prostate cancer, an increase in the probability of death over a twenty year period by four thousand one hundred percent (4,100%). Three (3) out of one thousand (1,000) females age thirty (30) will die from lung, colon, breast or ovarian cancer but forty-one (41) out of one thousand (1,000) females aged fifty (50) will die from lung, colon breast or ovarian cancer, an increase in the probability of death over a twenty-year period by approximately one thousand percent (1,000%). Regarding death by accidents, there is no substantial increase in the

probability of death as males and females age until age seventy (70), meaning that an age twenty (20), thirty (30), forty (40), fifty (50) or sixty (60) year old all have an equal probability of death by accident, approximately two (2) out of one thousand (1,000) (Woloshin, Schwartz & Welch, 2002).

The physical decrement of various systems of the human body as the result of aging has been reported in numerous studies. Loss of oxygen uptake and aerobic exercise capacity (or cardiovascular endurance) is also inevitable with age (Astrand, 1960, 1986; Heath, Hagberg and Ehsani, 1981; Panton et al., 1995). According to Panton et al. (1995), after age thirty (30), maximal cardiac output declines at a rate of five percent (5%) to ten percent (10%) per decade due to the fact that the heart loses contractile strength. The respiratory system also changes with age as the flow of oxygen decreases (Kent, 1978a; Kent, 1978b). Skeletal and muscle mass may also be loss as the result of aging (Lexell, 1995). Muscle mass reduction occurs in approximately one-third of the population (Tzankoff & Norris, 1977; Forbes, 1970, 1976). Muscle mass reduction may begin as young as twenty-five (25) and by the age of fifty (50), approximately ten percent (10%) of muscle mass may be lost. Lexell (1995) found that "Type II" "slow-twitch" fiber muscle mass (there are two (2) types of muscle fiber mass, "Type I" "fast-twitch" and "Type II" "slow twitch"), is more likely to be adversely affected by the aging process than Type I muscle fiber mass. Lexell (1995) also found that with increasing age, skeletal muscle mass is progressively lost and partly replaced by fat and connective tissue. Other studies (Brown, 1972; Campbell, McComas and Petito, 1973; Sica, Sanz and Colombi, 1976; Brown, Strong and Snow, 1988; Doherty & Brown, 1993; Dougherty, Vandervoort, Taylor and Brown, 1993) have suggested other decrements in

human muscle mass with age. Older persons, according to Lexell (1995) also have an increased risk of falls and increased risk of fractures.

Recognizing the nexus between aging and fitness, the physical career of the police and law enforcement officer is akin to the career of the athlete, therefore, the characteristics of the aging athlete can be extrapolated to aging police officers and law enforcement officers. Studies suggest that there is "prime" in the career of the athlete. The concept of biological aging can perhaps be validated by some measure of quantitative analysis such as the years of peak athletic performance as measured by peak muscular strength and cardiovascular endurance.

Lehman (1953) studied the prime years that athletes are more likely to break records and be top performers and concluded that skills peak before the age of thirty (30) in sports where performance requires explosive outbursts of speed and energy, whereas maximal success is achieved between the ages of thirty-one (31) and thirty-six (36) in sports where physical strength is not required but psychomotor precision is essential. These findings were recently confirmed by Schulz and Curnow (1988) who also found that this peak has remained relatively stable over the last one hundred (100) years despite advances in training methods and nutritional improvements. They also posited that performance in sports relying on action time, speed of limb movement, flexibility, explosive strength, and gross body coordination peaks in the mid-twenties, whereas prowess demanding control precision, rate control, arm-hand steadiness, aiming and stamina peaks in the late twenties or early thirties (Schulz & Curnow, 1988). Backman and Molander's (1986) findings suggest that older athletes may be less proficient than younger athletes in coping with high stress conditions.

Pirow (1994) elaborated on this concept in an attempt to quantify aging by delineating six (6) separate ages of a man relative to athletic performance in cardiovascular events such as swimming, track and field events, and weight-lifting events. The athletic performance variables consisted of an anaerobic output, lactic acid accumulation, aerobic output, metabolizing fat, energy, and glycogen limit. The six (6) stages were measured relative to peaks and declines in athletic performance pertaining to the above performance variables. Pirow's first stage consisted of persons too young for physical activity to acquire competence, while subsequent stages consisted of training and development, the peak performance period, the mature and slow decline and lastly, old age and increasing decline. Acquiring competence and the training and development stages begin around age five (5) and steadily increases to the stage of peak performance at about age twenty-five (25). The maturity, slow decline and ultimately, decreasing performance begins after age thirty (30).

Trappe et al. (1996) compared highly trained elite male runners, fitness trained runners that did not compete, and a sedentary male population in a longitudinal analysis over a twenty-two (22) year study period. Trappe et al. (1996) found that despite a rigorous and continued training regiment, the average highly trained, elite, and competitive male athlete suffered a five percent (5%) to seven percent (7%) loss of cardiovascular output per decade from the middle twenties when they were first tested through the middle forties. Roos, Rice and Vandervoort (1997) found that older males and females lose levels of motor units (MU) which is reduced force control and contracting of the muscles. Bonnefoy, Kostka, Arsac, Berthouze and Lacour (1998) compared healthy older males (average of seventy-one (71) years old) with younger

males (average of twenty-three (23) years old) and found that maximal anaerobic power (muscle strength) decreased approximately eight percent (8.3%) per decade in males, regardless of health.

The social psychology of aging is a relative concept that may be interpreted, defined and redefined in several contexts. Aging can be individual-orientated and objective or group-orientated and subjective. There are varying definitions of aging across cultures and physical and social scientific communities. Aging as a socially constructed concept has the highest degree of subjective attitudes. How a certain culture envisions aging is related to how infants, children, youths, young adults, adults, and the elderly are treated in society and at what point there is a "best age" for specific major life events such as graduation from high school, the first job, and marriage. These "best ages" are referred to as "norms." Age norms are essentially the belief and timing of when certain events are agreed upon within a certain culture by a majority of people within that culture. Different age groups may envision their own age group or other age groups from different standpoints.

One of the first sociological studies investigating age norms was conducted by Neugarten, Moore and Lowe in 1965. Neugarten and his colleagues introduced the concept of age norms as a "social clock" that is a socially shared set of expectations about the timetables of the major milestones of adult development (Neugarten, Moore and Lowe, 1965). These age norms are met with social approval and in extreme cases (such as youthful status offenses), are met with legal sanctions if violated by certain individuals. Age norms can be useful tools in society to measure adequate life-course development or they can be a destructive concept that stagnates individual development.

For example, rigid age norms can pressure a young person into an unwanted marriage or parenting an unwanted child while ostracizing a middle age couple for wanting to have children. Neugarten found that eighty percent (80%) of people were within a five (5) year variance of when a particular event was expected to occur in a person's life. Neugarten also found that these age norms remain relatively steady over time except in times of rapid social change when the rhythm of the life cycle is altered. Fallo-Mitchell and Ryff (1982) confirmed Neugarten's findings and also concluded that perhaps a normative system acts to define appropriate times for the accomplishment of life events (Fallo-Mitchell & Ryff, 1982).

Peterson (1996) investigated "best age" norms in Australia in two (2) separate studies and found in one study that the best age in life for a man to marry was 25.5 years old while the best age in life for a woman to marry was 23.7 years old. The best age to become a grandparent was 53 years old (gender neutral), finish school was 18.5 years old and retire was 61 years old.

However, not everyone in Peterson's study agreed on the existence of best ages although 75% of the study's respondents believed there was an appropriate age in five (5) of the defined six (6) major life events. Peterson (1996) also asked the same questions in a different context. Peterson asked the respondents if there was an age that was *too old* to engage in a particular activity or event. While thirty percent (30%) of the study population agreed that there is an age that a person should retire (conversely meaning that 70% believed that there shouldn't be a mandatory retirement age), fifty-two percent (52%) believed in the existence of an age that is too old to enter a university (Peterson, 1996).

These subjective attitudes of aging have also been investigated by Jeffers, Eisdorger and Bussee (1962), Kastenbaum (1972) and Barak (1987) and have been referred to as "Personal Age", "Cognitive Age", "Functional Age", and "Ideal Age." Staats (1996) elaborated on Kastenbaum's original research and found that these attitudes may actually hinder the aging process. An individual's behavior, life trajectory, and future may be conditioned by such attitudes. Many people may feel the need to base important life decisions on what others in society (for example, "Everybody should be married by age thirty (30))" believe. Staats studied subjective attitudes of age norms over different cohorts and compared contrasting attitudes based on gender and age. Staats found that older persons have a "youthful bias" (belief that a best age for a significant life event was generally younger that the younger respondents) and that women reported younger ages for items such as settling down for a career and starting a family.

Sociological constructs of aging may also become the *effect* some particular phenomena as opposed to a *cause*. For example, income inequality is the highest among older persons due to "heterogeneity" of older persons and integration of various institutions such as the economic marketplace (O'Rand, 1996). Structural and temporal factors increase inequity over time that in itself may affect the aging process.

Psychologists generally study aging through a singular, intra individual experience that attempts to capture the individual at certain resolution points over the life course such as acceptance of adulthood. Although psychologists have studied psychological aging (considered "adult" and "child development" in psychological contexts) since Sigmund Freud (Jung, 1933; Havinghurst, 1948; Erikson, 1950), a

foundational model of adult psychological development was introduced in 1976 by D. H. Levinson.

Levinson's Model of Adult Development consisted of five (5) stages. The first stage, the early adult transition stage begins at age seventeen (17) and lasts until age twenty-two (22). During this period ("Early Adult Transition"), youths must make the transition from childhood to the adult world. The next stage in the model, ("Entering the Adult World") are the years between age twenty-two (22) and age twenty-eight (28). During this stage, the young adult must make major life commitments such as career choices and marriage. During the third phase ("Age 30 Transition") between the ages of twenty-eight (28) and thirty-three (33), the person begins to question their particular life and must redefine ambitions and goals. Adults aged thirty-three (33) to age forty (40), ("Settling Down") are reserved for those who successfully resolved the "Age 30 Transition" stage and then settle down in their middle and late thirties to pursue modified goals. The last stage, ("Midlife Transition"), from age forty-one (41) until age forty-five (45), the person realized that life is half over and should enjoy what remains. The person who realizes this usually examines life again and tries to make appropriate changes and adjustments (Levinson, 1976).

Fagan and Ayers (1983) attempted to apply Levinson's Model of Adult Development to police officers. They found that most of the police officers in their study experienced stressful transition periods in moving from stage to stage. Fagan and Ayers also reported that Levinson's "Age 30 Transition" stage fit the participants most accurately while the "Midlife Transition" was the least model fit. The researchers suggested that perhaps the police officer's constant contact with death was the reason that

police officers do not suffer mid-life crises. The researchers also found that the lack of mentoring and the strict hierarchal structure of police agencies may stunt personal and professional development. Fagan and Ayers' study was a more general psychological development as opposed to Arthur Niederhoffer's classic work (1964) that theorized about the psychosocial development and onset of cynicism within the individual police officer after a specific point in the police officer's career.

Other psychological theories concerning life development and aging such as the "Bump Theory" (Rubin & Schulkind, 1997) target specific age periods. The Bump is the period in our lives when we have the clearest memories. According to Rubin and Schulkind (1997), this period is generally from age twenty (20) to age thirty (30). It is arguable whether or not there are memory lapses or those are the times when most people are at their physiological peak. Hess and Pullen (1994) investigated the impact of aging on the representation and use of social information within the context of impression formatting processes. Essentially, they attempted to ascertain if impressions (positive and negative) of other people change over the course by comparing younger adults (ages 18 to 32) with older adults (ages 54 to 80). The groups were compared by measuring differences in impression change; recall memory, study times and subjective impressive change ratings. The researchers found that both age groups weighted negative information about other people more than positive information, but there was no significant difference between two groups in memory recall and no significant improvement in studying over the life course. Younger persons were also no more likely to change a negative impression of a person. Gross et al. (1997) found that older persons are generally more emotionally stable and have fewer emotional experiences than

younger persons. Heckhausen and Brim (1997) found that as people age, they consider other person's problems their own age more serious than their own problems.

The study of aging is an evolving endeavor that endures significant changes, sometimes with each succeeding generation, that reflect the social history of a particular society and how that society views aging. The study of aging must account for these consistent changes and reflect the social context of aging research. Age restriction policies in policing and law enforcement are an example of the changing viewpoints of aging. Age restriction policies in policing and law enforcement were virtually unquestioned prior to the 1970s. As the United States changed and reformed the concepts of aging, age restriction policies in general were examined to determine their necessity and utility. Research on aging, age and work performance and age restriction policies must reflect the current perspectives on aging in a particular society.

Chapter Three

Aging and Work Performance

Research on aging and work performance should also be considered a critical area that necessitates research considering the changing demographics of the workforce in the United States. The number of workers aged fifty-five (55) and older are projected to increase by fifty percent (50%) between 1998 and 2008 (Vaughn-Miller, 2002) and a greater proportion of older Americans are returning to work after initially retiring (Marshall, 2001). Additionally, a smaller generation of workers (those born between 1965 and 1980 and known as "Generation X") are expected to replace the aging baby boom (those born between 1946 and 1965) generation (Bloch, 2000). Research on aging is generally conducted within the social and psychological constructions of age norms and adult development but rarely in a structured setting such as a work organization. Most research is focused toward the effect of aging on the work performance relative to the specific mission of the organization. Also, research methodology varies considerably and therefore, few generalized conclusions can be inferred. Lawrence (1996) found that age norms in small social systems (such as organizations) are imported form larger social systems and age norms do influence behavior in stable organizations. Excluding athletic occupations, the peak years for performance within organizations have generally been in the late thirties or early forties (Lehman, 1953; Simonton, 1988). Singleton (1983) found that age fifty-five (55) is the estimated age that organizations and communities appoint managers, policy makers and leaders and Wellford (1979) found that individuals within organizations in their fifties are generally more contented and have mastered skills preserving mental effort and energy expenditures that ultimately make them good leaders.

Aging and work performance must be examined from two perspectives. The first being the age of the employee and the effect on work performance alone. For example, do younger persons or older persons perform better at work when compared to each other? Are younger persons more motivated, thereby making them better employees? Are older employees more mature, thereby making them better employees? What is the role of work experience, particularly in policing and law enforcement? The second perspective regarding aging and work performance is the effect on work performance due to advancing age and decreases in physical abilities necessary for a specific occupation. This is particularly critical in occupations that demand superior health and physical fitness such as policing and law enforcement.

One of the earliest studies that investigated the social psychology of aging in industry was Meltzer's (1980) investigation in the "alleged correlation between decline in ability and age" and the self-reported mental health of workers in various age categories. The age of forty (40), according to Meltzer, is when people consider themselves too old to start over yet too young to die. Meltzer also found that there is a steep rise in mental health from ages twenty (20) to thirty-nine (39), with the peak reached at the latter ages of the thirties. A decline begins in the age forty (40) to age forty-nine (49) age group, with a gradual plateau until age sixty (60). The positive outlook on the employees' organization decreases drastically from age forty (40) and Meltzer believes this is due to a lack of fulfillment of earlier goals. One conclusion to Meltzer's research was the finding that mandatory retirement policies are injurious to employees' mental health.

Mottaz (1987) investigated the relationship between age and work satisfaction and found that prior research (Vollmer & Kinney, 1955; Hullin & Smith, 1965; Saleh &

Hyde, 1969; Sheppard & Herrick, 1972; Quinn, Staines and McCullough, 1974; Campbell, Converse and Rogers, 1976; Glenn, Taylor and Weaver, 1977; Weaver, 1978; Wright & Hamilton, 1978; Janson & Martin, 1982; Kallenberg & Loscocco, 1983) all generally concluded that work satisfaction is a function of age. Older workers tend to be more satisfied with their jobs. Explanations for the variance between older and younger workers range from generational differences to lower aspirations and expectations as people age. Mottaz also discussed the difficulties encountered when studying the effects of aging on some particular phenomena such as work satisfaction and performance. These difficulties consist of the conflicting methodological problems (i.e., longitudinal analysis versus cross-section analysis), compositional effects such as workers who entered the work force later in life years versus workers who entered earlier than usual, external variables not related to work or the organization such as a happy and content family life and the general suspicions encountered with self-reported data (Mottaz, 1987).

Phillips, Barret and Rush (1978) found that job satisfaction increasing with age concentrates on individual differences, preferred task attributes, and job redesign efforts. Age alone is usually not a valid predictor of work productivity and job satisfaction. However and Warr (1992) found that the data in his study of one thousand six hundred eighty-six (1,686) British workers confirmed a model constructed by Herzberg, Mauser, Peterson and Capwell (1957) that theorized that workers' morale begins high, steadily decreases when workers are in their late twenties or early thirties then begins to steadily rise with age.

Lashbrook (1996) studied the relationship of age norms for promotional expectations and work satisfaction. There were three (3) hypotheses in Lashbrook's

research: 1) workers, regardless of age, will expect a promotion within a relatively short time span, 2) promotions may be more anticipated in some age ranges than in others and 3) promotions may be more anticipated in later age ranges versus small organizations. Lashbrook found that most males under the age of thirty-five (35) expected a promotion very soon (three (3) years or less) while most males over the age of fifty (50) never expect another promotion. Lashbrook also found that normative expectations were not associated to job well being while current job conditions were linked to job well being.

Cleveland and Shore (1992) investigated perspectives on age and work attitudes and performance. Their study consisted of performance evaluations of four hundred fifteen (415) employees by managers as a large multinational corporation headquartered in the Southeastern United States. The researchers attempted to conjoin the subjective attitudes of aging with chronological aging. The two (2) hypotheses were: 1) chronological age and subjective age measures will have a stronger correlation with one another than with perceived relative age and, 2) subjective age attitudes will account for the variance not accounted for by main effects alone. They found that chronological age may not be that important in organizational criteria such as work attitudes, work performance and employee development but were predictive when combined with perceptions of ages of other employees in the work setting (Cleveland & Shore, 1992). Ferris, Judge, Chachere and Liden (1991) found that younger supervisors tended to give higher performance ratings to younger workers than older workers.

Hayslip (1996) examined the concept that older persons or older workers in organizations are more resistant to organizational change such as forming work groups. They found to the contrary that older workers are not as resistant to change in forming

work groups. Age may not be a situational determinant of the organizational environment in influencing overall work attitudes.

Aging and work production is also not limited to developed countries' traditional work organizational settings. Kaplan, Hill, Lancaster and Hurtado (2000) studied the work and energy production of adult male foragers belonging to the Ache, Hiwi, and Hadza tribes in Peru and Paraguay. Male foragers are responsible for acquiring food for their families and other members of the tribes. Kaplan et al. (2000) found that male production increased rapidly at age fifteen (15) until age twenty-five (25). The work production remained stable until age forty-five (45) when a steep decrease began to age fifty-five (55). After age fifty-five (55), the work production was at a minimum.

Police work is physically demanding, therefore, a review of the effects of age in organizations other than policing and law enforcement agencies that are both physically demanding and suffer from frequent serious accidents must be conducted beyond the biological, psychological, and sociological aging constructs discussed above. As the Decrement Model suggests, do levels of productivity decrease as employees age?

Shephard (1995) studied the effects of age on productivity in physically demanding occupations and found that adequate health programs can maintain work levels. Shephard also implicated that individuals should be judged on individual abilities, not group assumptions such as age restriction policies. This is the fundamental chasm between individual rights and organizational administration that is particularly acute in policing and law enforcement. Who is responsible for ensuring physical preparedness of police and law enforcement officers, individual officers or police agencies? How far should a police or law enforcement agency extend to individually test all applicants and

incumbent police officers to ensure physical preparedness as opposed to imposing broad-based age restriction policies?

There are inconsistent results when investigating the effects of age on work related-accidents. Part of this inconsistency is due to the very broad and expansive concepts of work related accidents. Accidents can be extremely costly to organizations, given that the average worker loses a total of over six (6) days work per accident (Miller & Lestina, 1996). Minter (2002) found that younger workers (aged nineteen (19) through twenty-nine (29)) get injured more often than older workers (aged fifty (50) to fifty-nine (59)), however; older workers incur more days lost due to recover per injury. According to Minter (2002) younger workers lose 10.4 days per injury while older workers lose 47.5 days per injury and the National Safety Council (1997) found that each workplace injury costs an estimated twenty-five thousand dollars ($25,000) due to medical costs and lost salary. Prince (2001) found that some injuries, particularly spinal disc injuries, knee injuries, and other joint injuries may actually be the effect of the aging process of the worker as opposed to the actions of the employee while working. Cellier, Eyrolle and Bertrand (1995) reported divergent results in the effects of age, work experience, and accidents. The diversity of situations such as driving, flying, and manual labor may be the reason for the divergent skills. The researchers concluded by stating that there are complicated effects that are not easily identified when researching the effects of age on specific physical skills needed for work.

A recurrent theme prevalent throughout the literature regarding occupational injuries is the origin and cause of the injury. Most studies on occupational injuries are usually from the managerial perspective that a majority of the injuries are the result of

human error, negligence, and (or) deficient training for the specific job task. A better trained and safety-conscious employee may completely eradicate or minimize work-related injuries. Public safety occupations, particularly policing and law enforcement, are unique. Administrators, managers, and trainers in police and law enforcement agencies cannot prevent all injuries due to the origin and circumstances of the injuries. Line of duty injuries suffered by police and law enforcement officers, in some instances, can be prevented. Police and law enforcement officers can be trained to improve verbal and physical tactics to prevent situations that may render the officer vulnerable to injury. Police and law enforcement officers attaining superior levels of physical fitness may also avoid injuries. However, there is a human element involved in the policing and law enforcement profession that creates completely unpredictable situations making line of duty injuries unavoidable and inevitable. The propensity for human violence ensures physical encounters between citizens and police officers. Criminal suspects who do not comply with verbal commands of police and law enforcement officers and refuse to be taken into custody compel police and law enforcement officers to use physical force. Emotionally disturbed persons, often volitionally impaired and uncontrollable, may react violently when taken into protective custody by police and law enforcement officers. Also, persons placed under arrest by the police or law enforcement officers are often substance abusers or currently under the influence of alcohol. According to the United States Department of Justice Bureau of Justice Statistics (1998), forty-one percent (41%) of all persons arrested in the United States in 1996 were under the influence of alcohol at the time they committed an offense and eighty-two (82%) were prior abusers of illegal substances and thirty-six (36%) percent were under the influence of illegal substances

while they were committing the offense for which they were arrested. Criminal suspects, while under the influence of alcohol or illegal substances, may react violently during apprehension encounters with police or law enforcement officers, virtually assuring line of duty injuries.

Police officers performing patrol duties also perform rescue missions such as running into burning buildings, climbing stairs, fences and fire escapes to rescue citizens and/or render medical aid. They are also required to endure the more mundane, albeit demanding physical tasks such as standing outdoors exposed to the climatic elements for long periods of time. Therefore, police and law enforcement agencies are somewhat limited in preventing work-related, line of duty injuries.

General research on work performance is of limited utility given the uniqueness of policing and law enforcement. Testing the effects of age on work performance in policing and law enforcement must be limited to policing and law enforcement agencies based upon the unique characteristics of the occupation. The two (2) general categories of testing age and work performance, age effect and decline of health and physical abilities can be tested in policing and law enforcement, however, a primacy should be placed on the decline (if any) of health and physical abilities. The primacy should be based on the latter given that maximum appointment ages and mandatory retirement ages are theoretically based upon the premises of declining health and physical abilities and work performance in policing and law enforcement.

Chapter Four

Aging and Policing

The difficulties encountered when endeavoring to obtain a valid operational definition of aging are amplified when the definition is applied to policing and law enforcement. Although there are commonly accepted individual biological, social, and psychological constructs to aging, there is not a comprehensive valid measure of aging (Comfort, 1979). How can a "best age" for a police officer be operationalized? What is the best age for a police officer? What are the best ages? Is life experience valuable only when the experience is obtained as a police officer? Why should police officers be forced to retire at a certain age? What should the retirement age be? And why? Shephard, (1995) as noted previously, believes that employees should be assessed individually, based upon McFarland's (1973) "functional age" and not biological or "chronological age."

There is a paucity of research determining the correlates of age, aging and policing and law enforcement. As stated in Chapter Three (3), aging and work performance research must be delineated into two (2) main groups. Relevant to policing and law enforcement, aging research either discusses the effect of the police and law enforcement officer's age on work performance alone or the effect of the police or law enforcement officer's age on the decrease in performance based upon a decrease in physical skills necessary for quality policing and law enforcement.

The existing research is not only limited but is subjected to various operational definitions. Making *a priori* assumptions and comparing existing research is a difficult task. Age as an individual variable used to predict police performance (both positive and

negative) has generally been studied as part of a multivariate analysis with other biographical information such as race, gender, social status, and educational background. Age, like other background variables, is very difficult to use as a predictor variable of future police performance (Poland, 1978). The lack of prior research regarding age in policing and law enforcement may also be attributed to historical changes in American society. Questioning government and organization policies with respect to the rights of the individual employees and applicants is a relatively new phenomenon that gained popularity within the greater "Civil Rights Revolution" of the 1960's.

A reform movement throughout the nation in the late 1800's (Alpert & Dunham, 1997) revamped government-hiring practices by removing political patronage and established the institution of civil service. One of the reasons for this movement was to improve the quality of police applicants. Slow changes in policing may have also compelled closer examinations of police personnel performance. The "Professional Model" (Wilson, 1968; Manning & Van Maanen, 1978) of policing that began in the late 1800's through the 1930's was an outgrowth of the greater reform movement throughout the nation. The Professional Model changed the way police and law enforcement agencies were managed. New demands placed on police officers by police supervisors and police managers, increased the need for better personnel. The Professional Model's disinterested and efficient crime fighter was eventually rejected by the public due to the numerous civil disorders of the 1960's. A more community oriented, problem solving and accountable police officer was demanded by the public to solve crime problems entangled within other complex social problems. Changes in policing and law enforcement agencies and society in general forced police administrators to examine

personnel policies and demand more productivity, quality service, and accountability from police officers. This eventually led to the need for highly qualified police applicants.

Perhaps the earliest known researcher that used age as a correlate of police performance was Lewis M. Terman's (1917) study of police intelligence and future performance. Terman used age only as a descriptive variable and found that the average age of police applicants in his study was age thirty (30). There were only thirty (30) police officers used in Terman's analysis, seriously undermining generalizability. The note of interest in Terman's study was the fact that the average age of police applicants has generally decreased about eight (8) to ten (10) years during the next fifty (50) years (Mattarazzo, 1964; Roper, 1981).

Blum (1964) was one of the first researchers that extensively examined police personnel selection. Blum reported that the minimum age for police officers is set by law based on the belief that those under age twenty-one (21) lack emotional maturity. Blum also theorized that maximum age limits were set by policing and law enforcement agencies based on the belief that persons seeking new careers after age thirty-five (35) are unstable and employment risks because persons that age (over the age of thirty-five 35) seeking employment have failed in previous occupations.

Levy (1967) conducted a thorough analysis of the personnel records of twenty-one hundred thirty-nine (2,139) police officers working in fourteen (14) different police and law enforcement agencies. Levy's central hypothesis was that personality differences existed between police "failures" (police officers that were terminated) and "non-failures" (psychological perspective of police officer); however, age was used as a

predictor variable. Levy found that future "non-failures" were youngest (operationally defined as less than age twenty-four (24)) and more likely to remain in the police or law enforcement agency than those police officers who were age thirty (30) or older at time of appointment. McConnell (1967) found that police officers younger than age twenty-one (21) obtained higher ratings from supervisors than older police officers while Morman, Hankey, Liddle and Goldwhite (1967) found to the contrary, older police officers in that study received higher ratings.

Cohen and Chaiken (1972) conducted a thorough and comprehensive analysis of police personnel characteristics in an expansive, longitudinal analysis of two thousand two (2,002) police officers appointed to the New York Police Department (NYPD) in 1957. Their study is one of the better studies due to the research design and number of subjects studied. One of their predictor variables of future police performance was age at time of appointment. Cohen and Chaiken categorized age by "younger" (under age twenty-five (25)) and "older" (over age twenty-five (25)) police officers. They found that older police recruit officers were least likely to advance beyond patrol assignments, had low absenteeism for sickness, and were less likely than average to incur civilian complaints (Cohen & Chaiken, 1972). Although younger police officers received more total complaints, there was no significance between age and *substantiated* complaints. An interesting recommendation by Cohen and Chaiken was that older police officers should be assigned to areas with strained police-community relations, possibly due to an expectation of maturity.

Azen, Snibbe and Montgomery (1973) conducted a twenty (20) year longitudinal analysis of ninety-five (95) male deputy sheriffs in Los Angeles County using

biographical (including age), psychological and aptitude variables alone as a predictor of police performance. Although age predicted what type of job and rank the sheriffs would have, the finding was tautological (you would expect older police officers in higher ranks) and of limited utility because the study was cross-sectional and not longitudinal. Dunnette and Motowidlo (1975) found that younger police supervisors received higher ratings than older police supervisors. Once again, this finding is tautological because it is expected that younger police supervisors who are motivated enough to strive for leadership positions early in their police careers are generally more motivated than the average police employee. Poland (1978) found that police officers that were younger when they were hired used more sick leave, were less likely to advance in rank but had more department awards and were more often assaulted in the line of duty. Poland's findings regarding department awards and line of duty assaults infers that perhaps younger police officers are more likely to pursue and apprehend violent criminals. Morgan (1980) studied aging and law enforcement strictly from a psychological adult-development perspective and did not make any empirical examinations, limiting the utility of the research from a policy perspective.

An extensive empirical examination into the maximum appointment age in the New York Police Department (and then separate New York City Housing Authority Police Department, NYCHAPD) was conducted in 1981 by Roderick J. Bartell, director of a private consulting firm (Bartell Associates & The City of New York Corporation Counsel, 1981). Bartell's research was policy oriented and tested the relationship between age, quality of police service and expense to the community. Bartell, in the introduction of the report (p.2, 1981) stated that there weren't any identifiable, scientific

research endeavors that specifically addressed the issue of age-based hiring requirements that had any real value or could conclusively support or eliminate imposition of a maximum appointment age. Bartell & Associates found that in 1981, all police agencies serving populations of more than one million (1,000,000) people had a maximum appointment age and eighty-eight (88%) percent of police agencies serving populations between five hundred thousand (500,000) and one million (1,000,000) had a maximum appointment age (Bartell Associates & The City of New York Corporation Counsel, 1981). Bartell & Associates conducted a valid research study, but the variables were very limited. The primary dependent variable was police performance as measured by arrests and overtime. Bartell & Associates may have failed to realize or recognize the multicollinearity between arrests and overtime in the NYPD. The primary way of earning overtime in the NYPD is through processing arrests or investigating complaints or offenses leading to arrests. Therefore, Bartell & Associate's analysis was essentially a univariate analysis testing the relationship between age and arrests. Bartell & Associates, when examining the personnel and arrest records of sixteen thousand (16,500) police officers in the NYPD and eight hundred eighty (880) police officers in the NYCHAPD, found that arrest activity significantly and substantially decreased after age thirty-four (34). Police officers in the age twenty-five (25) to age thirty-four (34) age group averaged 5.5 arrests while police officers in the age thirty-five (35) to age thirty-nine (39) averaged 3.5 arrests and a steady decline began after age forty-five (45). Another interesting finding in Bartell & Associate's study was the mean number of arrests per police officer in 1980 by age at initial appointment. Police officers who were aged thirty-five (35) or more at time of appointment averaged 1.5 arrests while police officers

between the ages of twenty (20) and twenty-four (24) at time of appointment averaged 5.0 arrests per police officer. This finding may empirically validate the concept that younger police officers are much more productive and active and therefore, may garner more civilian complaints, become involved in more violent confrontations and perhaps even more police vehicle accidents. Although Bartell & Associate's analysis was one of the better studies on aging and policing, the study only measured one (1) variable as a function of age and did not measure a trend over a period of time. It was essentially a cross-sectional study using records from one point (the year 1980) in time. Police officers hired at different times employed in 1980 may have had different generational, cultural, training, organizational and agency philosophies embedded into them. Measuring a primary independent variable such as age requires measurement over a substantial time to determine the existence of any significant trend.

Although the physiological and physical decline with age is indisputable, does the seemingly stressful and physically demanding occupation of policing and law enforcement have direct adverse health effects? Violanti, Vena and Petralia (1998) conducted a cohort analysis of two thousand five hundred ninety-three (2,593) male police officers over a forty (40) year period and found that police officers suffer from increased risks of malignant neoplasms, bladder cancer, leukemia, heart disease, colon cancer and cirrhosis of the liver. However, they also found that the average life expectancy of the police officers was sixty-six (66) years of age, but the overall rate of life expectancy for male police officers in the cohort was not substantially different from the rate of life expectancy for all males born in the United States in 1950.

A team of researchers from Johns Hopkins University investigated coronary disease and police officers (Sparrow, Thomas and Weiss, 1983). They found no statistically significant differences between chances of coronary disease over a ten (10) year period when compared to similarly matched control group. Also, Shephard (1991) found that cardiac arrest and disease is such a rare event and that physical activity is demanded very rarely of police officers. Public safety is unlikely to be compromised.

Police and law enforcement officers have increased exposure to persons with human immune deficiency (HIV), (Groseclose et al., 1995; Cooley, 2000), hepatitis (Welch, Tilzey, Bertrand, Bott and Banatvala, 1988), "needle stick" and other infectious diseases (Pagane, Chanmugam, Kirsch and Kelen, 1996) and tuberculosis (McFadden, 1991). Police and law enforcement officers may also suffer, because of their occupation, reactive airway dysfunction syndrome (RADS) (Promisloff, Phan, Lenchner and Cichelli, 1990) and have increased risks of cancer from radar equipment (Elmer-DeWitt, 1991; Davis & Mostofi, 1993). Police and law enforcement officers also suffer from increased risks of back and other musculoskeletal injuries (Mirbod, Inaba and Iwata, 1997) due to long periods riding in automobiles and motorcycles.

Police and law enforcement officers also work shift work to the point of unhealthy sleep deprivation that may increase the likelihood of motor vehicle accidents, shootings, and inappropriate use of force (Cochrane, 2001). Although working rotating shifts and evenings over prolonged periods of time has adverse physiological (Harrington, 1978; Kristensen, 1989), psychological (Rutenfranz, Colquhoun, Knauth and Ghata, 1977) and social (Walker, 1985) effects, what is the direct effect of shift work on aging?

Harma, Hakola, Akerstedt and Laitninen (1994) compared sleep recovery rates of younger workers with a mean age of twenty-four (24) and older workers with a mean age of fifty-seven (57) who worked evening shifts and found that younger workers delayed sleeplessness for longer periods of time, more easily recovered from prolonged shift work and had higher levels of alertness than older workers. Reilly, Waterhouse and Atkinson (1997) investigated the effect of age on evening work by testing heart rhythms and strength measures in security workers and car manufacturers who worked rotating shifts. Reilly et al. (1997) divided the subjects into two (2) groups, a younger group with a mean age of twenty-four (24) and an older group with a mean age of fifty-four (54) and found that the older group had greater cardiac disturbances in heart rhythms and scored lower on the strength measure than the younger group of workers. Reilly et al. (1997) recommended that older persons are better suited to work morning hours rather than evening hours.

When the original "public safety exemption" was amended into the ADEA in 1986, the United States Congress explicitly stated that the exception was temporary to allow for a study to be conducted to develop recommendations with respect to specific standards for any tests that it proposed as an alternative to age-based employment. The United States Congress commissioned the EEOC to monitor the study and a research group at Pennsylvania State University was selected to conduct the study (ADEA, 1986; United States House of Representatives hearing, March 24, 1993).

The final report (Landy, et al., 1992) recommended that physical fitness tests be used as selection criteria for public safety (police and sheriff officers, correctional officers and fire fighters) positions as opposed to chronological age restrictions such as

maximum appointment ages and mandatory retirement ages. The study was severely criticized for its methodological flaws and political underpinnings (Whitehead & Bolton, 1993; United States House of Representatives hearing, March 24, 1993). In fact, the EEOC, which vehemently opposes age restriction policies in employment, was mandated to monitor the study. Landy et al. (1992) ultimately found that public safety performance and job fitness can be measured by tests and not age alone. Although Landy's study has been criticized in numerous venues, the study had many useful points. Landy, in conducting a comprehensive and thorough meta-analysis on the cardiovascular decline of public safety workers created a general public safety decrement model for cardiovascular fitness. Landy found the cardiovascular decline within public safety workers is consistent with that of the sedentary population and not a physically active population. There is an average of a forty percent (40%) loss of cardiovascular endurance from age twenty (20) through age seventy (70) and the loss begins every decade after age twenty-nine (29). Landy also found that there was a significant decline in cardiovascular endurance as a function of age in public safety agencies that mandated physical fitness testing.

Landy investigated the function of age and public safety personnel from a public safety standpoint. From this standpoint, Landy (Landy et al., p. 8-10) calculated the chance that the public safety officer would become incapacitated during a critical task (by suffering a debilitating heart attack) and therefore, endanger the public. Landy calculated that the chance of this threat to public safety would occur once in twenty-five (25) years for a public safety force (with age restrictions) of five hundred (500) members. Based upon Landy's concluding formula, this threat to public safety will occur in Houston ***once***

every three years, Chicago ***three times every two years***, Los Angeles ***one time per year*** and New York City ***three times per year***. Landy also did not measure overall employee performance, just the threat to public safety. Tantamount to the uselessness of Landy's research and lack of mandated goals, when the 1996 ADEA amendments restored the public safety exemption, the United States Congress ***once again*** commissioned another study to be conducted to determine the correlates of aging and public safety. To date, the study as commissioned by the United States Congress has not been conducted.

Previous research to date on aging and policing is lacking in both quantity and quality. Most research studies on age restriction policies have been driven by a particular agenda and have not been conducted scientifically. Also, as early as 1973, the National Advisory Commission recommended that imposition of a maximum appointment age should be based on the physical demands placed upon a police officer or law enforcement officers working for a specific police or law enforcement agency and the retirement policies of the specific agency. Prior research (and legislation and court decisions) that generalize about age restriction policies fail to account for the variation in police and law enforcement agencies. The operations and workload vary in degree of intensity and quantity. Police and law enforcement agencies that are smaller and (or) have lessened workloads and are overall less demanding on the police and law enforcement officers, may not need to impose age restriction policies. Police and law enforcement agencies may also have the financial resources to test all police and law enforcement officers working in their agency, therefore ensuring physical preparedness. However, some police and law enforcement agencies, because of their size and (or) lack of resources, may not conduct periodic physical fitness testing to ensure physical preparedness of

police and law enforcement officers working for that agency. Age restriction policies are policies that are agency specific and research should be structured toward the specific agency when determining the need for a maximum appointment age and (or) a mandatory retirement age.

Chapter Five

An Overview of Policing in New York City and the New York Police Department's Maximum Appointment Age and the Mandatory Retirement Age

New York Police Department

The New York Police Department (NYPD) was created with the passage of the Municipal Police Act of 1844 (New York State, Laws of New York State, Chapter 315, 1844) and ratified by the New York City Common Council in 1845 (New York Board of Alderman, 1845). Passage of the act abolished the "watch department" and George W. Matsell was appointed as Police Chief of this "new" police agency numbering nine hundred (900) "patrolmen." This new agency was based on the "London Model" of policing replete with uniforms, a paramilitary structure and a chain of command (Andrews, 1999). One of the requirements (including United State's citizenship and New York City residency) for appointment as a "patrolman" was a maximum appointment age of age thirty-five (35). However, there is no mention of the necessity for age restriction policy in the original enactment of laws establishing the NYPD. Prior to the creation of the NYPD in 1844, the original patrolmen in New York City were volunteer night watchmen who served from nine o'clock in the evening until daybreak and were known as the "Rattlewatch" because they carried rattles on patrol to alert the public of pending and actual emergencies. They were not paid employees until an act of the Common Council in 1698 (Astor, 1971). The early organization of policing in New York City prior to 1844 was wrought with incompetence, corruption and a lack of a clear mission, organizational objectives and job functions. In fact, the New York state government (in a political dispute involving the New York State government controlled

Republicans versus the New York City government controlled Tammany Hall Democrats) attempted to instill a different police force for New York City entitled the Metropolitan Police Force in 1857 (Asbury, 1927; Andrews, 1999; New York Historical Society, 2000). The dispute involving the New York State government and refusal by the local New York City government to cede police authority to the New York State government led to a "police riot" at the steps of New York City's City Hall in 1857. A police captain from the state government's Metropolitan Police Force attempted to arrest the Mayor of the City of New York, Ferdanando Wood, in his office at City Hall. New York City's Municipal Police intervened and a disturbance lasting about thirty (30) minutes between the competing police agencies resulted in fifty-two (52) police officers suffering injuries (Asbury, 1927). The state government-controlled Metropolitan Police Force policed New York City until 1870, when policing New York City was eventually restored to New York City in 1870.

Problems of policing expansive and diverse urban areas in the United States in the middle and latter half of the 1800's were not unique to New York City (Schlesinger, 1934). The relative enormity of New York City's population and geography seemed to exacerbate policing problems. Although the creation of the NYPD in 1844 as a professional, full time, day and night policing service did not remove neither the aura of corruption nor incompetence, nor political influence, patrolmen were given general guidelines on policing and with that, a general mission that consisted of maintaining public order in New York City (Matsell, 1845). Patrolmen were required to wear uniforms, another organizational symbol that established their uniqueness from the rest of New York City's citizens (Astor, 1971). Patrolmen were reappointed every year by the

mayor of New York City, however, the mayor could only choose from a list of potential candidates provided by the local ward politicians. Gaining entrance on the list of eligibility for appointment entailed paying a local ward politician two hundred fifty ($250.00) dollars (Lardner & Repetto, 2000). This system of hiring patrolmen fostered endemic corruption in policing, given that local ward politicians had complete control over appointing patrolmen (Burrows & Wallace, 1999).

A reform movement initiated in 1883 by then New York State Assemblymen, future Police Commissioner of New York and future President of the United States, Theodore Roosevelt began investigating local government practices in New York City. Theodore Roosevelt's Special Committee to Investigate the Local Government and County of New York (Hearings of the New York State Committee to Investigate the Local Government and County of New York, 1884; Putnam, 1958) concluded in 1884 by exposing and condemning the corrupt practice of local politicians financially compensating members of the NYPD for not enforcing vice laws such as prostitution and alcohol related offenses. Roosevelt's committee investigation was a forerunner to a New York State Senate Committee formed in 1893 (known as the "Lexow Committee") to investigate corruption in the NYPD (Senate Committee to Investigate the Police Department of the City of New York, 1895). The reform recommendations of the Lexow Committee also condemned the appointment practices of the NYPD and were instrumental in securing Theodore Roosevelt's appointment as Police Commissioner and President of the New York Police Board (Jeffers, 1994). The NYPD's organizational stewardship by a lone Police Commissioner did not begin until 1901. Although Theodore Roosevelt's policies to enforce vice crimes were largely unsuccessful, his strong

leadership exposed the need to increase the quality of patrolmen and policing in the NYPD (Berman, 1985). The Lexow Committee was also the first of a seemingly cyclical pattern of exposure and heightened media attention of police misconduct (and consequent scrutiny) in the NYPD from 1844 through the early 1990's (State of New York Lexow Committee, 1895; New York Committee on the Police Problem, 1905; Curran Committee Investigation, 1913; Seabury Committee Investigation, 1932; Feinberg, 1950; Knapp Commission Investigation, 1972; Mayor's Advisory Committee, 1987; Mollen Commission Investigation, 1994). Each committee investigation concluded that police misconduct could be averted or minimized if the NYPD enhanced the quality of police personnel by increasing police salaries, increasing the quality of police supervision and enhancing the appointment requirements such as requiring higher levels of education attainment prior to appointment. The only mention of a correlation with age and police performance was the Mollen Commission's recommendation to raise the minimum appointment age from age twenty (20) to age twenty-two (22). According to the Mollen Commission Committee, raising the minimum appointment age would allow the NYPD to more extensively screen potential applicants because older applicants have a longer history of adult behavior (such as employment history) that can be assessed, as opposed to a teenager that recently graduated from high school (Mollen Commission Investigation, 1994).

The Maximum Appointment Age and Mandatory Retirement Age

The enactment of the Greater New York Charter in 1897 and the subsequent consolidation of the five (5) boroughs into modern day New York City in 1898 provided for a maximum appointment age for the newly consolidated NYPD (Greater New York

Charter, 1897). Chapter 612, section 284 of the Greater New York Charter (enacted by New York State as "Local Laws" for New York City) entitled "Police force: qualifications of members; publishing names and residences of applicants and appointees" provided for a maximum appointment age of age twenty-nine (29). The Greater New York Charter provided for "Home Rule" provisions, allowing certain municipalities such as New York City the power and authority to impose civil service rules (such as police personnel requirements) without the interdiction or approval of the New York State Legislature (Municipal Home Rule, New York State Code, New York Consolidated Law Service, 2002). Chapter 612, section 284 was amended in 1903 and the maximum appointment age was raised to age thirty (30), amended again in 1919 to thirty-four (34) if the applicant was applying to the New York Police Department (NYPD) during World War I. The provisions remained until 1937 when the law was amended and entered into the New York City Administrative Code (under chapter 434-8.0) and the maximum appointment age itself was lowered to age twenty-nine (29). The new appointment age remained unchallenged for forty-seven (47) years until 1984. In 1984, Robert E. Feimer argued that the maximum hiring age as a qualification for employment as an NYPD police officer violated the equal protection clause because military veterans were allowed to credit prior military service to their age and subtract up to six (6) years to the maximum appointment age, meaning that a qualified military veteran could enter the NYPD if they were up to six (6) years older (up to age thirty-five (35) at that time) than the maximum appointment age. Therefore, according to Mr. Feimer, what bearing does age have on qualifications as a police officer? The New York State Supreme Court held in *Feimer v. Ward* (1984) that veteran status or other

discretionary measures utilized by the NYPD to make exceptions for the maximum appointment age did not affect the validity of the maximum hiring age as a necessity for ensuring a physically fit police agency. The statute was incorporated in the New York City Administrative Code in 1985 and inserted into Chapter 1, section 14-109. However, the age restriction remained unchanged.

In 1990, the "Safe Streets, Safe City Omnibus Criminal Justice Program" (City of New York, Office of the Mayor, 1991) was signed into law by the New York State Legislature and incorporated into the New York City Administrative Code (New York City Administrative Guide Code, 11-1701, 11-1702, 11-1703). Safe Streets, Safe City contained numerous crime control proposals for New York City and the New York Police Department. The primary proposal and theoretical catalyst to control crime in New York City was an imposition of a tax surcharge on the citizens of New York City to hire an additional eight thousand (8,000) police officers for the NYPD over a three (3) year period. Possibly fearing an inadequate applicant pool, the NYPD introduced legislation into the New York City Council to amend 14-109 and were ultimately successful in raising the maximum appointment age thirty-four (34) (New York City Council Local Law 19 of 1991).

In 1986, amendments to the federal Age Discrimination in Employment Act (ADEA) included a "public safety exemption" that was valid until December 31st, 1993. Therefore, on January 1, 1994, the maximum appointment age and mandatory retirement age in the NYPD become prohibited by the federal ADEA. New York City's Administrative Code Chapter 1, section 14-109 was then suspended and the NYPD began appointing any person capable of passing the NYPD's qualifying exams. However, on

September 30th, 1996, then-President William Jefferson Clinton signed into law several amendments to the ADEA, (H.R. 849, 1995; ADEA 1996; Omnibus Consolidated Crime Control Act of 1997, United States Congress, 1997) one of which restored the public safety exception to the ADEA, thereby once again, allowing police and law enforcement agencies to impose age restriction policies. The NYPD presently maintains a maximum appointment age of thirty-four (34) and a mandatory retirement age of sixty-three (63). In 1992, a forty-three (43) year old police applicant who took the qualifying written exam in 1990 sued the NYPD on the grounds that the NYPD's maximum appointment age as contained in the New York City Administrative Code violated the ADEA because, although the application was filed in 1990 while the public safety exemption to the ADEA was in effect, he was continually discriminated against during his processing until 1994, when the exemption expired. According to Mr. Ruderman, the age discrimination was a continuous event. The United States District Court for the Southern District of New York ruled in the case of *Irving Ruderman v. Police Department of the City of New York* (1994) that the maximum appointment age imposed by the NYPD was legally in effect when Mr. Ruderman was applying as a police officer.

The most vociferous opposition to the maximum appointment age in the NYPD occurred in 1997 when the NYPD was forced to defend the core provisions and necessity of the maximum appointment age policy in three (3) separate lawsuits, *Walter v. NYCPD* (1997) and *Perez v. Safir* (1997), and *In the Matter of Angelo Petitto et al., Appellants, v. Lillian Barrios-Paoli et al.* (1997) (Garrick, 1997). The NYPD was also required to defend the validity of age restriction policies in 1998 before a special hearing conducted by the New York City Council regarding age discrimination in the NYPD (Della Monica,

1998; New York City Council Local Law 160, 1998). Currently, members of the New York City Council (City of New York City Council, 2002) are debating to completely remove the maximum appointment age as a hiring requirement for employment as a police officer in the New York Police Department. The bill, entitled Intro 0105-2002, is currently being debated by the New York City Council's Civil Service and Labor Committee for introduction for full vote in the New York City Council.

The NYPD's mandatory retirement age (written into the New York City Administrative Code law as "Termination of service of members of force because of 'superannuation'") of age sixty-three (63) has remained relatively resilient. The original mandatory retirement age, as contained in the New York City Administrative Code Chapter 434a, Chapter 21 in 1897 established a mandatory retirement age of sixty (60) (New York City Administrative Code, 2001) for "patrolmen." Actually, the laws gave the Police Commissioner the power and authority to retire any patrolmen at age sixty (60) without cause. The mandatory retirement age was inserted into Chapter 8, Title 1, Section 355 of the New York City Charter in 1900 (Charter Revision Commission, 1900). Patrolmen, as they were known in 1900, were eligible to retire at age fifty-five (55) and could stay after the age of sixty-three (63) if they were Civil War Veterans. Although patrolmen could stay until the age of sixty-three (63), the Police Commissioner could require a medical exam to determine physical fitness for patrolmen over the age of sixty (60). This procedure became law in 1937 and inserted into Chapter 929 into the New York City Administrative Code (New York City Administrative Code, 2001). The first challenge to this authority afforded the Police Commissioner occurred in 1925 in the case of *Hart v. Enright* (1925). The New York State Supreme Court ruled that although

many patrolmen are retained in service past the age of sixty (60), the age restriction policy is a legal exercise of authority granted upon the Police Commissioner.

In 1951, Local Law 71 required a mandatory retirement age of sixty-three (63) was signed into law by the New York City Council and inserted into Chapter 434a-21.0 of the New York City Administrative Code. The legal validity of the mandatory retirement age as contained in this law received the greatest challenge by a group of two hundred forty-one (241) involuntarily retired (because they attained the age of sixty-three (63)) patrolmen in the case of *Humbeutel et al. v. City of New York* (1953). In the *Humbeutel* case, the two hundred forty-one (241) involuntarily retired patrolmen made several arguments. Their first argument was that New York City did not have the power under Home Rule provisions to establish a mandatory retirement age because it usurped a New York State civil service law (Chapter 22 of the New York State Civil Service Law) that protected government employees from removal from service except in cases of "incompetency or misconduct." Their second argument was more interesting in that is was germane to the argument of the nexus between aging and police performance. The retired patrolmen hired three (3) medical doctors that specialized in geriatrics and the doctors argued before the court on behalf of the retired patrolmen that "biological age" (the state of physical fitness, according to the expert doctors) was more important than "chronological age" in determining fitness for police employment. The New York State Supreme Court ruled, regarding the first argument, that the mandatory retirement age is a valid exercise of the Home Rule provision. The New York State Supreme Court ruled, regarding the second argument in *Humbeutel*, that although the law deprives some individuals of the right of employment and deprives the Police Department of some

skilled patrolmen, in general, the age restriction policy is valid because policing requires "physical vigor and alertness, as well as mental qualifications" (p. 9, *Humbeutel et al. v. City of New York* (1953)).

There were several modifications to the mandatory retirement age regarding administrative provisions, however the age of sixty-three (63) remained (Local Laws 680 and 681 of 1952, Local Law 59 of 1959, Local Law 66 of 1971) as the mandatory retirement age. In a case entitled *In the Matter of Edward A. Kiley, Sr. v. Stephen P. Kennedy, as Commissioner of the Police Department, City of New York, et al.* (1958), the New York State Supreme Court ruled that patrolmen cannot be retired at age sixty-three (63) if they were still not eligible for full Social Security Insurance benefits after amendments to the Social Security in 1958 increased the age of eligibility for full benefits to age sixty-five (65) (United States Code, Title 42, Section 7). This New York State Supreme Court case led to the passage of New York City Local Law 59 of 1959.

Police officers were eventually awarded a pension of 50% of their final salary after twenty (20) years service, with pension benefit increases to 75% of their final salary after thirty-five (35) years of service through collective bargaining and contractual negotiations. One case, *Henry Beaudoin et al. v. Board of Trustees of the Police Pension Fund, Article 1, et al., Defendants* (1974) addressed the issue of the mandatory retirement age of age sixty-three (63) and realization of full pension benefits. In the *Beaudoin et al.* case, police officers aged sixty-three (63) and over claimed that they were not able to realize the full pension benefits after thirty-five (35) years of service, an amount that is 75% of the final year's salary. For example, if they entered the NYPD at the oldest possible maximum appointment age of age twenty-nine (29), police officers would only

be allowed to work for thirty-four (34) years until age sixty-three (63), excluding them from a maximum pension benefit. The New York State Supreme Court ruled in *Beaudoin et al.* that the mandatory retirement age was not enacted to purposely exclude police officers from realizing full pension benefits; therefore, the current practice was upheld as legal.

The current minimum appointment age to enter the NYPD is age twenty-one (21). The minimum appointment age has fluctuated between age twenty (20) and age twenty-two (22). The minimum appointment age is set by New York State Civil Service Law Section 25. There actually has been one (1) challenge to the minimum appointment age in 1953 in the case of *In the Matter of Le Roy Walden-El, Petitioner, v. Paul P. Brennan et al.* (1953). The New York State Supreme Court ruled that the New York State Civil Service Commission acted reasonable when fixing age twenty (20) as the minimum appointment age to the NYPD.

Imposition of both maximum appointment age and mandatory retirement age policies are not unilaterally agreed upon. As stated previously, most police and law enforcement agencies have a mandatory retirement age, but most do not have a maximum appointment age. In the NYPD, the maximum appointment age and mandatory retirement age restriction policies are analogous based upon New York City laws. According to New York City laws (New York City Administrative Code Section 14, 2001), police officers are guaranteed twenty (20) years of government employment as police officers. This benefit was bestowed upon World War I veterans and never removed from the law, possibly to prevent civil service abuses during changing New York City mayoral administrations. Therefore, if there is no maximum appointment age,

a mandatory retirement age will be ineffectual. For example, a person hired at age fifty (50) will be guaranteed employment beyond the mandatory retirement age of sixty-three (63). Proponents of a mandatory retirement age in the New York Police Department are by default, proponents of a maximum appointment age because of the civil service laws guaranteeing employment.

The perplexing issue of age restriction policies for police and law enforcement agencies and the lack of empirical evidence supporting imposition or elimination of age restriction policies presents the need for a sound, empirical investigation into age restriction policies. The current policy decisions are essentially borne out of subjective and objective attitudes about the abstruse issue of aging, the nexus between aging and the decline of physical fitness and the complicated occupation of policing and law enforcement. The primary policy endeavor is navigating the balance of interests of the safety of the public, the rights of individual employees and applicants and the amount of resources a government agency should expend to ensure all employees are tested fairly for fitness as policing and law enforcement officers. These issues are also agency specific. For example, it may be impractical for a police agency as large as the NYPD to administer comprehensive physical fitness tests for all applicants and incumbent employees. Presently, there are approximately (38,000) sworn uniformed members of the NYPD and the NYPD typically processes between ten thousand (10,000) and fifteen (15,000) applicants for every three thousand (3,000) recruits hired. Also, most of the prior research on aging and policing and law enforcement cannot be extrapolated to police officers working for the NYPD because of the variance in workload. NYPD police officers have averaged a total of three hundred forty thousand (340,000) arrests per

year from 1993 through 2000 (NYPD, OMAP, Crime Analysis Section, 1993-2000). This translates into approximately nine (9) arrests per police officer per year. NYPD police officers also handle an average of eight (8) million total requests for service per year (Bureau of Justice Statistics, 1987, 1990, 1993, 1997, 1999). Considering there are approximately 21,000 police officers actually on patrol handling calls for service, this translates into the average police officer in the NYPD responding to three hundred and eighty (380) calls for service per year. The workload of the average working patrol officer in the NYPD is astounding. Also, fiscal restraints (a perpetual problem but especially acute in the contemporary NYPD) of New York City may increase the workload because the NYPD is getting smaller in terms of uniformed personnel.

The NYPD, as a police agency, has also undergone a massive "re-engineering" effort to change the operational policing strategies from a police agency that was largely reactive to a police agency that is proactive (New York Police Department Police Department, 1994a, 1994b, 1994c, 1994d, 1994e, 1995, 1996, 1997, 1998, 1999, 2001). These operational strategies, along with the NYPD's "COMPSTAT" model of management and executive accountability, have been credited with the historic reductions of violent crime in New York City (Silverman, 1999; McDonald, Greenberg and Bratton, 2001). Additionally, these operational strategies integrate crime reduction, improvement of quality of life programs and, community policing initiatives. These NYPD agency strategies, initiatives and increased accountability place unique demands on contemporary NYPD police executives managing patrol precincts and units. Police executives that are accountable for fostering NYPD agency strategies demand increased work assignments from police officers assigned to their patrol precincts and units. This

requires a proactive and motivated working police officer that is required to engage in public interaction to reduce crime and improve quality of life conditions. The consistent threat of another terror attack must also be taken into account. New York City police officers are now working additional overtime to secure New York City from terrorist threats and are now burdened with the accompanying psychological stress from the fear of another attack and consequent level of a constant state of immediate preparedness and first response duties. Currently, the job of being a New York City police officer is more physically, psychologically, and emotionally challenging than ever.

The enormity of the NYPD as a police agency, workload and expectations placed upon NYPD police officers require that any analysis be strictly tailored based upon conditions unique to NYPD police officers. Prior research has failed to account for the variance in terms of size and operations of police and law enforcement agencies. Urban police agencies have more personnel and to have a more intensive workload. Also, prior research regarding age restriction policies, regardless of the methodology and validity, could not possibly control for the uniqueness of the NYPD and NYPD police officers or the other large urban police agencies in the United States such as the Los Angeles, Chicago, Houston and the Philadelphia Police Departments. To this end, the following analysis is structured towards the personnel and operational characteristics of the NYPD, but the findings may be extrapolated to any large, urban police agency that does not have the financial resources to test every police officer on an annual basis to determine if the police officer is physically fit to handle the increased policing workload.

III. RESEARCH PLAN

Chapter Six

Research Design and Methodology I: New York City Policing Physical Performance Decrement, the Central Hypotheses, the New York Police Department's Class of 1985, and the Longitudinal Cohort Design

Physical Performance Decrement and The Central Hypotheses

This research endeavor will attempt to determine substantial existence of decrement in physical performance (as measured by various health-related variables) as police officers in the New York Police Department (NYPD) age. This research will not (nor attempt to) suggest medical conclusions about aging. The research will explore and examine at what age physical declines as measured by injury recovery time, sick time, and work related disabilities and overall performance are the functions of age in the NYPD. The primary aim of this research is to empirically prove or disprove the necessity of a maximum appointment age and (or) a mandatory retirement age for police officers entering and currently employed by the New York Police Department. There are three (3) central hypotheses for this analysis:

HYPOTHESIS NUMBER ONE (1)

"As Police Officers age, they suffer from substantially longer periods of recovery from injuries suffered in the line of duty and use more sick leave time for both injuries sustained in the line of duty and regular illnesses."

HYPOTHESIS NUMBER TWO (2)

"There is also significant decline in physical performance amongst physically fit Police Officers. As physically fit Police Officers age, they are also likely to suffer longer recovery time periods for injuries sustained in the line of duty."

HYPOTHESIS NUMBER THREE (3)

"As Police Officers age, they are more likely to suffer from a debilitating injury or cardiovascular disease resulting in a disability pension."

The above hypotheses will be tested using a retrospective, longitudinal cohort panel design comparing four (4) "sub cohorts" drawn from the entire cohort of police officers hired in 1985 by the NYPD and graduating from the Police Academy during the calendar year of 1985 and following their careers regarding their individual physical and police performance through the calendar year 2000, ending on December 31, 2000. There were three thousand twelve (3,012) police officers hired by the NYPD in 1985. Police officers hired by the NYPD in 1985 were hired from New York City Civil Service Exams conducted in 1979, 1981, 1982 and 1984. The 3,012 police recruits hired in 1985 attended one (1) of three (3) Police Academy classes. The first class entered in January of 1985 and consisted of seventeen hundred fifty-six (1,756) police recruits, the second in April of 1985 and consisted of two hundred twelve (212) and the third in July of 1985 that consisted of one thousand forty-four (1,044) recruits. The entire cohort entered the Police Academy in 1985 and graduated during the calendar year 1985.

The sub cohorts were divided from the Study Group based upon the age of the police officer upon entrance to the Police Academy in 1985. The Study Groups were evenly divided into three (3) sub cohorts. The youngest police officers were aged twenty (20) years old and the oldest police officer at appointment was age thirty-seven (37) years old. The mean age was just over twenty-four (24) years old; the median was age twenty-three (23), meaning that about one-half of the Study Group was younger than twenty-three (23) and the other half was over age twenty-three (23). The mode was also age

twenty-three (23). The standard deviation was approximately 3 years (3.1), meaning that about ninety-five percent (95%) of the entire Study Group was between the ages of twenty (20) and twenty-six (26) and virtually all (99.5%) of the Study Group was between the ages of twenty (20) and thirty-two (32). The "Younger Aged Cohort" is the sub cohort within the Study Group that is the youngest one-third (1/3 or 33%) of the Study Group. The Younger Aged Cohort consists of police officers aged twenty (20) to twenty-one and one-half (21.5). The next oldest one-third is the "Middle Aged Cohort." The Middle Aged Cohort consists of police officers aged twenty-one and one-half (21.5) to approximately age twenty-five (24.9). The "Older Aged Cohort" consisted of the oldest one third of police officers in the Study Group, and the ages ranged from approximately age twenty-five (24.9) to age thirty-seven (37). Regarding demographic characteristics, the Class of 1985 was eighty-four point five percent (84.5%) male, fifteen point and five percent (15.5%) female; seventy-one point six percent (71.6%) White, fourteen point six percent (14.6%) Hispanic, twelve point five percent (12.6%) African-American and one point two percent (1.2%) Asian.

The fourth sub-cohort, the "Superior Fitness Sub Cohort" (SFSC), consisted of ninety-one (91) police officers within the Study Group (regardless of age) that finished in the upper tenth (top 10%) percentile while at the Police Academy in three (3) fitness components; cardiovascular endurance (as measured by running 1.5 miles), muscular strength (flat bench press) and muscular endurance (timed sit-ups) and have maintained a Body Mass Index (measure of body fat relative to weight, age and height) in the "above average" range according to scales constructed by the National Institutes of Health (NIH, 1998, 2000) during Police Academy training and throughout their careers. Police officers

in the Superior Fitness Sub Cohort must also have passed all three (3) fitness components at least once after Police Academy training while also maintaining the "above average" Body Mass Index designation for inclusion in the Superior Fitness Sub Cohort. The Superior Fitness Sub Cohort was enabled to be extracted from the Study Group based upon Police Academy Physical Education tracking records and future fitness tests for promotion occurring during the Study Period. Police officers were given the opportunity to earn extra points on civil service promotional examinations to Lieutenant in 1996, Captain in 1997, and Sergeant in 1997 and 1999. The civil service promotional examinations were excellent tests of maintenance of superior physical fitness because police officers participating in the physical fitness tests were given very short notification (about five weeks) that they were selected to participate. Therefore, police officers participating and receiving the full award probably had maintained relatively high levels of physical fitness. This was an excellent source of testing levels of physical fitness after a ten (10) year period after Police Academy physical fitness training. Police officers in the SFSC are also in the either the Younger Aged Cohort, Middle Aged Cohort or Older Aged Cohort.

INCLUSION REQUIREMENTS FOR THE SUPERIOR FITNESS SUB COHORT	
REQUIREMENT 1	SCORE 50TH PERCENTILE OR ABOVE ACCORDING TO THE COOPER INSTITUTE FOR AEROBIC RESEARCH IN CARDIOVASCULAR ENDURANCE AND MUSCULAR STRENGTH WHILE AT THE POLICE ACADEMY IN 1985.
REQUIREMENT 2	SCORE A 30 OR LESS ON THE NATIONAL INSTITUTES OF HEALTH BODY MASS INDEX (BMI) WHILE AT THE POLICE ACADEMY IN 1985.
REQUIREMENT 3	SCORE A FULL ONE (1) POINT AT THE VOLUNTARY PHYSICAL FITNESS AWARD EXAMINATION FOR PROMOTION TO LIEUTENANT IN 1996 AND CAPTAIN AND SERGEANT IN 1997.

New York Police Department's Class of 1985 and the Longitudinal Cohort Design

The year of 1985 was chosen for several reasons. The time period (fifteen (15) full calendar years) yields adequate time to capture and measure an aging trend. The mean age in 1985 for police officers entering the Police Academy was approximately age twenty-three (23). A fifteen (15) year study period will more than adequately measure the aging phenomena because the Study Group mean age in 2000 will be approximately age thirty-nine (39). According to most research relative to athletic primes discussed in Chapter Two (2), a majority of the Study Group will be beyond their prime athletic years, thereby unmasking the effects of the aging process relative to police performance. The year of 1985 was also chosen because they were the last class until 1994 to require passing a physical fitness-screening test prior to entrance into the Police Academy (NYPD Personnel Bureau, 1994). Presumably, Police Academy recruits were the most physically fit police officers to join the NYPD in close to a decade. Also, they were the first Police Academy class in which the cardiovascular fitness test (1.5 mile run), muscular endurance test (a timed sit-up test) and muscular strength test (flat bench press) were requirements in the Physical Education curriculum. This same test was given for extra promotional points during civil service promotional examinations, enhancing the reliability of the measure.

The longitudinal "Study Period" began on January 1, 1986 when all of the police officers had completed Police Academy training and were assigned to Neighborhood Stabilization Units (NSU) located in patrol precincts located throughout New York City. The Study Period extended a full fifteen (15) years, ending on December 31, 2000. Personnel records from NYPD hardcopy files, computer databases and network

mainframes located in various administrative units located throughout the NYPD. The primary source for the personnel data was the NYPD's Management Information Systems Division (MISD) mainframe application. Data were examined and collected on each individual police officer in the Study Group. These records and data of the Study Group during the Study Period (including records and data while the Study Group was in training at the Police Academy in 1985) were analyzed an entered into several databases in either Statistical Package for Service Solutions (SPSS) or Microsoft Excel (Excel) for archiving and further analyses. The data was reformatted into text files and databases were constructed in SPSS and Excel and mainly categorized into fifteen-year (15) periods. The first period, "Time 1", contained all data (i.e. Line of Duty Injury Reports, Sick Days Lost, Arrest Activity) of each individual police officer in the Study Group from initial appointment in 1985 through December 31, 1986. "Time 2" contained all data on each individual police officer from January 1, 1987 through December 31, 1987, "Time 3" contained all data on each individual police officer from January 1, 1988 through December 31, 1988 and each consecutive time period corresponds to the calendar year through "Time 15", which contained all of the data on each individual police officer from January 1, 2000 through December 31, 2000.

STUDY PERIOD JANUARY 1, 1986 THROUGH DECEMBER 31, 2000							
TIME 1 JANUARY 1, 1986 THROUGH DECEMBER 31, 1986	TIME 2 JANUARY 1, 1987 THROUGH DECEMBER 31, 1987	TIME 3 JANUARY 1, 1988 THROUGH DECEMBER 31, 1988	TIME 4 JANUARY 1, 1989 THROUGH DECEMBER 31, 1989	TIME 5 JANUARY 1, 1990 THROUGH DECEMBER 31, 1990	TIME 6 JANUARY 1, 1991 THROUGH DECEMBER 31, 1991	TIME 7 JANUARY 1, 1992 THROUGH DECEMBER 31, 1992	TIME 8 JANUARY 1, 1993 THROUGH DECEMBER 31, 1993
TIME 9 JANUARY 1, 1994 THROUGH DECEMBER 31, 1994	TIME 10 JANUARY 1, 1995 THROUGH DECEMBER 31, 1995	TIME 11 JANUARY 1, 1996 THROUGH DECEMBER 31, 1996	TIME 12 JANUARY 1, 1997 THROUGH DECEMBER 31, 1997	TIME 13 JANUARY 1, 1998 THROUGH DECEMBER 31, 1998	TIME 14 JANUARY 1, 1999 THROUGH DECEMBER 31, 1999	TIME 15 JANUARY 1, 2000 THROUGH DECEMBER 31, 2000	

The fifteen (15) year longitudinal cohort design allowed for the development of substantial (or unsubstantial) trends. A longitudinal cohort design is the most practical design considering the large amount of data collected, the time period studied and the study's principle hypotheses. This research will attempt to measure changes in individuals and groups over a long period of time. The most accurate research design to measure intra individual change as individual's age is through the longitudinal design (Young, Savola and Phelps, 1991; Yu, 1999). The longitudinal design is a quasi-experimental study that allows for the study of a particular trend. The study will attempt to discern if there are any trends to the data. More specifically, the study will be designed to determine if there are any trends while police officers age such as a secular trend. A secular trend in a linear context is the increase or decrease of some particular phenomena over time as observed by a linear function (Mendenhall & Sincich, 1996). More succinctly, does the physical and police performance decline with advancing age? Are there any noticeable trends when comparing the Younger Aged Cohort, the Middle Aged Cohort, the Older Aged Cohort, and the Superior Fitness Sub Cohort? In this research, the change trend that will be measured will be the physical decline of the police officer as the police officer ages.

The longitudinal analysis of the entire cohort is the most valid measure to detect these trends. Longitudinal studies have existed for about three hundred (300) years but have been used sparingly due to the amount of time needed to conduct the longitudinal analysis and the resources needed such as finances and personnel (Thomlinson, 1976; Baltes & Nesselroade, 1979; Menard, 1991). The original longitudinal studies were census studies of human populations. Longitudinal designs serve two (2) primary

purposes. They describe patterns of change and establish the direction and magnitude of a causal relationship (Menard, 1991). Glenn (1977, p. 8) defines a cohort as "those people within a geographically or otherwise delineated population who experience the same significant life event within a given period of time." Longitudinal cohorts are used extensively in medical and biological research to monitor the effect of a medical treatment stimulus such as drug dosages or physical therapy. Longitudinal cohort designs are also used in educational research to analyze the progress of young students as they age and undergo their educational careers. Longitudinal cohort designs are generally used in criminal justice research to monitor levels of deviance within the same families or age categories over periods of increased likelihood of deviance such as the juvenile years and young adulthood or the entire life course (Wolfgang, Figlio & Sellin, 1972; Dalgard & Kringlen, 1976; Tracy, Wolfgang & Figlio, 1990; Walters, 1992; Brennan & Mednick, 1993; Farrington, 1995).

There are several threats to longitudinal research in general and this longitudinal research design in particular that may undermine the quantitative findings and subsequent conclusions and policy implications. The primary threats to construct, internal, and external validity are the confounding effects of age, cohort and time period, or (ACT). This is has been the traditional threat against any longitudinal design. Essentially, ACT effect is the distortion of conclusions in a longitudinal design because of the time period. Are the changes from the research stimulus, or the fact that the subjects aged over a specific time period? This analysis will protect against these confounding effects due to the variables measured, amount of subjects and characteristics of the Study Group. Regarding age, the research is, in effect studying changes aging may have; therefore, the

effect of aging is fundamental, not detrimental, to the central hypotheses. The cohort effect is essentially the threat that different groups of people (older versus younger) will either react or be affected differently from stimulus (Bijleveld, 1998). The Aged sub-cohort categories do not vary to the point that they are substantial generational affects, meaning that the older police officers will react differently because they are from another generation than the younger police officers and all of the Study Group members will integrate, regardless of age, therefore, the cohort effect is reduced to a minimum. The time or period effect is essentially that the phenomena measured is actually the result of extraneous events and not the research design or stimulus per se. This longitudinal design will guard against the period effect because all members of the study group will endure and be exposed to the same time period and maturation within the police agency and learning and mastering policing skills, albeit in different levels, quantities, and intensity.

There are additional validity threats to longitudinal research design that may undermine the quantitative findings and conclusions. Threats to statistical conclusion validity refer to the threat that the specific outcomes are due to chance and not specific trends (Bijleveld et al., 1998). This research consists of analyzing three thousand twelve (3,012) research subjects involving thirty-three (33) variables over a fifteen (15) year time period. It is a near mathematical impossibility that all of the observed relationships are due to chance and that there are no correlations between variables. Another threat according to Bijleveld and Van der Kamp (1998) is the chance that spurious relationships may occur if all the sub cohorts exhibit the same trend. In other words, do increases or decreases effect all members of the Study Group evenly? This research design will guard

against this threat because if any relationships are spurious, they will be identified and one (1) or more of the research's central hypotheses will be rejected and a conclusion of "age has no effect" will be offered. Once again, the sheer number of subjects, number of variables studies and length of time period guard against threats to internal validity. The generic threats to internal validity pioneered by Campbell and Stanley (1963) will be addressed relative to this design:

History – This longitudinal design will guard against the threat of history in several ways. The threat of history is essentially that subjects in the design have different life experiences or experience life with differing viewpoints. Although this research cannot control for life histories of police officers prior to entering the Police Academy, the ages of the police officers (99.5% of the Study Group is between the ages of twenty (20) and thirty-two (32)) to not deviate significantly for a "generational gap" effect of their socialization histories. Most police officers entered the Police Academy at a (relatively) young age; therefore, most of their adult development years were spent as members of the NYPD. Also, every single subject will endure the same orientation and indoctrination into the NYPD, therefore, historical differences are limited.

Maturation – The threat of maturation is essentially the threat that the person in the study will change regardless of history and regardless of experimental stimulus. While it is true that people in the study group may change their personal habits to increase their perceived quality of life and prolong their life and careers, it is highly unlikely that all three thousand twelve (3,012) research subjects will endure dramatic life-style changes

(such as beginning and sustaining an advanced physical fitness training program) for the entire Study Period.

Testing – All of the data gathered and analyzed are the results of mandatory testing for all police officer applicants as requirements to graduate the Police Academy except of the optional physical fitness award. Everybody in the Study Group endured the same testing for physical fitness awards; however, the physical fitness awards are "normed" based on age and gender.

Instrumentation – Instrumentation is the threat the results of the research are caused by the variance in research instruments and not a causality relationship between variables. This research design is protected from instrumentation because all of the research instruments are standardized NYPD forms.

Statistical regression toward the mean – The linear moving average time series models used in Model One (1) and Model Three (3) compares several sub cohorts, therefore, statistical regression toward the mean is not a threat. Also, the logistic regression equation used in Model Two (2) is a log-odds ratio that is considered a non-linear regression model, also obviating this threat.

Selection Bias – Every police officer of the NYPD hired and entering the Police Academy in 1985 will be selected for this analysis, therefore removing the threat of selection bias.

Mortality – Given the overall retention problems of the NYPD (and other large police and law enforcement agencies) and specifically, this Study Group (approximately 25% of the Study Group will have left the New York Police Department within the first five (5) years of the Study Period), losing members of the Study Group will be an integral part of

the research. The study's will contain an "Active Cohort" to guard against this threat and retention issues will become a variable, particularly when determining if there are retention problems correlated to age and aging.

There are also threats to external validity and extrapolating findings from this research to other police and law enforcement agencies, given the variations of police and law enforcement agencies. The NYPD, like most police agencies, is a unique agency with its own style of training, supervision, and culture. Although this research is an applied research endeavor specifically for the NYPD police officers, the external validity is not threatened to the extent that findings may only be limited to the NYPD. Most large police agencies are very similar in that their missions and objects are to respond to calls for service and apprehend violent offenders. Another safeguard to external validity is the fact that everybody in policing and law enforcement ages and that time and aging are universal variables.

One of this research's primary dependent variable is days lost (the recovery time that the police officer stays home recuperating from the line of duty injury) as the result of a line of duty injury. The reliability of this data is critical to this research, and ultimately the findings, recommendations, and conclusions. Therefore, the accuracy of the reporting system is paramount. Will some police officers report a line of duty injury that other police officers will not? This is quite probable and the extent of these incidences is unknown. However, when a NYPD police officer is injured in the line of duty, it may affect the outcome of a criminal prosecution. According to the New York State Criminal Procedural Code, a criminal suspect who injures a police officer during an arrest encounter may be criminally charged with a Felony. Therefore, almost every police

officer will report an injury occurring under these circumstances. Another aspect that cannot be discounted is the fact that all medical bills are fully insured for police officers that are injured in the line of duty, removing financial hardship as a factor that may make a police officer reluctant to report a line of duty injury. Also, injuries may hamper the future of the police officer's career; therefore early detection and treatment of the injury may be of utmost importance to the injured police officer. There is also the possibility of a future, financially generous disability pension as the result of a previous line of duty injury that was documented. Police officers are strongly encouraged to report line of duty injuries and they are actually mandated to report a line of duty injury within twenty-four (24) hours to receive "line of duty" designation by the NYPD. Considering all of these factors, nearly one hundred percent (100%) of all line of duty injuries incurred by NYPD police officers are reported.

Another question related to reliability is the malingering police officer that fraudulently reports injuries that did not occur in the line of duty. The extent of these incidences is also unknown. However, there are several control mechanisms to deter this. At least three (3) supervisors (including the Commanding Officer of the police officer reporting the injury) must investigate the line of duty injury before the injury is tentatively approved. After the line of duty injury is tentatively approved, medical staff (medical doctors and nurses) reviews the line of duty injury report and conducts medical examinations of the injured police officer to determine the extent of the injury. Presumably, these mechanisms reduce malingering to a minimum.

The randomness of the occurrence of line of duty injuries also makes for an exceptional research variable in the quasi-experiment design. Lines of duty injuries are

unplanned, chance encounters that are virtually an unavoidable fact of policing in New York City. During the Study Period of 1986-1999, one (1) out of three (3) New York City police officers were injured in the line of duty per year. Police officers also have no foresight in who will use weapons against them, if they will get into a vehicle accident or what type of rescue mission awaits them. The complete randomization of line of duty injuries contributes immensely to the reliability and validity strength of this research.

The longitudinal, cohort panel design is a sound research design method to address the research questions at hand. The longitudinal design, although a quasi-experimental design, can easily detect aging trends in policing and law enforcement if a sufficient number of subjects are used over a long period of time using both an adequate quantity and quality of variables. This specific design, given the amount of subjects, length of time period studied and amount of variables analyzed promotes the validity of the research findings and conclusions.

Chapter Seven

Research Design and Methodology II: Data Collection, Study Group Variables, the Policing Assignment Exposure Rate (PAER) and Arrest Activity Rate score, and the Policing Performance Scale (PPS)

Data Collection and the Study Group Variables

Personnel data on the three thousand twelve (3,012) members of the Study Group was gathered, analyzed, reformatted, and positioned into several databases. There were a total of thirty-three (33) variables used in this analysis and three (3) statistical models were constructed to conduct and analyze both trend analyses and significant single-event occurrences during the entire Study Period to test the central hypotheses. Three statistical models, Model One (1), Model Two (2), and Model Three (3) were constructed to comprehensibly and quantifiably depict policing performance to test the central hypotheses and determine the existence (or "non existence") of significant decrement of NYPD police officers that would justify imposition of a maximum appointment age or mandatory retirement age. Model One (1) was entitled the "Physical Performance Trend Analysis" and consisted of eight (8) physical performance variables. Model One (1) was a fluid linear moving average model that was designed to detect trends of each sub cohort, the Younger Aged Cohort, the Middle Aged Cohort, and the Older Aged Cohort as each sub cohort aged over the fifteen (15) year Study Period. Model One (1) specifically incorporated several smoothing techniques to moderate the variability to increase and enhance the validity of the research findings. Model Two (2) was entitled the "Physical Performance Major Health Event Probability Analysis" and consisted of ten (10) physical performance variables. Model Two (2) differed significantly as a statistical model from Model One (1) and Model Three (3) in that Model Two (2) utilized a logistic

regression equation to determine the probabilities of a significant major health event occurring to a member of a particular sub cohort during the fifteen (15) year Study Period. Model Three (3), the "Policing Performance Trend Analysis" combined fifteen (15) physical and policing performance (both positive policing performance measures and negative policing performance measures) variables and was structured similar to Model One (1) in that it attempted to capture trends of both physical and policing performance measures over the fifteen (15) year Study Period. Also, to capture the mortality rate of the Study Group, the attrition rate was accounted for at each successive Time Period. For example, Time 2 variables will be measured using subjects only in the "Active Cohort"; meaning those police officers from the class of 1985 that are still working in the NYPD at the beginning of the relevant Time Period and have not resigned, have not been terminated, were not awarded a disability pension or for some other reason left the NYPD.

VARIABLES and DATA SOURCES

Demographic Variables

AGE
Age of Police Officer. Age of Police Officer was downloaded from a mainframe database entitled "PEPP" (Personnel Profile) computer file stored on the NYPD's MISD computer mainframe databases.

GENDER
Gender of Police Officer. Gender is only used relevant to this research as a descriptive statistic, also retrieved from the PEPP file.

RACE OR ETHNICITY

Race or Ethnicity of police officer, as it is reported by the police officer candidates to the New York City Department of Citywide Administrative Services on personnel records. There are five (5) categories, Black, White, Hispanic, Asian or Native American. Race or Ethnicity is only used relevant to this research as a descriptive statistic. Also retrieved from the PEPP file.

Physical Performance Variables

LINE OF DUTY INJURIES

This variable was the total amount of days lost (days police officer did not report for work) per line of duty injury. This data was retrieved directly from the New York Police Department's "Line of Duty Injury Report" form that is required to be prepared by police officers when they suffer line of duty injuries. The supervisors of the police officer are assigned to investigate the occurrence of the injury and the report is tentatively approved by the Commanding Officer of the police officer reporting the injury. Final approval of the line of duty injury report and investigation is made by the Commanding Officer of the Medical Division and the Chief of Personnel of the NYPD. The Line of Duty Injury Reports are archived in the medical records section in the NYPD's Medical Division. A total of fourteen thousand two hundred seventy-nine (14,279) line of duty injuries reported by the Study Group from initial appointment through December 31, 1999 (Time 1 through Time 14) were read, perused and thoroughly analyzed to determine how the injury occurred, the type of injury, whether or not the police officer lost any days (i. e., stayed home from work on "sick report") as a result of the line of duty injury, and how many days were lost.

LINE OF DUTY INJURIES; DAYS LOST PER PHYSICAL ENCOUNTER

This variable was the total amount of days lost (days police officer did not report for work) per line of duty injury incurred during a physical encounter. A physical encounter was operationalized as an arrest or other custodial situation or a rescue mission in that resulted in a police officer suffering a line of duty injury. An arrest situation involving a deadly weapon or dangerous instrument was not classified as physical encounter.

LINE OF DUTY INJURIES; DAYS LOST FROM VEHICLE ACCIDENTS

This variable was the total amount of days lost (days police officer did not report for work) per line of duty injury incurred as the result of a vehicle accident while working.

LINE OF DUTY INJURIES; DAYS LOST FROM EXPOSURE INJURIES
This variable was the total amount of days lost (days police officer did not report for work) per line of duty injury as the result of certain exposure injuries. Exposure injuries consisted of exposure and contact with persons and animals such as the police officer being bitten by humans or animals, exposure and contact with persons and animals stricken with infections and contagious diseases, needle stick injuries from hypodermic needles, exposure to cold and freezing water, and hazardous materials such as chemicals and gaseous fumes.

LINE OF DUTY INJURIES; DAYS LOST CARDIOVASCULAR/PULMONARY INJURIES
This variable was the total amount of days lost (days police officer did not report for work) per line of duty injury involving a cardiovascular illness such as cardiac arrest, chest pains, elevated pulse rate and blood pressure and shortness of breath.

LINE OF DUTY INJURIES; DAYS LOST FROM GUNSHOT TRAUMA
This variable was the total amount of days lost (days police officer did not report for work) per line of duty injury as the result of incidents involving gunshot trauma.

LINE OF DUTY INJURIES; DAYS LOST FROM INJURIES SUSTAINED WHILE IN TRAINING AT THE POLICE ACADEMY
This variable was the total amount of days lost (days police officer did not report for work) per line of duty injury incurred while in training at the Police Academy.

CHRONIC SICK DESIGNATION; CATEGORY A AND B
Police officers in the NYPD receive a designation of "Chronic Sick, Category A" if they report sick more than three (3) times in a twelve (12) month period and they receive a designation of "Chronic Sick, Category B" if they report sick six (6) or more times in a twelve (12) month period. This information was retrieved from the mainframe database entitled "PEMU" (Medical History Profile) computer file stored on the NYPD's MISD computer mainframe databases

HEART DISABILITY PENSION
Police officers in the New York Police Department receive an automatic "three quarters pension" (75% of their final year's salary, tax free). This variable was the total amount of heart disability pensions awarded. This data was retrieved from the PEPP file.

DISABILITY PENSION APPLICATION
This variable measured the amount of disability applications that were filed, albeit an ordinary disability application, an accident disability application or a heart disability application. Police officers in the New York Police Department receive 50% of their final year's salary if they are awarded an ordinary disability pension (33% if they have fewer than ten (10) years of service) and a "three quarters pension, 75% of their final

active year's salary" if they are awarded a accident disability (that is the result of a line of duty injury) or a heart disability. This data was also retrieved from the PEPP file.

ACCIDENT DISABILITY PENSION

Police officers in the New York Police Department receive an automatic "three quarter pension" (75% of their final year's salary, tax free) if they are deemed disabled as the result of a line of duty injury. This data was retrieved from the PEPP file.

REGULAR SICK DAYS

The total number of sick days used per year. The regular sick day variable was created by summing the total regular sick days lost divided by the number in the cohort during that year for the mean sick days lost. This data was retrieved from the PEMU file.

POLICE ACADEMY PHYSICAL FITNESS EDUCATION SCORES TRACKING SHEET

This standardized NYPD form was the physical fitness progress of all members of the Study Group when they were enrolled at the NYPD Police Academy. The tracking sheet gave the height, weight and physical fitness scores in the cardiovascular fitness test, the muscular endurance test and the flexibility test along with body fat composition. Members of the Study Group were tested upon entering and prior to graduating from the Police Academy. Data was extracted directly from the tracking sheets from the hardcopies archived in the NYPD Police Academy.

PROMOTION PHYSICAL FITNESS TEST AWARD

This standardized NYPD form contained the scores of each optional physical fitness award given in 1996, 1997 and 1999. The form contained the police officers age, date of birth, height and weight and a pass or fail designation for each of the four (4) physical fitness components, the cardiovascular endurance test, the muscular strength test, the muscular endurance test and the flexibility test. Data was extracted directly from the tracking sheets from the hardcopies archived in the NYPD's Personnel Bureau.

Policing Performance Variables

ASSIGNMENT HISTORY

This variable was the amount of days each member in the Study Group was assigned to particular patrol precinct or other NYPD unit. This variable was extracted from the NYPD's MISD PEPP file.

ARREST ACTIVITY

Arrest activity was the total number of arrests effected per officer in the cohort. The arrest activity was extracted from the NYPD's MISD's Online Booking System (OLBS) mainframe computer database that was the number of Felony, Misdemeanor and Violation arrests for each member of the Study Group from the time the entered the NYPD until December 31, 1999.

CIVILIAN COMPLAINT REVIEW BOARD (CCRB) COMPLAINTS

This variable was a formula compiled after collecting and analyzing all of the Civilian Complaints reported to the Civilian Complaint Review Board. Citizens of New York City can report complaints and allegations of police misconduct of members of the NYPD to the Civilian Complaint Review Board of New York City, an oversight review panel independent from the NYPD that investigates complaints of police misconduct related to use of excessive physical force (not amounting to criminal conduct), abuse of authority, discourtesy, and offensive speech (New York City Civilian Complaint Review Board, 2002). This data was extracted directly from the CCRB's mainframe application system that archives every single Civilian Complaint lodged against an NYPD police officer.

CENTRL PERSONNEL INDEX (CPI)

The Central Personnel Index (CPI) is a computer mainframe application that archives all disciplinary actions, including allegations against NYPD police officers. The purpose of the CPI is to centralize all disciplinary records given the transient culture (police officers are often transferred several times in their careers due to promotion, reduced commuting, disciplinary reasons, etc.) of NYPD police officers.

DAYS NOT AVAILABLE FOR FULL DUTY

This variable was the amount of days members of the Study Group were not on "Full-Duty" status. Police officers are placed on Restricted Duties for various reasons such as removal of firearms for disciplinary reasons (Modified Assignment) or Limited Duties because of illness. Females that were placed on Limited Duty because of pregnancy-related illnesses were excluded. When a police officer is not considered on Full-Duty status, they may not conduct enforcement functions and are assigned primarily to administrative tasks. This variable was extracted from the NYPD's MISD mainframe computer application entitled "Duty Availability" status.

DISCIPLINARY ACTIONS AND INCIDENCES

Disciplinary actions consisted of either Termination, Suspension or Modified Assignment. When police officers are suspended from the NYPD, they relinquish all salary and benefits. When police officers are placed on Modified Assignment, their firearms are usually removed and they are assigned to primarily administrative and clerical tasks.

EDUCATION LEVELS

Police officers' level of education as of 1994 was used as a positive police performance variable. The levels of education within the Study Group ranged from General Equivalency Diplomas (GED) to Master's Degrees. This information was extracted from the PEPP file.

PERFORMANCE EVALUATIONS

This variable was the total Performance Evaluation Score for all members of the Study Group in 1994. Police officers are theoretically evaluated once a year and receive a final Performance Evaluation score ranging from 1.0 to 5.0. This variable was extracted

directly from the computer file databases located in the NYPD's Employee Management Information System.

PROMOTION

This variable was the number of times a member of the Study Group was promoted and to what rank. This variable was extracted from the PEPP file.

RESISTING ARREST CHARGES (RAC) VARIANCE

The Resisting Arrest Charges (RAC) are the amount of times a police officer charges a criminal suspect with Resisting Arrest. The total number of Resisting Arrest charges was extracted from the NYPD's MISD's Online Booking System (OLBS) mainframe computer database.

Policing Assignment Exposure Rate (PAER) and Arrest Activity Rate Score

Prior studies on policing performance have failed to account for the variance in everyday tasks of police and law enforcement officers. The variance in police officers' tasks is particularly acute in large police and law enforcement agencies with numerous specialized policing assignments and units. The variance is also greater in police and law enforcement agencies that police large urban areas. Police and law enforcement officers in large police and law enforcement agencies are more likely to consist of larger numbers of "specialist" police and law enforcement officers while smaller police and law enforcement agencies usually consist mainly of "generalist" police and law enforcement officers. The specialist police and law enforcement officer has a high level of expertise in one specific area, such as preliminary crime scene evidence gathering, plain-clothed patrol, local area narcotics investigations, serious vehicle accident investigations and crime analysis and planning. Generally, when a serious policing incident occurs in a large urban area, the initial responding patrol officers and supervisors depend on the specialist officers to respond and assume responsibility for the necessary policing tasks and functions after the initial response and security of incident scene. However, smaller

police and law enforcement agencies, given their size and lack of resources, generally train all of their police and law enforcement personnel in all of the necessary police functions and expect the initial responding patrol police officers and supervisors to conduct most, if not all of the necessary policing tasks and functions, including follow-up investigations. The specialization of the policing and law enforcement functions in large urban police and law enforcement agencies leads to variance in policing and law enforcement tasks, and consequently, variance in exposure to injurious conditions.

There is also a considerable amount of variance in the workload in large police and law enforcement agencies. The workload disparity in large police and law enforcement agencies may also vary in accordance to the area policed. Some areas may need increased or decreased amount of police services based upon the rate of reported violent crime, population of area need to be policed, geographic landscape of the area and many other factors in a particular area. There is also considerable variance throughout the career of the police or law enforcement officer depending on factors such as the size of the police agency or whether or not the police or law enforcement officer opts for an assignment to a highly active specialized unit. For example, a police officer may begin his or her career in a highly work-intensive precinct and end their careers at a least demanding precinct and (or) unit in terms of workload. Police officers may also spend considerable portions of their police careers in specialized units such as narcotics enforcement units or plain clothes undercover units such as street crime units that strive to deter or immediately apprehend violent criminals. These police tasks that are especially dangerous. Additionally, individual personality such as self-initiative and motivation may vary amongst police officers working in the same area that may account

for an increased likelihood that a police officer will be injured in the line of duty. Some police and law enforcement officers, may become cynical and (or) "burn out", lose motivation, and then consequently choose to do the minimum amount of tasks necessary to avoid being reprimanded by a police supervisor.

A "Policing Assignment Exposure Rate (PAER) and Arrest Activity Rate Score" was calculated to control for this variance in policing careers, assignments and individual personality traits. Police precincts, units, and assignments in the NYPD were ranked based upon increasing or decreasing likelihoods of police officers getting injured in the line of duty based upon workloads and exposure to dangerous conditions. For example, a police officer working in a narcotics or street crime unit that conducts numerous arrests of violent and dangerous criminals has an increased likelihood of getting injured in the line of duty than police officers working in mainly administrative units. Also, police officers in certain patrol precincts with high rates of reported violent crime and more requests from the computerized 911 telephone-dispatch system have an increased likelihood of injury than police officers in patrol precincts with lower rates of reported violent crime and a reduced number of requests for service due to decreased interactions with the public. Also tabulated was the rate of police vehicle accidents. Certain areas of New York City (such as the traffic congestion prone areas in midtown and lower Manhattan) have high rates of police vehicle accidents, further exposing those police officers working in those areas to line of duty injuries.

The Policing Assignment Exposure Rate (PAER) and the Arrest Activity Rate Score was calculated first using the rate of reported violent crime in precincts in New York City. There are seventy-six (76) patrol precincts in the NYPD that are divided

amongst seven (7) patrol boroughs. Patrol Borough Manhattan South consists of ten (10) precincts. Patrol Borough Manhattan North consists of twelve (12) precincts. Patrol Borough Bronx consists of twelve (12) precincts. Patrol Borough Brooklyn North consists of ten (10) precincts. Patrol Borough Brooklyn South consists of thirteen (13) precincts. Patrol Borough Queens North consists of eight (8) precincts. Patrol Borough Queens South consists of eight (8) precincts. and Patrol Borough Staten Island consists of three (3) precincts. The "Violent Crime Rate" (VCR) of each patrol precinct was calculated based upon the mean number of robberies per police officer in the patrol precinct. mean number of burglaries per police officer. mean number of felonious assaults per police officer. mean number of rapes per police officer and mean number of murders (multiplied by ten times. given the severity of the crime) per police officer for the years 1986 through 1990. The VCR was calculated and tabulated for each patrol precinct. The years 1986 through 1990 were chosen because those were the years the majority of the cohort would be working in a patrol assignment in a patrol precinct. The Study Group averaged approximately six and one-half years (6.5) working in a patrol precinct as police officers. The VCR of each patrol precinct was then added to the number of radio assignment requests for service via the 911 system ("calls for service rate") per year for the years 1995 and 1996 (the earliest years the data was available at the time of this research) and was that number was divided by twenty (20). The VCR and the radio assignment request for service was then added to the rate of police vehicle accidents per police officer (the earliest year data was available was 1999) working in that patrol borough ("police vehicle accident rate") multiplied by ten (10) times. The

VCR. the calls for service rate and the rate of police vehicle accidents were then calculated for each patrol precinct.

The mean exposure score was 20.7 with a standard deviation of 4.6. The patrol precinct that ranked the highest (with an exposure score of 38.58) in terms of increased exposure was the 73rd police precinct in the New York City borough of Brooklyn. The average number of reported robberies from 1985 through 1990 was one thousand eight hundred and eleven (1,811). During that time period, the 73rd police precinct was staffed with an average of one hundred seventy-eight (178) police officers. This calculates into a mean robbery rate per uniformed police officer during that time period of just over ten (10.17) robberies per uniformed police officer per year. The average number of reported burglaries per year from 1985 through 1990 was one thousand one hundred five (1,105). This calculates into a mean burglary rate per uniformed police officer during that time period of just over six (6.21) burglaries per uniformed police officer per year. The average number of reported felonious assaults from 1985 through 1990 was one thousand thirteen hundred forty-seven (1,347). This calculates into a mean felonious assault rate per uniformed police officer assigned to the 73rd police precinct during that time period of approximately seven and one-half (7.56). The average number of reported rapes from 1985 through 1990 was one hundred thirty-one (131). This calculates into a mean rape rate of approximately one reported rape (.75) per uniformed police officer assigned to the 73rd police precinct. The average number of murders from 1985 through 1990 was fifty-three (52.5). This calculates into a mean murder rate per uniformed police officer assigned to the 73rd police precinct during that time period of point two nine five (.295).

Therefore, the VCR of a police officer working in the 73rd police precinct would be calculated as follows:

Policing Assignment Exposure Rate (PAER) Violent Crime Rate (VCR) Sub Totals for the 73rd Police Precinct										
Police Precinct	**Robbery Rate**	**+**	**Burglary Rate**	**+**	**Felonious Assault Rate**	**+**	**Rape Rate**	**+**	**Murder Rate (Multiplied by 10)**	**=**	**Violent Crime Rate Sub Total**
073rd	**10.17**	**+**	**6.21**	**+**	**7.56**	**+**	**.73**	**+**	**2.95**	**=**	**27.63**

The Violent Crime Rate (VCR) sub total of twenty seven point sixty-three (27.63) was then added to the rate of calls for service per uniformed police officer assigned to the 73rd precinct per year in 1995 and 1996. A police officer assigned to the 73rd police precinct averaged a total of approximately five hundred and ninety-six calls (596) for service in 1995 and 1996, or an annual rate of two hundred and ninety-eight (298) calls for service per year. The two (2) year total of five hundred ninety-six (596) was divided by one hundred (596/100) for a "calls for service rate" of five point ninety six (5.96). These two (2) sub totals, the VCR (27.63) and the calls for service rate (5.96) were then added to the police vehicle accident rate of the geographic patrol area (Patrol Borough Brooklyn North) of the 73rd police precinct. The police vehicle accident rate in Patrol Borough Brooklyn North (in 1999) was approximately nine (8.9) police vehicle accidents for every one hundred (100) officers assigned to the ten (10) precincts encompassing Patrol Borough Brooklyn North. This rate was then divided by the number of police officers assigned to the 73rd precinct (10) (8.9/178=.05). This number was then multiplied by ten (10) (.05 * 10 = 5.0) for a police vehicle accident rate score of five (5.0) in the 73rd police precinct. The police vehicle accident rate of five (5.0) was then added

to the VCR (27.63) and calls for service rate (5.96) for a Policing Assignment Exposure Rate (PAER) for police officers working in the 73rd police precinct (5.0 + 27.63 + 5.96 = 38.59) was approximately thirty-nine (38.59), the highest PAER of the NYPD's seventy-six patrol precincts.

By contrast, the patrol precinct that ranked the lowest (with a PAER score of 6.99) in terms of decreased exposure was the 123rd police precinct in the New York City borough of Staten Island. The average amount of reported robberies from 1985 through 1990 in the 123rd police precinct was twenty-eight (27.5). During that time period, the 123rd police precinct was staffed with an average of one hundred forty nine (149) police officers. This calculates into a mean robbery rate per uniformed police officer during that time period of just over ten (.18) robberies per uniformed police officer per year. The average amount of reported burglaries per year from 1985 through 1990 was two hundred ninety five (295). This calculates into a mean burglary rate per uniformed police officer in the 123rd police precinct during that time period of approximately two (1.98) burglaries per uniformed police officer per year. The average amount of reported felonious assaults from 1985 through 1990 was seventy-seven (76.5). This calculates into a mean felonious assault rate per uniformed police officer assigned to the 123rd police precinct during that time period of approximately one half (.51) felonious assault. The average amount of reported rapes from 1985 through 1990 was sixty (60). This calculates into a mean rape rate of approximately point zero four rapes (.04) per uniformed police officer assigned to the 123rd police precinct. The average amount of murders from 1985 through 1990 was five (5). This calculates into a mean murder rate per uniformed police officer assigned to

the 123rd police precinct during that time period of point zero two three (.023). The VCR of a police officer working in the 123rd police precinct would be calculated as follows:

Policing Assignment Exposure Rate (PAER) Violent Crime Rate (VCR) Sub Totals for 123rd Police Precinct										
Police Precinct	**Robbery Rate**	**+**	**Burglary Rate**	**+**	**Felonious Assault Rate**	**+**	**Rape Rate**	**+**	**Murder Rate (Multiplied by 10)**	**=**	**Violent Crime Rate Sub Total**
123rd	**.18**	**+**	**1.98**	**+**	**.51**	**+**	**.04**	**+**	**.23**	**=**	**2.94**

The Violent Crime Rate (VCR) sub total of two point ninety-four (2.94) was then added to the rate of calls for service per uniformed police officer assigned to the 123rd precinct per year in 1995 and 1996. A police officer assigned to the 123rd police precinct averaged a total of approximately two hundred seventy-three (277.52) calls for service in 1995 and 1996, or an annual rate of one hundred thirty-eight (138.26) calls for service per year. The two (2) year total of two hundred seventy-eight (277.52) was divided by one hundred (277.5/100) for a "calls for service rate" of two point seventy-seven (2.77). These two (2) sub totals, the VCR (2.94) and the calls for service rate (2.77) were then added to the police vehicle accident rate of the geographic patrol area (Patrol Borough Staten Island) of the 123rd police precinct. The police vehicle accident rate in Patrol Borough Staten Island was approximately two (1.9) police vehicle accidents per one hundred (100) police officers assigned Patrol Borough Staten Island. This rate was then divided by the number of police officers assigned to the 123rd precinct (1.9/149=.0128). This number was then multiplied by ten (10) (.013 * 10 = 1.28) for a police vehicle accident rate score of just over one (1.28) in the 123rd police precinct. The police vehicle

accident rate (1.28) was then added to the VCR (2.94) and calls for service rate (2.77) for a Policing Assignment Exposure Rate (PAER) for police officers working in the 123rd police precinct (1.28 + 2.94 + 2.77 = 6.98) was approximately seven, (6.98), the lowest PAER of the NYPD's seventy-six patrol precincts.

Policing Assignment Exposure Rate (PAER)
Violent Crime Rate (VCR) Sub Totals for the Two (2) highest and Two (2) lowest scoring police precincts

Police Precinct	Robbery Rate	+	Burglary Rate	+	Felonious Assault Rate	+	Rape Rate	+	Murder Rate (Multiplied by 10)	=	Violent Crime Rate Sub Total
73rd	10.17	+	6.21	+	7.56	+	.73	+	2.95	=	27.63
79th	5.55	+	6.35	+	4.81	+	.40	+	2.5	=	21.61
22nd (Central Park)	1.57	+	.18	+	.34	+	.22	+	.60	=	2.91
123rd	.18	+	1.98	+	.51	+	.04	+	.23	=	2.94

The Policing Assignment Exposure Rate (PAER) for each patrol precinct and other specialized and administrative NYPD units was then scaled as follows:

- **Over Two (2) standard deviations from the mean = Exposure Rate of 4.5.**
- **Between One (1) and Two (2) Standard Deviations from the mean = Exposure Rate of 4.0.**
- **Between 25.3 and the mean of 20.7 = Exposure Rate of 3.**
- **Below one (1) standard deviation from the mean = Exposure Rate of 1.**
- **Below two (2) standard deviations from the mean = Exposure Rate of .5.**

The patrol precincts and other specialized units were then categorized based upon

central tendency. The police precincts with a PAER (over two (2) standard deviations from the mean (20.7 + (4.6 * 2) = 29.9)) greater than twenty-nine point nine (29.9) were given the highest scores, four point five (4.5). The police precincts with a PAER score less than two (2) standard deviations from the mean (20.7 – (4.6 * 2) = 11.5) were given the lowest scores, one-half (.5). Specialized units were categorized depending on their operational strategic policing mission. For example, narcotics units that specialize in "buy and bust" operations (a policing tactic that requires an undercover police officer or detective to pose as an illegal seller or buyer of narcotics or other controlled substance to surreptitiously purchase or sell illegal substances with the purpose of arresting a narcotics dealer, usually outside, but these deals often occur inside residences) and plain-clothed street crime or anti crime police officers that specialize in apprehending violent felons, particularly those felons possessing illegal firearms were given the highest possible exposure rate (4.5) while police officers working in administrative commands that have no inherent job-related physical dangers received the lowest possible score of .25. The other patrol precincts and units were scaled based upon the exposure to danger and possible injury.

The PAER and Arrest Activity Rate Score Exposure and Activity Score also accounted for the individual police officers' arrest activity, irrespective of their assignment in the NYPD. Police officers with increased arrest activity, particularly arrest activity involving felonies and felons, increase their likelihood of injury in the line of duty. This variable attempted to capture a previously elusive measure when conducting research in policing and law enforcement, measuring initiative and motivation of individual police and law enforcement officers, irrespective of their work assignments.

Although adding this control variable is not a panacea, this is an excellent mechanism when controlling for police officers who are proactive versus those that just handle tasks assigned to them and those police officers that attempt to avoid any tasks assigned to them. This variable enhances the overall validity of the findings. Controlling for this variable is especially critical considering the variation in arrest activity of the Study Group. The mean number of arrests was one hundred sixty-one (161); however, there is substantial variance in the distribution of the Study Group's arrest activity. The median number of arrests is sixty-four (64), and the standard deviation is one hundred fifty (150), meaning that almost the entire Study Groups' arrest activity ranged from zero (0) arrests to six hundred eleven (611). This type of dispersion necessitates accounting for each individual police officer's arrest activity and directly account for individual arrest activity in the PAER and Arrest Activity rate score as opposed to grouping techniques based upon central tendency used in the PAER scores.

Police officers hired in the three (3) Police Academy classes of 1985 could have worked a maximum potential of five thousand four hundred fifty-seven (5,457) days through December 31, 1999 if they entered the Police Academy in January of 1985, a maximum of five thousand three hundred seventy-two (5,372) days through December 31, 1999 if they entered the Police Academy in April of 1985 and five thousand two hundred eighty-two (5,282) days through December 31, 1999 if the entered the Police Academy in July of 1985.

Policing Assignment Exposure Rate (PAER)
Police Precinct/Unit Assignment Rankings

POLICE PRECINCT/UNIT	Policing Assignment Exposure Rate (PAER)	POLICE PRECINCT/UNIT	Policing Assignment Exposure Rate (PAER)
Street Crime Unit	4.5	106th	2.0
Narcotics Unit Undercover	4.5	68th	2.0
73rd	4.5	115th	2.0
79th	4.5	9th	2.0
83rd	4.0	103rd	2.0
70th	4.0	90th	2.0
77th	4.0	26th	2.0
66th	4.0	60th	2.0
14th (Midtown South)	4.0	102nd	2.0
71st	4.0	30th	2.0
Narcotics Unit Detective	4.0	7th	2.0
Patrol Borough Task Forces	3.5	41st	2.0
49th	3.0	76th	2.0
67th	3.0	10th	2.0
48th	3.0	6th	2.0
46th	3.0	110th	2.0
75th	3.0	78th	2.0
19th	3.0	94th	2.0
61st	3.0	23rd	2.0
52nd	3.0	105th	2.0
47th	3.0	50th	2.0
34th	3.0	111th	2.0
13th	3.0	112th	2.0
104th	3.0	28th	2.0
62nd	3.0	84th	2.0
88th	3.0	17th	2.0
20th	3.0	120th	2.0
109th	3.0	1st	2.0
108th	3.0	25th	2.0
81st	3.0	69th	2.0
40th	3.0	Homeless Outreach	2.0
44th	3.0	Traffic Control Division	2.0
32nd	3.0	101st	1.0
24th	3.0	45th	1.0
113th	3.0	122nd	1.0
43rd	3.0	100th	1.0
107th	3.0	5th	1.0
114th	3.0	63rd	1.0
42nd	3.0	Detective Units	1.0
72nd	3.0	22nd (Central Park)	.5
Narcotics Unit Supervisor	3.0	123rd	.5
18th (Midtown North)	2.0	Administrative Units	.25

The amount of days worked each individual member of the Study Group was extracted from the specific computer mainframe database as was their assignment histories. Each patrol precinct or other assignment or unit in the NYPD was given an exposure score as discussed above. The amount of days in a specific assignment was calculated based upon the number of days worked in a specific assignment. The total number of days each police officer worked was then added and totaled. For example, Police Officer A who entered the Police Academy in April of 1985 and was assigned the entire Study Period (5,282) days in a patrol precinct with a PAER of 3.5 would have a raw score (5,282 * 3.5 = 18,487) of eighteen thousand four hundred eight-seven (18,487). Although this represents a rare occurrence considering the rates of attrition and transience from the Study Group, (about 34% of the entire Study Group were no longer working for the NYPD by December 31, 2000 and thirty-six (36%) of the Study Group was promoted at least once, ensuring a change of assignment; and between seven percent (7%) and ten percent (10%) of the Active Cohort was transferred to a new police precinct, unit, or assignment each year), that would amount to the raw score.

This raw score number (18,487) was then divided by one hundred (100) and then added to the arrest activity (number of arrests throughout policing career) score of each individual police officer in the Study Group. Felony arrests were weighted an additional twenty percent (20%) based on the premise that Felony criminal suspects are generally more violent, conceal illegal and dangerous weapons, and more likely to flee a police officer's apprehension effort; thereby exposing the police officers to a greater degree of injury as opposed to a Misdemeanor criminal suspect. The above police officer with a PAER of eighteen thousand four hundred eighty-seven (18,487) who effected one

hundred (100) felony arrests and fifty-five (55) misdemeanor arrests would have a raw PAER and Arrest Activity Rate score of three hundred sixty (360). Police Office B who had a raw PAER score of twenty thousand one hundred twenty (20,120), effected seventeen (17) Felony arrests and fifteen (15) Misdemeanor arrests had a PAER and Arrest Activity Rate score of two hundred thirty-six point four (236.4). Police Office C, however, who had only a PAER raw score of ten thousand two hundred thirty-five (10,235) and effected only two (2) Felony arrests and five (5) Misdemeanor arrests would have a PAER and Arrest Activity Rate score of one hundred nine (109).

The PAER and Arrest Activity rate was then divided into ten (10) evenly divided percentiles based on central tendency. Those police officers in the Study Group who scored between the 40th and 60th percentiles received a PAER and Arrest Activity Rate "weighted average" score of 1.0, meaning that those police officers (20% of the Study Group) were the "base rate" of a probability of a line of duty injure based upon daily exposure to danger because of their policing assignments and individual policing activity.

Police officers with an increased probability of suffering a line of duty injury received a decreased PAER and Arrest Activity Rate score weighted average scores. For example, a police officer with a high PAER and Arrest Activity Rate score in the 90th Percentile (the top ten percent (10%) of police officers in terms of increased exposure and arrest activity) of the Study Group received a PAER and Arrest Activity Rate score Weighted Average of .6. The bottom ten percent (10%) received a PAER and Arrest Activity Rate score Weighted Average of 1.4. It should be noted that the PAER and Arrest Activity Rates also controlled for promotions of members of the Study Group.

Generally, Detectives and patrol supervisors (such as Sergeants and Lieutenants) have a decreased likelihood of suffering a line of duty injury because Detectives are generally

SAMPLE POLICING ASSIGNMENT EXPOSURE RATE AND ARREST ACTIVITY SCORES

COLUMN	A	B	C	D	E	F	G
	DAYS WORKED MULTIPLIED BY PRECINCT UNIT PAER	PAER SCORE (COLUMN A DIVIDED BY 100)	FELONY ARRESTS	FELONY ARRESTS MULTIPLIED BY 20% (COLUMN C MULTIPLIED BY 20%)	MISDEMEANOR ARRESTS	ARREST ACTIVITY (COLUMN D ADDED TO COLUMN E)	PAER PLUS ARREST ACTIVITY EQUALS PAER AND ARREST ACTIVITY RATE (COLUMN F ADDED TO COLUMN B)
POLICE OFFICER A	18.487	185	100	120	55	175	**360**
POLICE OFFICER B	20.120	201	17	20.4	15	35.4	**236.4**
POLICE OFFICER C	10.235	102	2	2.4	5	7	**109**

assigned to administrative tasks and patrol supervisors usually do not spend much time on patrol apprehending criminal suspects and answering calls for service, for they are usually burdened with administrative tasks, spend considerable amount of time supervising personnel and usually respond to incidents after the danger element (i.e. violent criminal, emotionally disturbed person) has been tempered or completely removed, thereby lessening the supervisor's exposure to injury. Therefore, members of the Study Group who were promoted to Detective or Sergeant had their PAER scores halved (commencing with their promotion) and reduced to one-third if they were promoted to Lieutenant. They did not receive PAER points if they were promoted to

Captain and Detectives retained all points if they remained in narcotics or street crime units.

PAER AND ARREST ACTIVITY RATE SCORES OF STUDY GROUP		
PAER AND ARREST ACTIVITY RATE SCORE	**PERCENTILE**	**PAER AND ARREST ACTIVITY RATE SCORE WEIGHTED AVERAGE**
460.1	90^{TH}	.6
321.5	80^{TH}	.7
228	70^{TH}	.8
167.2	60^{TH}	.9
129.1	50^{TH}	1.0
94.2	40^{TH}	1.1
65.2	30^{TH}	1.2
39.7	20^{TH}	1.3
15.8	10^{TH}	1.4

The PAER and Arrest Activity Rate score weighted averages were then used when calculating days lost per line of duty injury for each member of the Study Group. For example, a member of the Study Group who lost ten (10) days and had a PAER and Arrest Activity Rate score weighted average of .8 (an increased exposure to a line of duty injury based upon policing assignment and arrest activity) would be recalculated to a loss of eight (8) days based upon the PAER Arrest Activity Rate weighted average multiplied by the actual days lost (.8 multiplied by 10 equals 8). Using another example, a member of the Study Group who lost ten (10) days and had a PAER and Arrest Activity Rate weighted average of 1.4 (a decreased exposure to a line of duty injury based upon policing assignment and arrest activity) who sustained a line of duty injury and lost ten (10) days would be recalculated to loss of actually fourteen days (14) based upon the

PAER Arrest Activity Rate score weighted average multiplied by the actual days lost (1.4 multiplied by 10 equals 14).

The PAER and Arrest Activity Rate score weighted averages were used in Model One (1), the "Physical Performance Trend Analysis." Model One (1) consisted of calculating the mean days lost per overall line of duty injuries for each member of the Study Group. Model One (1) then also further analyzed line of duty injuries by categorizing them into seven (7) additional variables related to line of duty injuries; the mean number of days lost from injuries sustained while in training in the police academy, the mean number of days lost per line of duty while engaged in a physical encounter, the mean number of days lost per line of duty injury as the result of a police vehicle accident, the mean number of days lost during to an extraordinary exposure, the mean number of days lost per line of duty injury from trauma as the result of a use of firearms, the mean number of days lost from cardiovascular line of duty injuries, and the mean number of days lost per line of duty injury from a cardiovascular injury while engaged in a physical confrontation. The mean number of days lost from each line of duty injury from each member of the Study Group over the fifteen (15) year period was calculated and placed in the appropriate Time Period (for example, all line of duty injuries and subsequent days lost occurring in 1987 were placed in "Time 2") and the mean number of days lost of each sub cohort for every Time Period in the Study Period was calculated. The means from each Time Period were then placed in a separate dataset to construct a statistical model that would most appropriately analyze the type of data and period studied with the greatest possible degree of efficacy.

Model Two (2), the "Physical Performance and Major Health Event Probability Analysis" model consisted of a logistic regression model equation using ten (10) physical performance and major health event variables. Model Two (2) was designed to determine if there were any statistically and significant differences between the sub cohorts when measuring major health event variables such as a cardiac injury, extended sick leave incidences, disability pension applications and awards. A logistical regression model was constructed to determine whether age (an independent variable) could predict a major health event occurrence (dependent variable) during successive Time Periods during the Study Period. The logistic regression model was constructed specifically for Model Two (2) considering the type of variables used and the coding scheme. The Physical Performance Major Health Event Probability Analysis model variable scheme was coded using binary ("0" = no major event occurring in Time Period or "1" = a major health event occurring in Time Period for each member of Study Group), categorical measure as opposed to the continuous variables used in Model One (1) and Model (2). The categorical measures ("0" or "1") are based upon a Maximum Likelihood Estimation (MLE). The logistic regression coefficients, when using a dichotomous, binary dependent variable, can then be transformed into a "log odds ratio", that can indicate how much of the log of the dependent variable odds change (in terms of percentage increase or decrease) when the independent variable changes by one (1) unit (Bohrnstedt & Knoke, 1994). For example, will a one (1) unit increase from the Younger Aged Cohort to the Middle Aged Cohort increase the percentage probability that a Study Group member will suffer a cardiac event or apply for a disability pension? Model Two (2) was designed to detect, in terms of percentage increase or decrease, the variation in

probability of a major health event occurring to members in a specific sub cohort during a specific successive "time interval." Given the rare occurrence of these events and the size of the Study Group, these variables were tested over three (3) Time Intervals as opposed to the fifteen (15) Time Periods used in Model One (1) and Model Three (3).

The ten (10) variables tested in the logistic regression analysis in Model Two (2) was the log-likelihood of getting injured while in training at the Police Academy, log-likelihood of chronic sick designation in a specific Time Interval, log-likelihood of a cardiac injury (on or off duty) in a specific Time Interval, log-likelihood of heart disability application in a specific Time Interval, log-likelihood of an accident disability application in a specific Time Interval, log-likelihood of an ordinary disability application in a specific Time Interval, three (3) or more line of duty injuries during physical encounters for the Study Group members scoring in the top 20th Percentile of PAER and Arrest Activity scores in a specific Time Interval, the log-likelihood of a heart or accident disability application in any of the three (3) Time Intervals, and the log-likelihood of a cardiac injury in any of the three (3) Time Intervals.

Model Three (3), the "Policing Performance Trend Analysis" was similar to Model One (1) in that a moving average linear model was constructed to determine the fluctuation of trends in the data. However, Model Three (3) utilized positive and negative policing performance variables and a specific scale, the "Policing Performance Scale (PPS)" was constructed to standardized and proportionately measure the overall policing performance of the Study Group. The PPS was designed to comprehensively capture the career policing performance of each individual member of the Study Group

and determine if there is any variation between the sub cohorts in terms of policing career performance over the course of the entire Study Period. The PPS consists of four (4)

MODEL TWO (2) PHYSICAL PERFORMANCE MAJOR HEALTH EVENT PROBABILITY ANALYSIS CORRESPONDING TIME INTERVALS AND TIME PERIODS	
INTERVAL 1	TIME PERIOD 1 THROUGH TIME PERIOD 5 1985 THROUGH 1990
INTERVAL 2	TIME PERIOD 6 THROUGH TIME PERIOD 10 1991 THROUGH 1995
INTERVAL 3	TIME PERIOD 11 THROUGH TIME PERIOD 15 1996 THROUGH 2000

positive policing performance and eleven (11) negative policing performance measures. The four (4) positive policing performance variables consisted of arrest activity, education attainment through 1994, personnel evaluation ratings, and promotional attainment. The policing performance measures and PPS were scaled based upon a point system and a rate was calculated for each policing performance variable to adequately reflect the variables' degree of proportionate importance in the PPS. For each example, a positive policing performance variable, "Promotion Points", was scaled in the PPS based upon a point system for each promotion of the Study Group. Police officers in the NYPD can attain an initial, front-line supervisory promotion (to the rank of Sergeant) in the NYPD by competing in a standard written examination administered by New York City's

personnel agency, the Department of Citywide Administrative Services (DCAS), passing the examination and then obtaining a position on a list of eligible candidates (based upon test scores, in descending order based upon highest passers first). All uniformed members in the rank of Police Officer (provided they have at least three (3) years' experience) may compete for this exam. For example, a promotion to Sergeant was a positive policing performance and awarded two (2) points per occurrence. The next supervisory promotion, promotion to the rank of Lieutenant, is attained virtually the same way. All eligible Sergeants may compete for the promotion by passing a written examination. A promotion to Lieutenant was also awarded two (2) points per occurrence. The next supervisory promotion after Lieutenant is Captain. Once again, attainment of this position for eligible Lieutenants is gained by successfully passing a written examination administered in a similar manner by DCAS. Promotion to Captain was worth three (3) points per occurrence. Promotions to Sergeant, Lieutenant, Captain are considered "Civil Service" promotions in that they are administered in accordance with New York City and New York State Civil Service laws and the employees obtaining those positions are afforded all applicable protections.

Police officers in the NYPD may also be granted "Discretionary Promotions" under the direct authority of the Police Commissioner. Discretionary promotions are granted as the result of exemplary performance and afford the Police Commissioner power to reward employees outside the rigid structure of Civil Service. Police officers may be designated as "Special Assignment", a discretionary promotional title and an increase in salary. Police officers also may attain a promotion to "Detective Specialist" or "Detective Investigator" for outstanding performance as a police officer over an

extended period of time or a set period of time in a dangerous assignment such as undercover narcotics units. There are three (3) grades of Detective promotions, third grade, second grade, and first grade. Promotion to "Police Officer, Special Assignment", "Detective Third Grade" (Specialist or Investigator), and "Detective Second Grade" were awarded one and one-half (1.5) points. Promotion "Detective First Grade" (a rare and prestigious discretionary promotion) was awarded two (2) points. Sergeants and Lieutenants, in addition to their civil service promotions, may also attain discretionary promotions. Sergeants or Lieutenants that are designated as "Commanding Officers" of their respective assignments or units or work in a unit or assignment requiring a unique expertise or qualification may be promoted to either "Sergeant-Special Assignment", "Sergeant-Supervisor Detective Squad", "Lieutenant-Special Assignment", or "Lieutenant-Commander Detective Squad." These promotions were awarded one and one-half points. Promotion into the executive ranks above the rank of Captain are also discretionary. All promotions above the rank of Captain were awarded three and one-half points (3.5). Education attainment as of 1994 was also considered a positive policing measure and up to four (4) points were awarded for education attainment up to a Master's Degree or Juris Doctor Degree. Arrest activity was also calculated as a positive policing performance measure.

The eleven (11) negative policing performance variables consisted of mean number of total sick days lost, mean number of total sick occasions, mean number of regular sick days, mean number of days not available for full enforcement duty, major disciplinary incidences such as terminations, suspensions and modification of assignment, rate of central personnel index (CPI) allegations, rate of total sum of CPI

entry points, civilian complaint review board (CCRB) rates of allegations of complaints involving excessive use of force, rate of CCRB complaint allegations that were substantiated and rate of CCRB complaint allegations involving use of excessive force that were substantiated, and rates of variation of resisting arrest charges. Sick days are an excellent measure of policing performance over the course of the Study Period because the length of the Study Period will capture both abuse of sick leave (malingering, a negative policing performance) and comparison of sick rates allows for a physical policing performance measure. Major discipline incidences such as suspensions are obvious negative policing performance measures as are entries into police officers' central personnel index records and record of civilian complaints. Also counted as a negative policing performance measure was the variance of resisting arrest charges. A criminal suspect is charged with Resisting Arrest when the police officer or police officers involved in the arrest need to use force to bring the criminal suspect into custody. Although charging a criminal suspect with Resisting Arrest is not an unusual occurrence (about six percent (6%) of all arrests), high rates of individual police officers charging criminal defendants with Resisting Arrest is *possibly* indicative that the police officer is using excessive force when apprehending criminal suspects. Therefore, resisting arrest charges (RACS) were considered a negative policing performance measure when the number exceeded the NYPD average of charging Resisting Arrest.

The total negative policing performance measures were added and a subtotaled negative policing performance measure score was tallied for each relevant Time Period. The total positive policing performance measures rates were calculated and then added to the negative police performance measures for each Time Period and the sum was deemed

the "Police Performance Scale." The scores for each sub cohorts' Police Performance Scale were then placed in a moving linear average model used in Model One (1). Each score for the sub cohorts was placed in each corresponding Time Period to detect trends in policing performance over the course of the Study Period.

The data extraction, calculation and reformatting into the variable coding schemes for the three (3) models were designed to comprehensively measure policing performance and the PAER and PPS was constructed to control for unique nuances in policing and policing personalities. The variables coding schemes and models were also coded to adequately detect both long term trends and significant one-time events in the careers of the Study Group. Given the amount of data collected and analyzed and number of variables tested, the variable coding scheme and statistical models will effectively test the central hypotheses and determine the effect of aging and policing performance.

MODEL THREE (3) POLICING PERFORMANCE SCALE (PPS) VARIABLES VARIABLE CODING SCHEME

POSITIVE POLICE PERFORMANCE MEASURES	NEGATIVE POLICE PERFORMACE MEASURES
PROMOTION POINTS	**CENTRAL PERSONNEL INDEX (CPI) ALLEGATION AND ENTRY POINTS**
Promotion to POLICE OFFICER "Special Assignment" = 1.5 Points.	**ALLEGATION POINTS**
Promotion to DETECTIVE 3RD GRADE (Discretionary) = 1.5 Points.	Criminal Allegations = 1 Point.
Promotion to DETECTIVE 2ND GRADE (Discretionary) = 1.5 Points	Allegations of Police Misconduct = .5 Point
Promotion to DETECTIVE 1ST GRADE (Discretionary) = 2 Points.	**ENTRY POINTS**
Promotion to SERGEANT (Civil Service) = 2 Points.	ADJUDICATION OF ALLEGATIONS
Promotion to "SERGEANT SPECIAL ASSIGNMENT" (Discretionary) = 1.5 Points.	Exonerated, unfounded, or unsubstantiated = 0 Points
Promotion to "SERGEANT DETECTIVE SQUAD" (Discretionary) = 1.5 Points.	Substantiated = 2 Points
Promotion to LIEUTENANT (Civil Service) = 2 Points	Partially Substantiated = 1 Point
Promotion to "LIEUTENANT SPECIAL ASSIGNMENT" (Discretionary) = 1.5 Points	Other Misconduct Discovered = .5 Point
Promotion to "LIEUTENANT DETECTIVE SQUAD" (Discretionary) = 1.5 Points	PENALTIES AFTER DEPARTMENT DISCIPLINARY ADMINISTRATIVE HEARING
Promotion to CAPTAIN (Civil Service) = 3 Points.	Each day lost = 1 Point
Promotions Above the rank of CAPTAIN = 3.5 Points	Modification of Assignment = 1 Point.
	Suspensions = 1 Point in Time Period of occurrence
	OTHER ENTRIES
	Department Police Vehicle Accidents = .5 Per occurrence 1 Point after third Police Vehicle Accident.
	Chronic Sick Designation "A" = 1 Point in Time Period of designation
	Chronic Sick Designation "B" = .5 Point in Time Period of designation.
	Unjustifiable use of firearm = 2 Points.
	Accidental discharge of firearm = 1 Point.
	Use of firearm requiring tactics review = .5 Point
	Justifiable use of firearm = 0 Points
	Negative Performance Evaluation = .5 Point.
	Involuntary Transfer = 1 Point.
	Fail to safeguard and secure an NYPD prisoner = 1 Point
	LOST DEPARTMENT PROPERTY
	Loss of NYPD Identification Shield or Identification Card = .75 Point.
	Loss of firearm = 1 Point.
	Loss of other NYPD issued property = .5 Point.

MODEL THREE (3) POLICING PERFORMANCE SCALE (PPS) VARIABLES VARIABLE CODING SCHEME (CONTINUED)

EDUCATION ATTAINMENT AS OF 1994

High School Diploma or Equivalent = 1 Point

Associate's Degree (AA) = 2 Points

Baccalaureate's Degree (BA) = 3 Points

Master's Degree (MA) or Juris Doctor (JD) = 4 Points

SERIOUS DISCIPLINARY INCIDENCES

Modification of Assignment = 1 Point

Suspensions = 1 Point in Time Period of occurrence

Terminations = 1 Point in Time Period of occurrence

PERFORMANCE EVALUATION RATINGS IN 1994

Final Performance Evaluation Score - Scores Ranged from 1 to 5 in .5 intervals. Generally, the point awards correspond to ratings as follows

Extremely Competent = 4.5 and above

Highly Competent = 4.0 through 4.5

Competent = 3.0 through 4.0

Low = Below 3.0

CIVILIAN COMPLAINT REVIEW BOARD (CCRB) ALLEGATIONS AND COMPLAINT ADJUDICATION

ALLEGATIONS

CCRB Force Allegations - Number of CCRB Allegations involving excessive use of force in Time Period = 1 Point per allegations

ADJUDICATION

CCRB Allegations Substantiated - Number of CCRB Allegations Substantiated in Time Period = 1 Point per allegation substantiated.

CCRB Force Allegations - Number of Force Allegations Substantiated in Time Period = 1 Point per allegation substantiated.

Other Misconduct discovered by investigations = .5 Point

CCRB allegation mediated with NYPD employee = .25 Point.

ARREST ACTIVITY

Mean number of arrests per sub cohort member

SICK DAYS LOST AND DAYS LESS THAN FULL DUTY

Mean number of sick days lost per member in sub cohort.

Mean number of sick occasions per member in sub cohort

Mean number of regular sick days per member in sub cohort.

Mean number of days not on "Full Duty" status and available for enforcement duties per member in sub cohort

RESISTING ARREST CHARGES (RACS) VARIANCE.

Percentage of members of sub cohort that are above the Study Group median of .067 (about seven percent (7%)) charging criminal suspects with Resisting Arrest.

MODEL THREE (3) POLICING PERFORMANCE SCALE (PPS)
PERFORMANCE VARIABLE RECODED WEIGHTED MEASURES

POSITIVE POLICE PERFORMANCE MEASURES	NEGATIVE POLICE PERFORMACE MEASURES
PROMOTION POINTS Sum of Total Points during each Time Period Divided by Number in Active Cohort at relevant Time Period multiplied by one thousand (1000).	**CENTRAL PERSONNEL INDEX (CPI) ALLEGATION AND ENTRY POINTS** **CPI ALLEGATIONS** – Total sum of points divided by number in sub cohort in relevant Time Period multiplied by one hundred (100). **CPI ENTRY POINTS** – Total sum of points divided by number in sub cohort in relevant Time Period multiplied by one hundred (100).
EDUCATION ATTAINMENT Mean score per member of each sub cohort of Educational Attainment of Active Cohort by 1994.	**SERIOUS DISCIPLINARY INCIDENCES** Modification of Assignment = 1 Point Suspensions = 1 Point in Time Period of occurrence Terminations = 1 Point in Time Period of occurrence
PERFORMANCE EVALUATIONS Mean Final Performance Evaluation Score of each sub cohort on Performance Evaluation in 1994.	**SICK DAYS LOST AND DAYS LESS THAN FULL DUTY** Mean number of sick days lost per member in sub cohort per Time Period. Mean number of sick occasions per member in sub cohort per Time Period. Mean number of regular sick days per member in sub cohort per Time Period. Mean number of days not on "Full Duty" status and available for enforcement duties per member in sub cohort per Time Period.
ARREST ACTIVITY Mean number of arrests per sub cohort member. Mean number is used in all Time Periods.	**RATE OF RESISTING ARREST CHARGES (RACS)** Percentage of sub cohort (up to one (1) point per Time Period) above the median of entire Study Group charging defendants with Resisting Arrest per arrest.
[redacted]	**CIVILIAN COMPLAINT REVIEW BOARD (CCRB) ALLEGATIONS AND COMPLAINT ADJUDICATION** **CCRB Force Allegations** - Sum of all allegations divided by number in cohort multiplied by ten (10). **CCRB Complaints Substantiated** – Sum of all allegations substantiated divided by number in sub cohort multiplied by one hundred (100). **CCRB Force Allegations Substantiated** – Sum of all allegations divided by number in cohort multiplied by one hundred (100).

MODEL THREE (3) SAMPLE POLICING PERFORMANCE SCALE (PPS) TIME 8 (1993)				
	YOUNGER AGED SUB COHORT	**MIDDLE AGED SUB COHORT**	**OLDER AGED SUB COHORT**	**SUPERIOR FITNESS SUB COHORT**
POSITIVE POLICING PERFORMANCE MEASURES				
PROMOTION POINTS	53.95	44.83	31.04	105.55
EDUCATION ATTAINMENT	1.41	1.51	1.47	1.67
PERFORMANCE EVALUAITON RATING	3.57	3.58	3.61	3.71
ARREST ACTIVITY	7.5	8.7	8.1	8.7
POSITIVE POLICING PERFORMANCE MEASURES SUB TOTALS	**66.43**	**58.63**	**44.22**	**119.64**
NEGATIVE POLICING PERFORMANCE MEASURES				
CPI ALLEGATIONS	.076	.523	.21656	0
CPI ENTRY POINTS	.418	1.382	.5053	.5555
SERIOUS DISCIPLINE INCIDENCES	.640	.534	.378	.112
CCRB FORCE ALLEGATIONS	.501	.478	.361	.333
CCRB SUBSTANTIATED CASES	.7598	.747	.4331	0

CCRB FORCE CASES SUBSTANTIATED	.4559	.4483	.14443	0
MEAN NUMBER OF TOTAL SICK DAYS LOST	11.54	13.19	10.89	3.02
MEAN NUMBER OF TOTAL SICK OCCASIONS	1.69	1.57	1.43	1.41
MEAN NUMBER OF REGULAR SICK DAYS LOST	9.03	10.98	8.78	1.84
MEAN NUMBER OF DAYS ON "LESS THAN FULL DUTY STATUS"	27.10	27.16	26.37	11.5
PERCENTAGE OF SUB COHORT ABOVE STUDY GROUP MEDIAN OF RACS	.58	.60	.61	.35
NEGATIVE POLICING PERFORMANCE MEASURES SUB TOTALS	**(-52.80)**	**(-57.61)**	**(-50.11)**	**(-19.12)**
	ADDED TO THE:			
POSITIVE POLICING PERFORMANCE MEASURES SUB TOTALS	**66.43**	**58.63**	**44.22**	**119.64**
	EQUALS (=)			
POLICING PERFORMANCE SCALE (PPS) **FOR TIME 8**	**13.63**	**1.01**	**-5.89**	**100.51**

Chapter Eight

Research Design and Methodology III: Data Sets and Statistical Model Construction

Model Construction

Model One (1)

Physical Performance Trend Analysis

A linear moving average time series model was constructed to investigate any significant trends and (or) differences between the sub cohorts in Model One (1). The linear moving average is perhaps the best way to measure a trend over a significant period of time (Yaffee & McGee, 2000). Given the amount of subjects, data collected and analyzed, codification methods and reformatting of the variables and data, and length of Study Period; a linear moving average time series model was constructed specifically for this analysis. This model is an unconditional model to measure change and the potential existence of significant and substantial variance between the sub cohorts in the Study Group over the course of the Study Period. Analyses of measures of change should by dynamic (over time) but measured in continuous time (yearly intervals) periods, therefore, a model should be constructed are the rate of change as a function of time (Plewis, 1985). The Study Group will be tested on fifteen (15) different occasions, (Time 1 through Time 15) throughout the Study Period, capturing the Study Group's performance upon entrance into the Police Academy until December 31, 2000.

The linear moving average time series model was constructed for this research endeavor based upon the basic theory of the simple average (the "mean") and the single moving average mathematical models and expanded on them to more accurately analyze

potential trends occurring in the Study Group over the course of the Study Period. There are several "moving average" statistical techniques that are generally used to smooth data and reduce the variance of the data from the mean. For example, if a sub cohort has a mean of ten (10) days per line of duty injury, but there is a substantial amount of variance (i.e., a standard deviation of more than five (5)), the mean is not a true measure of the particular sub cohort's physical performance. Also, substantial variance in the means from Time Period to Time Period will also undermine the validity of the findings. However, based upon the large number of subjects in this analysis, using analyses with the mean of the distribution is a valid measure. Additionally, a statistical model was designed explicitly for this measure to control for potential problems related to variance and the means. The simple average (mean) model is as follows:

SIMPLE AVERAGE (MEAN)

$$\textit{Simple Average} = \bar{y} = \bar{\Sigma} \frac{yt}{T}$$

The Simple Average equals the mean (average) of the sum of a specific data calculation at one (1) time period.

The simple averages of the data of the sub cohorts will be collected and simple averages will be calculated into simple averages (means). For example, the total days lost per line of duty injury (the sum of all days lost divided by total number of injuries) per police officer during "Time 1" in a specific sub cohort will be calculated. Model One (1) will compare the means of the three (3) Aged Cohorts, the Younger Aged Sub Cohort, the Middle Aged Sub Cohort, and the Older Aged Sub Cohort with a fourth sub cohort,

the Superior Fitness Sub Cohort (SFSC). The SFSC in Model One (1) will be further categorized based upon age according to age categories of the general Study Group. For example, the SFSC will contain a "Younger Aged Superior Fitness Sub Cohort" (aged twenty (20) to twenty-one and one-half (21.5)), a "Middle Aged Superior Fitness Sub Cohort" (aged twenty-one and one-half (21.5) to approximately age twenty-five (24.9)), and an "Older Aged Superior Fitness Sub Cohort (approximately twenty-five (24.9) to age thirty-seven (37). As noted in Chapter Six (6), the fourth sub-cohort, the "Superior Fitness Sub Cohort", consisted of ninety-one (91) police officers that exhibited superior physical fitness and had above average body fat proportion scores and maintained that level of physical fitness and body fat composition throughout their careers. As stated previously, the purpose of comparing a sub cohort in this manner is to determine if police officers that maintained superior physical fitness throughout the fifteen (15) year Study Period will suffer from any decline in physical abilities irrespective of their attainment of superior fitness. Essentially, will the aging process of police officers in the cohort effect everyone, regardless of levels of physical fitness?

Each of the three sub cohorts, the Younger Aged Sub Cohort, the Middle Aged Sub Cohort, the Older Aged Sub Cohort, will have separate means based upon the mean days lost per line of duty injury for each member in their specific sub cohort as will the Superior Fitness Sub Cohort (SFSC). That will be the mean days lost per line of duty during the specific time period. The first mean, consisting of the mean days lost per line of duty injury for each sub cohort during Time 1, will be added to the next time period, "Time 2", then divided by two (2). The next mean, calculated from the mean days lost per line of duty injury during "Time 3" will be added to the means of Time 1 and Time 2,

then divided by two (2). These calculations will be conducted through "Time 14." Ultimately, the means of the fourteen (14) Time Periods were added, then that sum was divided by fourteen (14) and a "Final Moving Average" of the amount of days lost per line of duty injury per officer in a specific sub cohort was obtained. That will be the moving average. This model is essentially the "classic" moving average design.

SINGLE MOVING AVERAGE MODEL

$$\textit{Single Moving Average} = MA\ (2) = \sum_{t=t1}^{t2} xt$$

The Single Moving Average (2nd Order) equals the mean (average) of the sum of a specific data calculation at two time periods divided by two (2).

However, given the enormity of the Study Group and length of the Study Period, a unique Running Moving Average Model (RMAM) was specifically designed and constructed for Model One (1) and Model Three (3) to protect (or smooth) against the "hash" or "residual" (sometimes referred to the "error term" in the classic linear regression model) effects that threaten any linear or time series model. The hash or residual effects are irregular fluctuations in the data that may undermine results (Yaffee & McGee, 2000). There are several statistical techniques used to exponentially smooth moving average data such as the centered moving average, the prior moving average, and the running median (Statistical Package for Service Solutions, 1997). The centered moving average utilizes the means of every two (2) time periods, the prior moving average uses the prior time period averages for the next time period measure and the running median is similar to the centered moving average, however the median (the 50th

percentile data point) is used instead of the average (mean). Exponential smoothing techniques, such as construction of the RMAM, also minimize "secular trends" that are fluctuations in the data during a short period of time during a long-term study (Sincich & Mendenhall, 1996). When analyzing trends, particularly long term trends, the objective is to minimize the residual effects and variance to strengthen the validity of the empirical findings.

MODEL ONE (1) RUNNING MOVING AVERAGE MODEL (RMAM)

$$RMA\ (tx) = \bar{y} = \sum \frac{y(tx) + (tx)}{2}$$

The Model One (1) Running Moving Average Model (RMAM) equals the mean of the sum of the present single average (y(tx)) plus the single average of the immediate preceding average divided by two (2).

The RMAM constructed for both Model One (1) and Model Three (3) was designed to reduce the hash or residual effects, minimize secular trends, and attempt to identify any evidence of decrement in the sub cohorts by capturing the level of physical decline (if any) during a specific time period in the Study Period. The RMAM was also designed to capture the physical performance of the Active Cohort at a single period of time in the Study Period. For example, the RMAM design will measure physical performance throughout the years of the Study Period; both overall performance and performance at specific years. This fluid, continuous design of the RMAM will also determine at what point or Time Period in the Study Period a physical performance of the Study Group begins to deteriorate, if at all.

The RMAM will calculate the means from Time 1, then add the means of Time 2 and then divide that sum by two (2) that will equal the RMA at Time 2. The RMAM at Time 2 ("Active RMAM") will then calculate the means from Time 3, then add the RMAM at Time 2 (the RMAM of Time 1 and Time 2) and then divide that sum by two (2) that will equal the RMAM at Time 3. This will be conducted at every successive time period during the Study Period with the specific intent to capture the performance of the sub cohorts at a specific period in time. Although the design of the Study Period, the length of the Time Period and the size of the Study Group alone may be adequate, the specialized RMAM will increase the research's internal validity and subsequent findings.

Model One (1) will also account for members leaving the cohort at a specific time. This is known as "panel attrition" (Menard, 1991). Panel attrition can potentially undermine any longitudinal cohort; however, panel attrition is a critical variable in this research. This analysis will utilize panel attrition as a valuable variable to determine how many members of a specific sub cohort are leaving and the reason they are leaving such as termination for disciplinary reasons and early retirement based upon a health condition such as cardiovascular disease or a physical disability as the result of a line of duty injury. Each successive time period will account for the members currently present in the cohort. For example, although three thousand twelve (3,012) police officers were hired in 1985, by the beginning of Time 2, (January 1, 1987), there were only two thousand seven hundred forty-five (2,745) members of the Study Group employed as police officers. Two hundred ninety-seven (297) police officers (or 10.24%) of the Study Group left the NYPD in fewer than two (2) years. Model One (1) will account for this panel attrition by only calculating the current members of the Study Group in the respective

time periods, or the Active Cohort. The Active Cohort will refer to the Study Group at a particular juncture in the Study Period, such as Time 1, Time 2 through Time 15.

Model Two (2)

Physical Performance Major Health Event Probability Analysis

Model Two (2) measured ten (10) physical performance major health event variables of the Younger Aged Sub Cohort, the Middle Aged Sub Cohort, and the Older Aged Sub Cohort in three (3) separate Time Intervals over the span of the Study Period. The Superior Fitness Sub Cohort (SFSC) was not used in Model Two (2) due to the dichotomous logistical regression design. Model Two (2) was designed to test if increasing age will increase the probability of a major health event. Therefore, the health event probability was the dependent variable coded as a "0" or "1" and the Aged Sub Cohorts were the independent variables. The Younger Aged Sub Cohort was an independent variable coded as a "1", or the "Base Rate", meaning that the natural log-transformations (logit) would equal the percentage increase or decrease of the probability (log-likelihood of two (2) probabilities occurring) of a major health event with advancing age, or the beginning with the Younger Aged Sub Cohort. The Middle Aged Sub Cohort was coded as "2", and the Older Aged Sub Cohort was coded as "3." Model Two's variable coding scheme was constructed and designed to determine if with increasing age, does the probability of a major health event increase?

The ten (10) dependent variables tested in Model Two (2) were whether or not a member of one of the sub cohorts experienced a major health event such as an injury while in training at the Police Academy, designated chronic sick in a specific Time Interval, suffered a cardiac incident either while working or off duty during a specific

MODLE TWO (2) VARIABLE CODING SCHEME	
DEPENDENT VARIABLES	
POLICE ACADEMY INJURY DURING TIME INTERVAL?	NO = 0 YES = 1
CHRONIC SICK DESIGNATION DURING TIME INTERVAL?	NO = 0 YES = 1
CARDIAC INJURY (On or Off Duty) DURING TIME INTERVAL?	NO = 0 YES = 1
HEART DISABILITY INJURY DURING TIME INTERVAL?	NO = 0 YES = 1
ORDINARY DISABILITY APPLICATION DURING TIME INTERVAL?	NO = 0 YES = 1
ACCIDENT DISABILITY APPLICATION DURING TIME INTERVAL?	NO = 0 YES = 1
LINE OF DUTY INJURY DURING A PHYSICAL ENCOUNTER, TOP 20TH PERCENTILE PAER SCORES OF COHORT DURING TIME INTERVAL?	NO = 0 YES = 1
ACCIDENT OR HEART DISABILITY APPLICATION DURING TIME PERIOD?	NO = 0 YES = 1
DISABILITY APPLICATION EVER?	NO = 0 YES = 1
ANY CARDIAC INCIDENT EVER?	NO = 0 YES = 1
INDEPENDENT VARIABLES	
YOUNGER AGED COHORT.	1
MIDDEL AGED COHORT	2
OLDER AGED COHORT	3

Time Interval, filed for a heart disability application during a specific Time Interval, filed for an accident disability application during a specific Time Interval, filed for an ordinary disability application during a specific Time Interval, whether the most active police officers in the sub cohorts suffered more than three (3) line of duty injuries while engaged in physical encounters during a specific Time Interval, whether or not a member of one of the sub cohorts filed for an accident or heart disability application during there career, an ordinary disability application during their career or suffered a cardiac injury or filed for a heart disability application during the entire Study Period.

The data was then re-coded into binary "dummy variables" as a "0" or "1" for each of the above variables. For example, if a police officer was designated as "chronic sick" during Time Interval 2 (1991 through 1995), the variable coding scheme would reflect a one (1). Those members of the Study Group who were not designated as "chronic sick" were coded as zero "0." The purpose of Model Two (2) and the variable coding scheme employed was to determine the probabilities of health events occurring to police officers during the Study Period and compare if there is an increase in probability based upon age.

The values were then computed into a non-linear regression, log-likelihood equation based upon the likelihood of two (2) probabilities occurring based upon predictor (independent) variables. In this model, the predictor variables are age category. The values were then computed into a log-likelihood ratio equation to determine the increase or decrease in percentage change on the dependent variable when the independent variable increased by one (1) unit, or increase in age as coded by age category. For example, will an increase in chronological Aged Sub Cohort from Younger

Aged Sub Cohort (coded as "1", the "Base Rate") to Middle Aged Sub Cohort (coded as "2) to Older Aged Sub Cohort (coded as "3") increase the probability of the occurrence of a significant health event?

MODEL TWO (2) LOGISTIC REGRESSION EQUATION

Prob(Y)=1

(Anoval)* (Anova2) * (Beta Coefficient Value of each independent variable) = (Log-likelihood Transformation (Log10)) =

PERCENTAGE INCREASE OR DECREASE IN PROBABILITY WITH EVERY ONE UNIT INCREASE OR DECREASE IN INDEPENDENT VARIABLE

(YOUNGER AGED SUB COHORT, MIDDLE AGED SUB COHORT, OLDER AGED SUB COHORT)

Model Three (3)

Policing Performance Trend Analysis

Model Three (3), the "Policing Performance Trend Analysis" consisted of thirteen (13) variables that were used to calculate the policing performance of each member of the Study Group based upon the Policing Performance Scale (PPS). Model Three (3) was an attempt to measure and analyze the overall policing performance of each member of the Study Group to compare if there were any significant differences in overall policing performance correlated with age using positive policing measures such as arrest activity and rate of promotions and negative policing measures such as rates of serious disciplinary incidences, Central Personnel Index (CPI) disciplinary records and Civilian Complaint Review Board (CCRB) complaint investigation records. The thirteen (13) measures of total policing performance of police officers in each of the sub cohorts as

measured by the Policing Performance Scale (PPS) as discussed in Chapter Seven (7) during each Time Period in the Study Period were placed in the same linear moving average Running Moving Average Model (RMAM) as used in Model One (1). However, Model Three (3) differed from Model One (1) significantly in the sub cohorts that were analyzed. Model Three (3) compared the Younger Aged Sub Cohort, the Middle Aged Sub Cohort, the Older Aged Sub Cohort *and the entire* Superior Fitness Sub Cohort (SFSC) for a total of four (4) comparison sub cohorts. The SFSC was not categorized by age, the entire ninety-one (91) members of the SFSC were compared and contrasted because most of the variables were policing performance variables. The SFSC was used in Model Three (3) on an exploratory basis to determine if there is any correlation with superior fitness and policing performance. Model One (1) used only physical performance variables and the SFSC as a control for superior physical fitness and the effect of age.

Three models, Model One (1), "the Physical Performance Trend Analysis", Model Two (2), the "Physical Performance Major Health Event Probability Analysis", and Model Three (3), the "Policing Performance Trend Analysis" were constructed and designed to most quantifiably measure and detect trends of the sub cohorts over the fifteen (15) year Study Period. The intent of the variable recoding schemes and statistical models' construction was to capture both empirically unquestioned health variables and some elusive concepts (and hard to quantify using social science techniques) in policing performance such as motivation and initiative and to measure those concepts over a long period of time with a large amount of subjects. The underlying theme of this research endeavor was to measure and determine if there are any significant differences in the

physical decline in police performance as predicted by age and the aging process, given the length of the Study Period. Model One (1) and Model Two (2) were designed explicitly to test the hypotheses. Model Three (3) is an exploratory, "balancing" statistical model that strives to measure overall policing performance, not exclusively physical performance variables to determine if there are any significant differences in the overall policing performance as predicated by age.

IV. FINDINGS

Chapter Nine

Descriptive Statistics

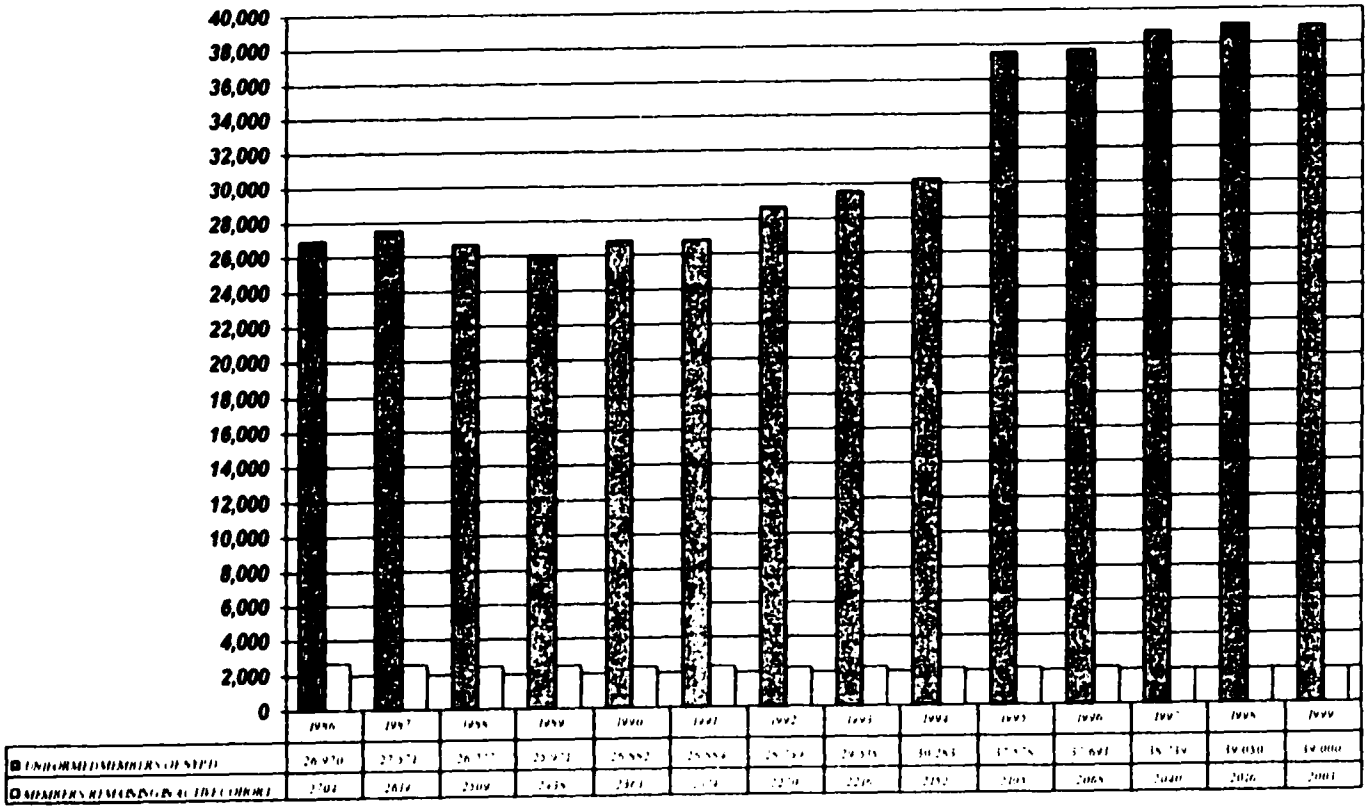
Study Group Descriptive Statistics

There were three thousand twelve (3,012) members of the Study Group that were hired by the New York Police Department (NYPD) and entered the Police Academy during calendar year 1985. One thousand seven hundred fifty six (1,756), or approximately fifty eight percent (58.3%) of the Study Group were hired for the January, 1985 Police Academy class, two hundred twelve (212) or approximately seven percent (7.1%) of the Study Group were hired for the April, 1985 Police Academy class and the remaining one thousand forty-four (1,044) or thirty-four percent (34.6%) of the Study Group were hired for the July, 1985 Police Academy class. As noted in Chapter Six, the Study Group was eighty-four point five percent (84.5%) male, fifteen point five percent (15.5%) female; seventy-one point six percent (71.6%) White, fourteen point six percent (14.6%) Hispanic, twelve point five percent (12.6%) African-American and one point two percent (1.2%) Asian and approximately half (49.9%) were residents of one of the five (5) boroughs of New York City at the end of Time Period 14 (December 31, 1999).

The Study Group and Rates of Attrition and Assignment Mobility

Two thousand three (2,003) Study Group members were still remaining (Active Cohort) in the NYPD by the start of Time 15, January 1, 2000. One thousand nine (1,009) members (nearly thirty-four percent (33.5%)) left the Study Group during the Study Period. This is notable because nearly one-third of the Study Group left the NYPD prior to becoming eligible for a regular service pension available after twenty (20) years

MEMBERS OF STUDY GROUP COMPARED WITH OVERALL UNIFORMED MEMBERS OF THE NEW YORK POLICE DEPARTMENT, 1986-1999



of service in the NYPD that would not have been available to the Study Group members until 2005. The NYPD consisted of twenty six thousand nine hundred seventy (26,970) total uniformed members and the Study Group numbered three thousand twelve (3,012) members (approximately 11.2% of the total number of uniformed members in the NYPD) in 1986; the Study Group's Time Period 1. The Study Group as a percentage of the total uniformed members of the NYPD decreased steadily as the NYPD increased substantially (nearly forty-nine percent (49%)) the number of total uniformed members during the Study Period due to legislation (City of New York Office of the Mayor, Safe Streets, Safe City, 1991), various Federal programs to increase the number of police officers in New York, and the merger of the former New York City Housing Authority Police Department and the former New York City Transit Authority Police Department into the NYPD in 1995. There were forty thousand one hundred (40,100) uniformed members of the service by the end of the Study Period on December 31, 2000, an increase of thirteen thousand one hundred thirty (13,130) uniformed officers from Time Period 1 to Time Period 15. There were two thousand three (2,003) members of the Study Group by the start of Time Period 15 and the Study Group comprised of fewer than five percent (4.9%) of the total number of uniformed police officers in the NYPD during the year 2000, Time Period 15.

The mean number of years members of the entire Study Group were employed by the NYPD was approximately eight and one-half (8.5) years. There was not a substantial variance in mean number of years employed by the NYPD based upon age category or mean number of years in patrol precinct assignments. Members of the Middle Aged Sub Cohort and the Older Aged Sub Cohort were slightly more likely to remain in the Active

Cohort than the Younger Aged Sub Cohort by the end of the Study Period. Although the correlation is slight, remaining in the Active Cohort was a function of age category in that the Middle Aged Sub Cohort and the Older Aged Sub Cohort members were more likely to remain with the NYPD at the end of the Study Period.

MEAN NUMBER OF YEARS EMPLOYED AND MEAN NUMBER OF YEARS IN PATROL PRECINCT ASSIGNMENTS AND PERCENTAGE OF SUB COHORT LEAVING ACTIVE COHORT DURING STUDY PERIOD			
	MEAN NUMBER OF YEARS EMPLOYED BY NYPD	MEAN NUMBER OF YEARS IN PATROL PRECINT ASSIGNMENTS	PERCENTAGE OF ENTIRE ACTIVE COHORT AT END OF STUDY PERIOD
YOUNGER AGED SUB COHORT	8.55	6.6	32.7%
MIDDLE AGED SUB COHORT	8.34	6.6	33.1%
OLDER AGED SUB COHORT	8.6	6.7	34.2%

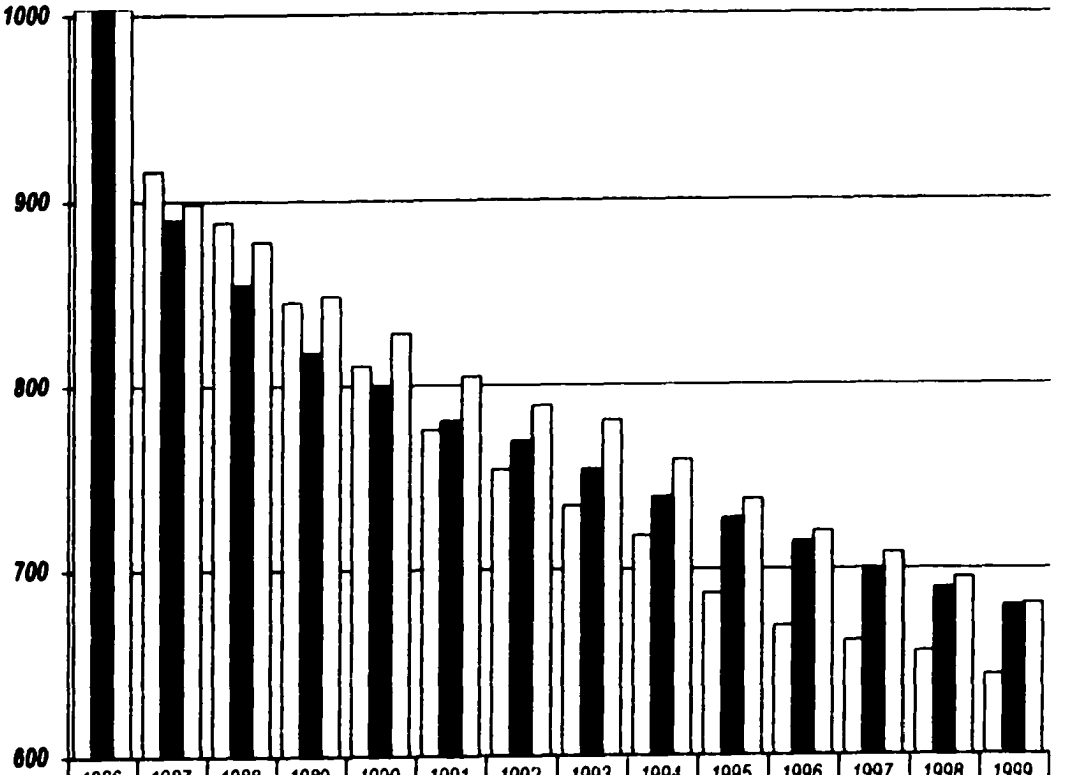
Members of the Younger Aged Sub Cohort and Middle Age Sub Cohort were more likely to resign from the NYPD than the Older Aged Sub Cohort. Approximately nineteen percent of both the Younger Aged Sub Cohort (18.9%) and Middle Aged Sub Cohort (19%) resigned from the NYPD during the Study Period while slightly fewer than fourteen percent (13.9%) of the Older Aged Sub Cohort left the NYPD by resigning. Also, resigning from the NYPD accounted for nearly thirty seven percent of members of the Younger Aged Sub Cohort (36.5%) and the Middle Aged Sub Cohort (36.7%) who left the Active Cohort during the Study Period but resigning was the reason only twenty seven percent (26.9%) of the Older Aged Sub Cohort left the Active Cohort during the Study Period. Fewer than five percent (4.7%) of members of the Middle Aged Sub Cohort were terminated during the Study Period making them slightly less likely to be

terminated than members of the Younger Aged Sub Cohort (5.6%) and the Older Aged Sub Cohort (5.4%). A greater percentage (10.2%) of members of the Older Aged Sub Cohort received an accident disability pension than member of the Younger Aged Sub Cohort (8.5%) or members of the Middle Age Sub Cohort (8.1%). Members of the Middle Aged Cohort were slightly more likely (1.4%) to receive an ordinary disability pension than the Older Aged Sub Cohort (1.3%) and more likely than the Younger Aged Sub Cohort (.8%).

The Study Group experienced the greatest rate of attrition during Time Period 1 (entrance into the Police Academy during the calendar year 1985 until December 31, 1986) when comparing Time Periods and rates of attrition. A total of three hundred eight members (308) or ten percent (10%) of the entire Study Group left the NYPD during Time Period 1. Nearly two-thirds (206 out of the 308) resigned. Ninety-seven (97) of the three hundred eight (308) or nearly thirty-three percent (33%) were terminated. Three (3) members of the Study Group died (one of the deaths was a line of duty death), one (1) member of the Study Group received an accident disability and one (1) member received a "vested" pension, meaning that they had credited pension service with another agency and they only had to work a minimal amount of time for the NYPD before they received a reduced pension. During Time Period 1, approximately nine percent (8.8%) of the Younger Aged Sub Cohort left the Study Group, approximately twelve percent (11.5%) of the Middle Age Sub Cohort left the Study Group, and approximately eleven percent (10.5%) of the Older Aged Sub Cohort left the Study Group during Time Period 2.

Eighty-five (85) total members of the Study Group left the Active Cohort during

YOUNGER AGED SUB COHORT, MIDDLE AGED SUB COHORT, AND OLDER AGED SUB COHORT MEMBERS REMAINING IN ACTIVE COHORT, 1986-1999

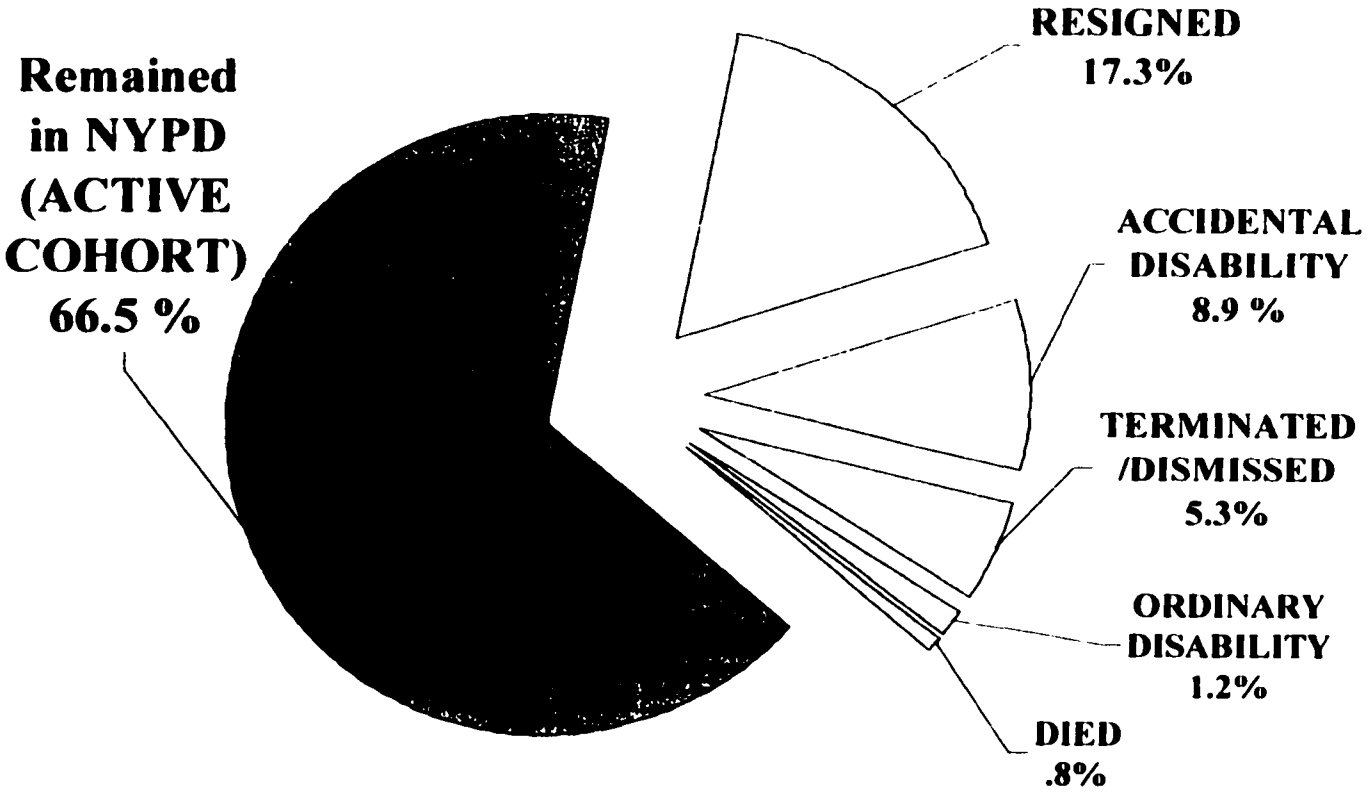


	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
□ YOUNGER AGED SUB COHORT	1004	916	888	844	810	776	755	735	718	687	670	661	655	642
■ MIDDLE AGED SUB COHORT	1004	889	854	817	800	781	770	755	739	727	715	699	690	680
□ OLDER AGED SUB COHORT	1004	899	877	848	828	804	789	780	759	738	720	708	695	681

Time Period 2. As with Time Period 1, the majority of members leaving the Study Group (64 of the 85, or approximately 75%) resigned. Members of the Middle Age Sub Cohort represented (29 of the 64) approximately forty-five percent (45.3%) of the resignations during Time Period 2 while the Younger Aged Sub Cohort accounted for nearly thirty percent (29.7%) of the resignations and the Older Aged Sub Cohort accounted for a quarter (25%) of the resignations. Fourteen (14) members of the Study Group were terminated during Time Period 2. A total of fourteen (14) members were terminated during Time Period 2. The Younger Aged Sub Cohort and Older Aged Sub Cohort each comprised of nearly thirty-six percent (35.7%) of the terminations (5 each) during Time Period 2 while the Middle Aged Sub Cohort comprised of the remaining approximately twenty-nine percent (28.7%). Four (4) members of the Study Group died and three (3) members of the Study Group received an accident disability pension (1 in each of the 3 age sub cohorts) during Time Period 2.

One hundred and ten (110) members of the Study Group left the Active Cohort during Time Period 3. Once again, as with Time Period 1 and Time Period 2, the most frequent reason for leaving the Active Cohort was resignation. Sixty-nine percent (69%) of the Study Group members who left the Active Cohort during Time Period 3 did so by resigning. Approximately forty-two percent (42%) were members of the Younger Aged Sub Cohort, approximately thirty three percent (32.9%) were from the Middle Aged Sub Cohort, and twenty five percent (25%) were from the Older Aged Sub Cohort. There were twenty-three (23) members of the Study Group terminated during Time Period 3. Terminations accounted for twenty-one percent (21%) of the members that left the Active

REASONS MEMBERS OF STUDY GROUP LEFT NYPD DURING STUDY PERIOD



Cohort during Time Period 3. Approximately thirty-nine percent (39%) of the terminations during Time Period 3 were members of the Younger Aged Sub Cohort. The Middle Aged Sub Cohort and the Older Aged Sub Cohort both accounted for seven (7) of the terminations (or approximately 30.5% each) during Time Period 3. Six (6) members of the Study Group (three (3) from the Middle Age Sub Cohort and three (3) from the Older Aged Sub Cohort) received an accident disability pension, four (4) members of the Study Group (two (2) from the Younger Aged Sub Cohort and two (2) from the Middle Aged Sub Cohort) died during Time Period 3 and one (1) member of the Study Group (from the Younger Aged Sub Cohort) received a "vested" retirement pension.

Seventy-one (71) members of the Study Group left the Active Cohort during Time Period 4 and seventy-seven (77) members of the Study Group left the Active Cohort during Time Period 5. The rate of attrition of the Study Group began a steady, stabilizing decrease after Time Period 5, or the first full five (5) years ("Interval 1") in the NYPD for the Study Group. A total of six hundred fifty-one (651) members (or nearly twenty-two percent (21.6%)) of the Study Group left the NYPD within the first five (5) years. During the next five (5) year interval ("Interval 2", Time Period 6 through Time Period 10 or the calendar years 1991 through 1995), a mean of fifty-one (51) members of the Study Group left the NYPD during each Time Period compared to an mean attrition rate per Time Period in Interval 1 (Police Academy through 1990) of one hundred thirty (130) members of the Study Group. During Interval 3 (Time Period 11 through Time Period 15 or the calendar years of 1996 through 2000), a mean of twenty-six (25.5) members of the Study Group will leave the NYPD during each Time Period. Even when Time Period 1 is factored out of the calculation because of the excessive amount of members (310)

leaving the Study Group during Time Period 1, the mean rate of attrition (approximately eight six (86) members per Time Period) is still much higher than the rate of attrition in Interval 2 (51) and Interval 3 (26).

The attrition trends as do the rates of attrition of the Study Group change during Interval 2 and Interval 3. As noted previously, resignations account for the majority of members leaving the Study Group in Interval 1. Resignations accounted for nearly sixty-five percent (64.5%) of the Study Group members leaving the Active Cohort during Interval 1, by Interval 3; resignations accounted for approximately twenty seven percent (27.4%) of the Study Group members who left the Active Cohort during Interval 3. The attrition rate of the Active Cohort because of disability pensions increased as opposed to the decrease in resignations. Approximately eight percent (7.8%) of members of the Study Group left the Active Cohort during Interval 1 because of a disability (accident or ordinary) pension. However, members of the Study Group leaving the Active Cohort during Interval 3 because of a disability pension account for nearly fifty-nine percent (58.8%) of members of the Study Group who left the Active Cohort during Interval 3.

The rates of attrition throughout the Study Period expose some notable trends and preliminary findings when comparing the Aged Sub Cohorts. It should be noted that the Superior Fitness Sub Cohort (SFSC) was excluded in the analyses of attrition rates because inclusion in the SFSC required membership in the Active Cohort through Time 14; therefore, members who left the Active Cohort prior to Time 14 were ineligible for inclusion in the SFSC. Overall, the majority of attrition by the Study Group occurred during the first five (5) years of the Study Period when nearly twenty-two percent (21.6%) of the entire Study Group left the NYPD. After the first five (5) years, (Interval

1), the rate of attrition decreased dramatically to approximately eleven percent (10.8%) in Interval 2 and then to fewer than five percent (4.9%) in Interval 3. When comparing the Younger Aged Sub Cohort, the Middle Aged Sub Cohort and the Older Aged Sub Cohort and who left the Study Group during Interval 1, thirty-five percent (35%) of Study Group members who left the Active Cohort during Interval 1 were from the Younger Aged Sub Cohort, thirty-four percent (34%) were from the Middle Aged Sub Cohort and thirty-one (31%) were from the Older Aged Sub Cohort. During Interval 2, approximately forty-one percent (41.4%) of Study Group members who left the Active Cohort were from the Younger Aged Sub Cohort, twenty-six percent (26%) were from the Middle Aged Sub Cohort, and thirty-three (33%) were from the Older Aged Sub Cohort. During Interval 3, approximately twenty-seven percent (27%) of Study Group members who left the Active Cohort were from the Younger Aged Sub Cohort, thirty-four percent (34%) were from the Middle Aged Sub Cohort, and thirty-eight percent (38%) were from the Older Aged Sub Cohort.

The overall rate of attrition throughout the entire Study Period exposes slight variations amongst the Younger Aged Sub Cohort (32.7%), the Middle Aged Sub Cohort (33.1%), and the Older Aged Sub Cohort (34.2%), however, there are some generalizations that can be inferred regarding the *reasons* for leaving the NYPD during the Study Period. Generally, members of the Younger Aged Sub Cohort and Middle Aged Sub Cohort who left the NYPD left by resigning in the first five (5) years. The Older Aged Sub Cohort members that left the NYPD were more likely to leave the NYPD after ten (10) years of service and by a disability pension than by resigning. The rates of termination for the Middle Aged Sub Cohort throughout the Study Period are

substantially lower (nearly a full percentage point) than the Younger Aged Sub Cohort and Middle Aged Sub Cohort.

Members of the Study Group that remained in the Active Cohort generally did not spend most of their policing careers in one assignment or unit. Approximately forty-one percent (41.4%) of the Active Cohort (of all ranks) was working in a patrol precinct assignment by the end of Time Period 14. Members of the Younger Aged Sub Cohort were slightly more likely (43.8%) than the Middle Age Sub Cohort (39.6%) and the Older Aged Sub Cohort (40.8%) to be working in a patrol precinct assignment at the beginning of Time period 15. Nearly eighty-nine percent (88.9%) of the Study Group changed assignments (either by transfer to a new assignment at a different patrol precinct or other unit within the same rank or title or promotion to a new rank) three (3) or more times, meaning that only eleven percent (11.1%) of the Study Group remained in the same patrol precinct they were assigned upon graduation from the Police Academy.

There was a significant correlation between age category and likelihood of remaining in the same patrol precinct members of the Study Group were assigned upon graduation of the Police Academy during Time 1. Over fourteen percent (14.1%) of the Older Aged Sub Cohort remained in the same patrol precinct they were assigned upon graduation from the Police Academy while approximately twelve percent (11.9%) of the Middle Aged Sub Cohort remained in the same patrol precinct they were assigned upon graduation from the Police Academy and seven and one half percent (7.5%) of the Younger Aged Sub Cohort remained in the same patrol precinct they were assigned upon graduation from the Police Academy.

Two-thirds (67%) of the Study Group changed assignments five (5) or more times, over twenty-five percent (25.4%) changed assignments ten (10) or more times, and over sixteen percent (16.3%) changed assignments twelve (12) or more times within the Study Period. Regarding mobility and age category, members of the Younger Aged Sub Cohort were slightly more likely than the Middle Aged Sub Cohort and Older Aged Sub Cohort to change assignments five (5) or more times, slightly more likely to change assignments ten (10) or more times, and slightly more likely to change assignments twelve (12) or more times. Therefore, based upon the rates of mobilization and transience, increased rates of mobility are a direct function of decreasing age, or stabilization is a function of increasing age, depending on the policing management perspective.

The Study Group and Policing Career Advancement

Members of the Younger Aged Sub Cohort were also more likely to advance beyond the rank of police officer through Time Period 15. Approximately thirty-nine percent (38.8%) of the Younger Aged Sub Cohort gained at least one (1) promotion during the Study Period while approximately thirty-four percent (34.4%) of the Middle Aged Sub Cohort attained at least one (1) promotion and thirty-three percent (33.1%) of the Older Aged Sub Cohort gained at least one (1) promotion. The highest rank attained by a member of the Study Group was Deputy Inspector (one (1) additional discretionary promotion above the rank of Captain, the highest Civil Service rank). One member of the Study Group (in the Middle Aged Sub Cohort) attained this rank. However, members of the Younger Aged Sub Cohort generally out performed the Middle Aged Sub Cohort and the Older Aged Sub Cohort at every level of both Civil Service promotional ranks and

discretionary ranks during the Study Period. Ten (10) members of the Younger Aged Sub Cohort attained the rank of Captain by Time Period 15, while four (4) members of the Middle Aged Sub Cohort attained the rank of Captain and three (3) members of the Older Age Sub Cohort attained the rank of Captain. One (1) percent of the entire Younger Age Sub Cohort hired in 1985 attained the rank of Captain, one-half percent (.5) of the entire Middle Aged Sub Cohort attained the rank of Captain, and less than one half percent (.3%) of the Older Age Sub Cohort attained the rank of Captain through Time Period 15. A greater percentage of the Younger Aged Sub Cohort were also more likely to attain the rank of Lieutenant (and discretionary promotions within the rank of Lieutenant; "Lieutenant-Special Assignment" and "Lieutenant-Commander, Detective Squad") and the rank of Sergeant (and discretionary promotions within the rank of Sergeant; "Sergeant-Special Assignment" and "Sergeant-Supervisor Detective Squad"). Three and one-half percent (3.5%) of the Younger Aged Sub Cohort attained the rank of Lieutenant and approximately fifteen percent (15.2%) of the Younger Aged Sub Cohort attained the rank of Sergeant while less than three percent (2.7%) of the Middle Age Cohort attained the rank of Lieutenant and less than twelve percent (11.7%) of the Middle Aged Sub Cohort attained the rank of Sergeant. Approximately three percent (2.95%) of the Older Aged Sub Cohort attained the rank of Lieutenant and approximately twelve percent (12.2%) attained the rank of Sergeant.

Discretionary promotions to the rank of Detective Third Grade, Detective Second Grade, and Detective First Grade were not substantially correlated with age category. Approximately nineteen percent (19.1%) of the Younger Aged Sub Cohort attained one (1) or more discretionary promotions to the Detective ranks within the Study Period

while nearly nineteen percent (18.8%) of the Middle Age Sub Cohort attained one (1) or more discretionary promotions to the Detective ranks within the Study Period, while approximate eighteen and one half percent (18.4%) of the Older Aged Sub Cohort attained one (1) or more discretionary promotions to the Detective ranks within the Study Period.

Generally, policing advancement (particularly the upper Civil Service ranks) was a function of age category. Members of the Younger Aged Sub Cohort were more likely than the Middle Age Sub Cohort and Older Aged Sub Cohort to attain the upper Civil Service ranks of the Captain and Lieutenant. There was not a substantial relationship regarding the first Civil Service promotional rank of Sergeant and the discretionary promotional grades within the rank of Detective.

Arrest Activity

Members of the Study Group affected a mean of one hundred twenty-two (122) arrests per member of the Study Group during the Study Period. However, there was considerable variance in the distribution of arrests effected by members of the Study Group, considering the median number of arrests was sixty-two (62) and the standard deviation was one hundred fifty (150), meaning that about ninety-five percent (95%) of the Study Group effected between no arrests and four hundred and twenty-two (422) arrests during the Study Period, a considerable range. Additionally, members of the Study Group that affected the mean number of arrests (122) would be in the top thirty-five percent (35%) in terms of arrest activity within the Study Group. The top twenty percent (20%) of the Study Group affected a mean of two hundred or more arrests while the bottom twenty percent (20%) of the Study Group affected fewer than thirteen (13)

arrests during the Study Period. Members of the Middle Aged Sub Cohort had the highest number of mean arrests (131) than members of the Younger Aged Sub Cohort (113) and members of the Older Aged Sub Cohort (121). The high rate of variance and unequal distribution was a phenomenon that similarly affected all of the sub cohorts.

Sick Days Lost and the Study Group

Members of the Study Group did not report for work because they were sick a total of forty five thousand seven hundred twenty-one (45,721) occurrences during the Study Period. The Study Group members did not report for work due to a sickness a mean of nearly fifteen and one-half (15.4) occurrences within the Study Period and lost a mean of nearly six days (5.9) of work per occurrence. Members of the Younger Aged Sub Cohort reported sick a mean number of approximately sixteen occurrences (16.2) within the Study Period, or approximately once per Time Period. Members of the Middle Aged Sub Cohort reported sick a mean number of fifteen (15.1) occurrences within the Study Period, and members of the Older Aged Sub Cohort reported sick a mean number of fourteen (14.1) occurrences within the Study Period. However, members of the Younger Aged Sub Cohort lost five and one-half (5.6) days per sick occurrence, members of the Middle Aged Sub Cohort lost nearly six (5.9) days per sick occurrence, and members of the Older Aged Sub Cohort lost nearly six and one-half (6.5) days per sick occurrence.

Members of the entire Superior Fitness Sub Cohort (SFSC) reported sick a mean of four and one half (4.6) days, with a mean days lost per occurrence of slightly more than four (4.1) days. The Younger Aged Sub Cohort within the SFSC averaged nearly three (2.9) occurrences with an average of more than four (4.2) days lost per occurrence

while the Middle Aged Sub Cohort within the SFSC averaged more than eight (8.1) occurrences with an average of more than four (4.2) days lost per occurrence. The Older Aged Sub Cohort within the SFSC reported sick an average of two and one half times, , losing an average of nearly four (3.7) days per occurrence.

There are two (2) primary ways members of the NYPD may report sick. They may report sick directly to the location to that they are assigned, or they may report sick to the NYPD's Medical Division, the agency's centralized internal health and wellness unit that is staffed with medical doctors, psychologists, and licensed nurses. When a member of the NYPD is afflicted with a minor illness or sickness such as a common cold

MEAN SICK OCCURRENCES AND DAYS LOST PER OCCURRENCE DURING ENTIRE STUDY PERIOD
ENTIRE STUDY GROUP AND SFSC

	MEAN SICK OCCURRENCES	MEAN DAYS LOST PER OCCURENCE
ENTIRE STUDY GROUP	**15.4**	**5.9**
YOUNGER AGED SUB COHORT	16.2	5.6
MIDDLE AGED SUB COHORT	15.1	5.9
OLDER AGED SUB COHORT	14.1	6.5
ENTIRE SFSC	**4.6**	**4.1**
YOUNGER AGED SUB COHORT WITHIN SFSC	2.9	4.2
MIDDLE AGED SUB COHORT WITHIN SFSC	8.1	4.2
OLDER AGED SUB COHORT WITHIN SFSC	2.5	3.7

or a virus, the member may report sick to the location they are assigned. However, when the member is reporting sick because they are seriously ill, injured, or sustained an injury from a previous line of duty injury, they must report the sickness or illness to the NYPD's Medical Division for an initial medical interview and evaluation. There were twenty-five thousand eight hundred forty (25,840) of these type of serious sick occasions. The Study

Group members reported sick because of these types of serious occasions a mean of approximately eight and one-half (8.6) occurrences per Study Group member. The mean days lost for the serious occurrences were approximately twenty-six (25.8) days. The Younger Aged Sub Cohort members reported sick because of a serious sickness or illness occasion at a rate of approximately three (2.8) occasions per member with a mean loss of approximately twenty-four (24.3) days per occurrence. The Middle Aged Sub Cohort members reported sick because of a serious sickness or illness occasion also at a rate of approximately three (2.7) occurrences per member with a mean loss of approximately twenty-five (25.2) days per occasion. Members of the Older Aged Sub Cohort reported sick because of a serious sickness or illness occasion at a rate of approximately two and one-half (2.5) occurrences per member with a mean loss of approximately twenty-eight (28.1) days per occasion. Overall, age and reporting sick and days lost because of sick occasion was a function of age category. Younger Aged Sub Cohort members were more likely to report for sick than the Middle Aged Sub Cohort members and the Older Aged Sub Cohort members, but Older Aged Sub Cohort members were more likely to lose more days per occasion than Middle Aged Sub Cohort members and Younger Aged Sub Cohort members.

Line of Duty Injuries

The Study Group suffered a total of fourteen thousand two hundred seventy-nine (14,279) line of duty injuries during the Study Period, or a mean rate of nearly five (4.7) line of duty injuries per member of the Study Group during the entire Study Period. There were a total of one hundred seventy four thousand two hundred twenty-two

(174,222) line of duty injuries suffered by the entire NYPD during the Study Period, or an annual moving average of twelve thousand four hundred forty-four (12,429) line of

MEAN LINE OF DUTY INJURY (LODI) OCCURRENCES AND DAYS LOST PER OCCURRENCE DURING ENTIRE STUDY PERIOD AND PERCENTAGE RATE OF SUB COHORT SUFFERING LINE OF DUTY INJURIES THROUGHOUT STUDY PERIOD

ENTIRE STUDY GROUP AND SFSC

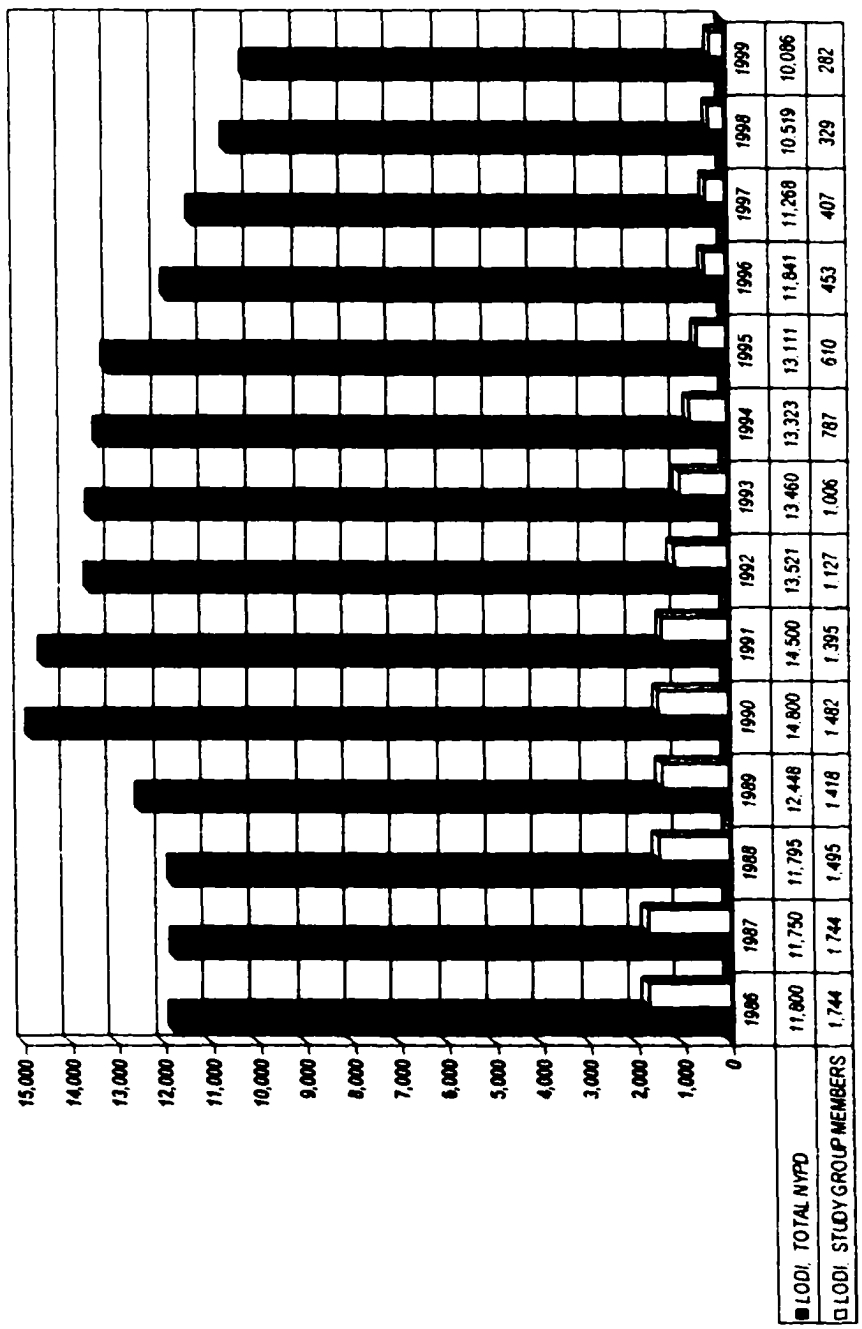
	MEAN LODI OCCURRENCES	MEAN DAYS LOST PER OCCURENCE	PERCENTAGE OF SUB COHORT
ENTIRE STUDY GROUP	**4.7**	**10.7**	**29.5%**
YOUNGER AGED SUB COHORT	5.4	9.3	33%
MIDDLE AGED SUB COHORT	4.7	10.4	30%
OLDER AGED SUB COHORT	4.3	12.4	27.5%
ENTIRE SFSC	**3.4**	**5.3**	**9.0%**
YOUNGER AGED SUB COHORT WITHIN SFSC	3.1	3.5	10%
MIDDLE AGED SUB COHORT WITHIN SFSC	3.55	5.4	11%
OLDER AGED SUB COHORT WITHIN SFSC	2.9	7.8	6%

duty injuries during the Study Period. The moving average annual rate of line of duty injuries for the Study Group was approximately one thousand twenty (1,020) line of duty injuries per Time Period, meaning that the annual likelihood throughout the entire Study Period that a Study Group member would be injured in the line of duty was approximately one (1) in three (3), or thirty-three percent (33%), the same approximate equivalent for the entire NYPD during the Study Period.

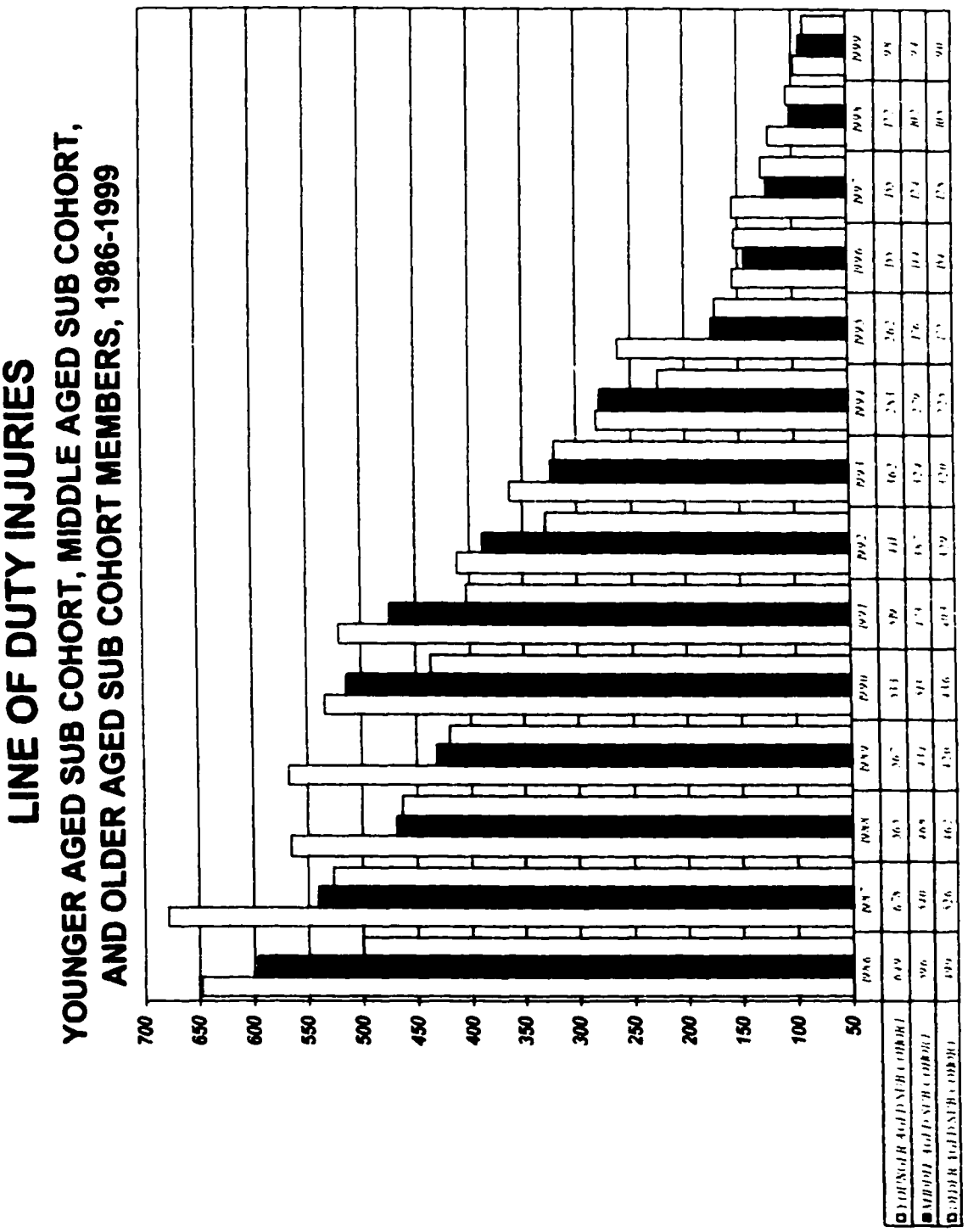
The line of duty injuries suffered by the Study Group, however, where not evenly distributed during each Time Period throughout the Study Period. The Study Group members had an increased likelihood of suffering a line of duty injury during Interval 1 and the likelihood of suffering a line of duty injury decreased slightly from Interval 1 to Interval 2 and then decreased substantially from Interval 2 to Interval 3. During Interval

NYPD LINE OF DUTY INJURIES

TOTAL LINE OF DUTY INJURIES OF NYPD AND STUDY GROUP MEMBERS 1986-1999



	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
LODI, TOTAL NYPD	11,800	11,750	11,795	12,448	14,800	14,500	13,521	13,460	13,323	13,111	11,841	11,268	10,519	10,086
LODI, STUDY GROUP MEMBERS	1,744	1,744	1,495	1,418	1,482	1,395	1,127	1,006	787	610	453	407	329	282



1, there was an annual mean for the entire Study Group of one thousand five hundred seventy-seven (1,577) line of duty injuries and an annual mean number of members of the Study Group of two thousand six hundred fifty-six (2,656), or an annual rate of .59 line of duty injuries for each member of he Study Group.

During Interval 2, the annual mean number of line of duty injuries decreased to nine hundred eighty-five (985) and the annual mean number of members of the Study Group decreased to two thousand two hundred thirty (2,230). The annual rate of line of duty injuries also decreased slightly to .44 line of duty injuries for each member of the Study Group during Interval 2. During Interval 3, the annual mean of line of duty injuries decreased to three hundred sixty-eight (368) and the annual mean number of members of the Study Group during Interval 3 was two thousand thirty-two (2,032), or an annual rate of .18 line of duty injuries for each member of the Study Group during Interval 3.

Members of the Study Group significantly reduced the likelihood of getting injured in the line of duty during the Study Period from Interval 1 through Interval 3, perhaps because assignments of most of the Study Group members within the NYPD changed throughout the Study Period, from patrol duties and intensive enforcement assignments to primarily clerical, administrative, and supervisory tasks as the policing careers of the Study Group progressed.

The members of the Younger Aged Sub Cohort suffered five thousand three hundred fifty-nine (5,359) line of duty injuries during the Study Period for an approximate rate of five and one-half injuries (5.4) injuries per member during the Study

Period. Members of the Middle Aged Sub Cohort suffered four thousand six hundred fifty-one (4,651) line of duty injuries during the Study Period for an approximate rate of nearly five (4.7) line of duty injuries per member during the Study Period and members of the Older Aged Sub Cohort suffered four thousand two hundred sixty-nine (4,269) line of duty injuries during the Study Period for an approximate rate of more than four (4.3) line of duty injuries per member during the Study Period.

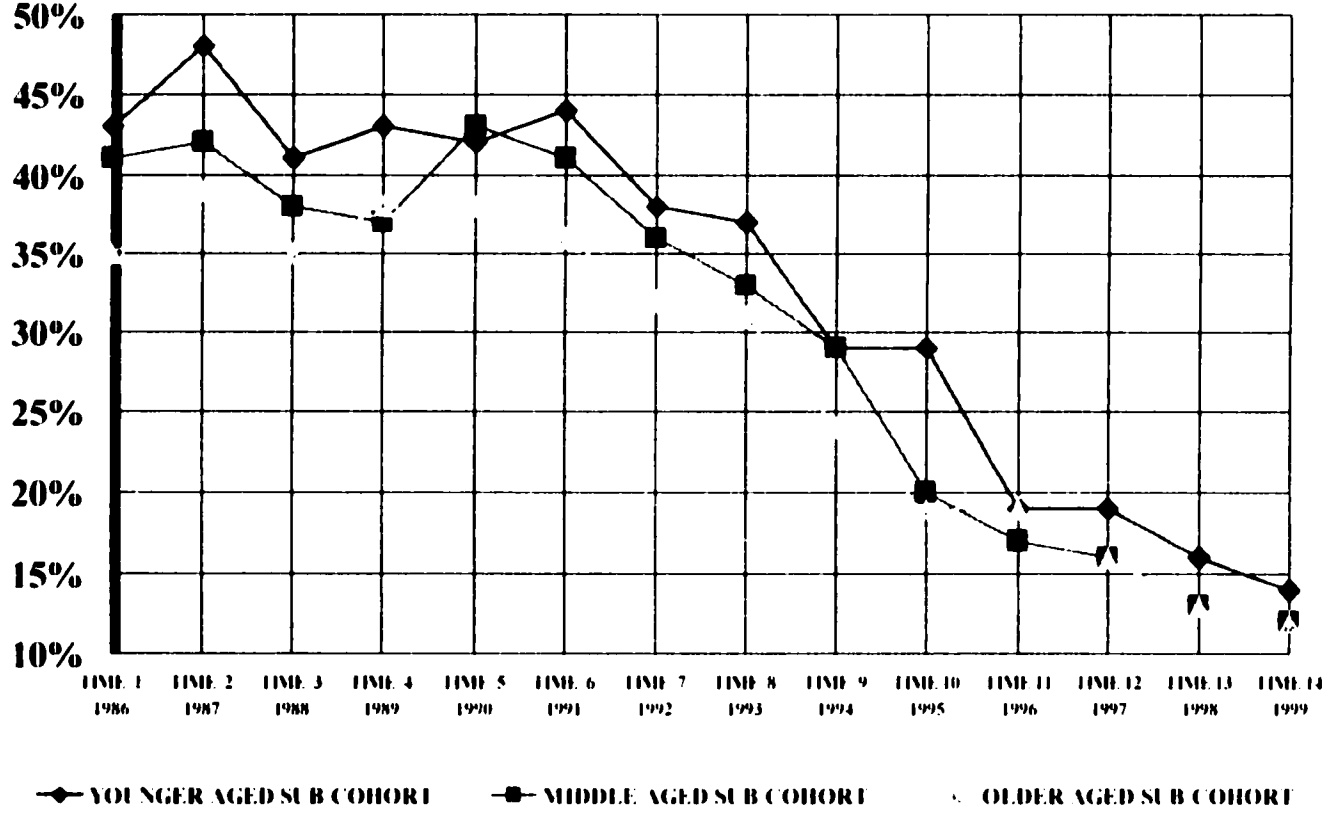
Members of the Superior Fitness Sub Cohort (SFSC) suffered a total of three hundred ten (310) line of duty injuries, averaging approximately three and one-half (3.4) injuries per member of the SFSC. The Younger Aged Sub Cohort members within the SFSC averaged approximately three (3.1) line of duty injuries, the Middle Aged Sub Cohort within the SFSC three and one-half (3.55) line of duty injuries and the Older Aged Sub Cohort within the SFSC nearly three (2.9) line of duty injuries during the Study Period.

Analyzing the descriptive statistics of Study Group yields a number of valid preliminary findings. Members of the Younger Aged Sub Cohort were more likely to leave the NYPD during the Study Period than members of the Middle Aged Sub Cohort and members of the Older Aged Sub Cohort. Members of the Younger Aged Sub Cohort were also more likely to leave by resigning from the NYPD than the Middle Aged Sub Cohort and the Older Aged Sub Cohort. Members of the Middle Aged Sub Cohort were less likely than the Younger Aged Sub Cohort and Older Aged Sub Cohort to leave the NYPD during the Study Period because of termination. Members of the Younger Aged Sub Cohort were more likely than the Middle Aged Sub Cohort and Older Aged Sub

LINE OF DUTY INJURIES

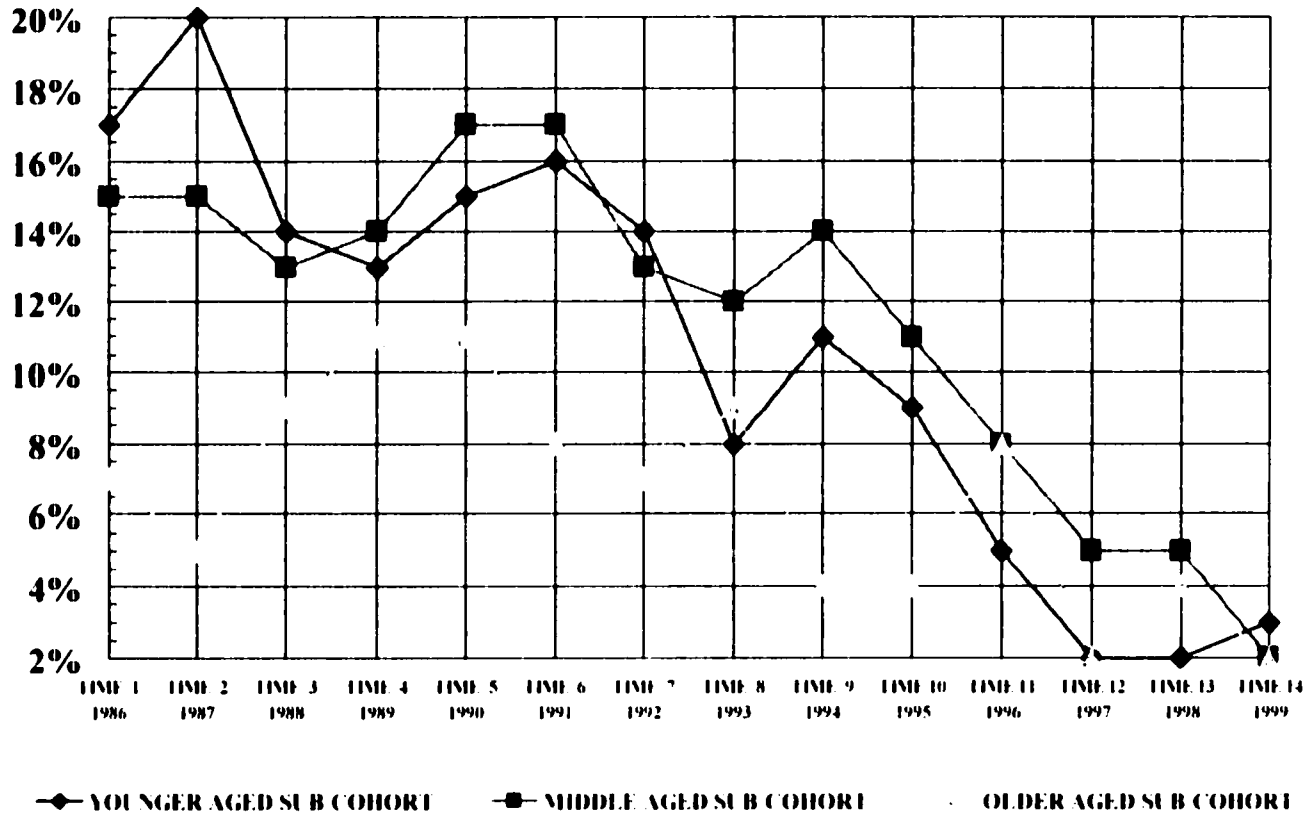
PERCENTAGE OF YOUNGER AGED SUB COHORT, MIDDLE AGED SUB COHORT, AND OLDER AGED SUB COHORT THAT SUFFERED LINE OF DUTY INJURIES

ENTIRE STUDY GROUP



LINE OF DUTY INJURIES

PERCENTAGE OF YOUNGER AGED SUB COHORT, MIDDLE AGED SUB COHORT, AND OLDER AGED SUB COHORT WITHIN SUPERIOR FITNESS SUB COHORT (SFSC) THAT SUFFERED LINE OF DUTY INJURIES



Cohort to be promoted throughout the Study Period. Members of the Middle Aged Sub Cohort were more active than the Younger Aged Sub Cohort and the Older Aged Sub Cohort in terms of arrest activity, but there was substantial variance in the means of arrest activity undermining generalizations regarding arrest activity and age category. There was also a direct relationship relative to prevalence of sick occasions and age category. Members of the Younger Aged Sub Cohort were more likely to report sick than members of the Middle Aged Sub Cohort and members of the Middle Aged Sub Cohort were more likely than members of the Older Aged Sub Cohort to report sick, however, members of the Younger Aged Sub Cohort remained out sick fewer days per occasion than members of the Middle Aged Sub Cohort and the Older Aged Sub Cohort.

Members of the entire Study Group were substantially more likely to be injured in the line of duty during their first five (5) years of the Study Period than the last five (5) years of the Study Period and members of the Younger Aged Sub Cohort were more likely than the Middle Aged Sub Cohort to be injured in the line of duty. Members of the Middle Aged Sub Cohort were more likely than the Older Aged Sub Cohort to be injured in the line of duty. Based on the percentage of Younger Aged Sub Cohort, Middle Aged Sub Cohort, and Younger Aged Sub Cohort, that suffered line of duty injuries, a higher percentage of the Younger Aged Sub Cohort were injured in the line of duty throughout the Study Period. During the entire Study Period, the rate of line of duty injuries for the Younger Aged Sub Cohort was thirty-three percent (33%), the Middle Aged Sub Cohort was injured in the line of duty at a rate of thirty percent (30%), and the Older Aged Sub Cohort was injured at a rate of approximately twenty-eight (27.5%). This relationship

was similar in the SFSC, although the entire SFSC suffered a much lower rate of nine percent (9%). The Younger Aged Sub Cohort within the SFSC was injured in the line of duty at a rate of ten percent (10%), the Middle Aged Sub Cohort was injured in the line of duty at a rate of eleven percent (11%), and the Older Aged Sub Cohort was injured at a rate of six percent (6%). Generally, as the age of the police officer increases, the probability of likelihood of injury in the line of duty decreases.

These findings are valuable in that they provide statistical parameters of the Study Group during the Study Period. However, they do not control for the variance of the policing activities and assignments or capture the performance of the Study Group for the entire Study Period. The performance of the Superior Fitness Sub Cohort has also been largely excluded in this chapter. Model One (1), Model Two (2), and Model (3) will comprehensively capture the performance of the Study Group during the entire Study Period and succinctly test the main hypotheses of this research.

Chapter Ten

Results
Testing the Three (3) Central Hypotheses Utilizing Model One (1), Model Two (2), and Model Three (3)

Hypotheses Number One (1)

The three (3) central hypotheses for this analysis were tested with the construction of Model One (1), Model Two (2), and Model Three (3). **Model One (1)**, the **Physical Performance Trend Analysis** was constructed to test **Hypothesis Number One (1)**, that stated "**As Police Officers Age, they suffer from substantially longer periods of recovery from injuries in the line of duty and use more sick leave time for both injuries sustained in the line of duty and regular illnesses.**" The recovery time (days lost from work) from line of duty injuries was tested exclusively using the linear Running Moving Average Model (RMAM) in Model One (1). Sick leave time for regular illnesses in Hypothesis Number One (1) was tested in Chapter Nine's (9) previous descriptive statistics cross tab analyses.

Model One (1)

Physical Performance Trend Analysis

Model One (1) was used to test Hypothesis Number One (1) and also used to test Hypothesis Number Two (2), which will be discussed below. There was one (1) primary dependent variable and seven (7) secondary dependent variables analyzed in Model One (1). The measurement of the primary dependent variables was days lost per line of duty injury. The independent variable was age category, the Younger Aged Sub Cohort, the Middle Aged Sub Cohort, and the Older Aged Sub Cohort.

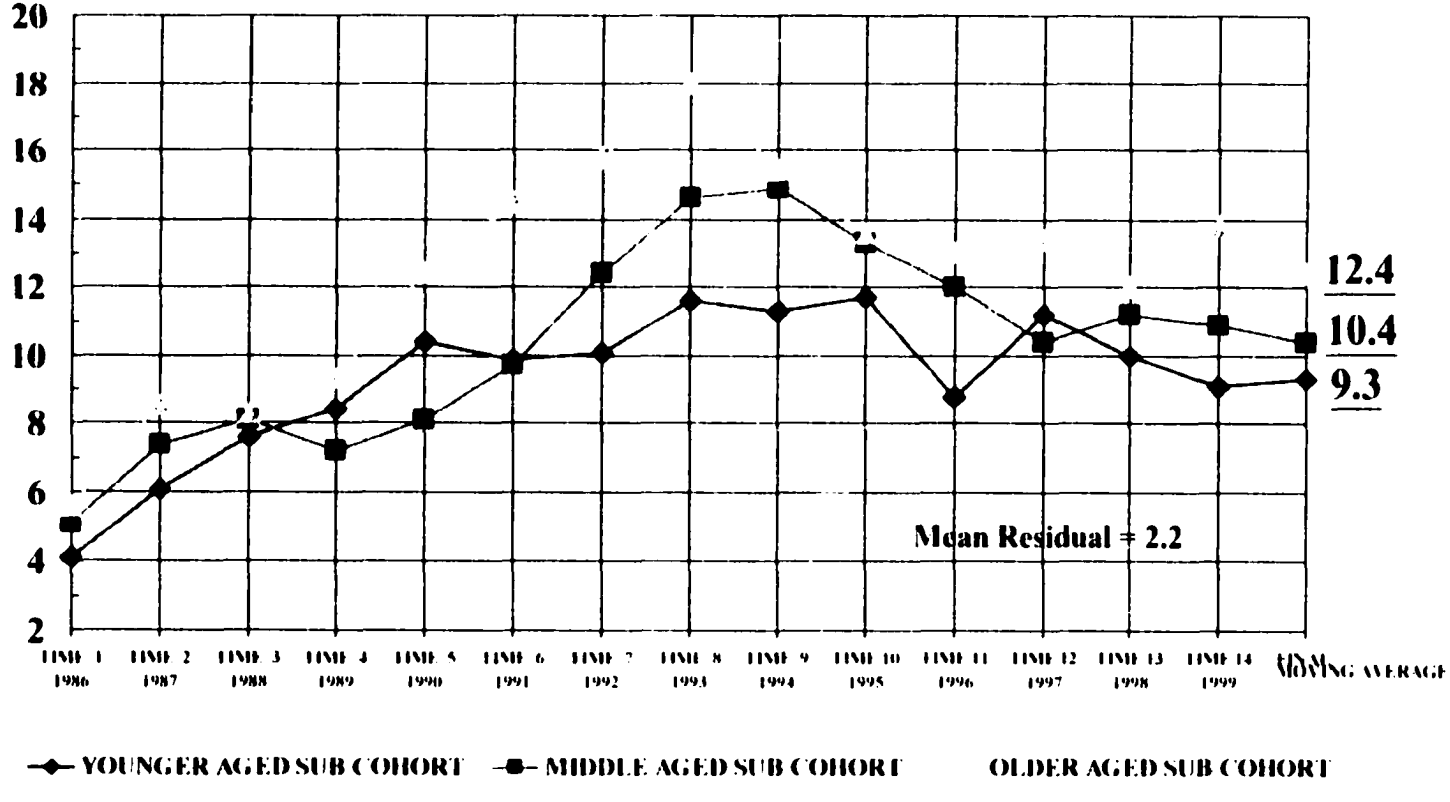
MODEL 1

PHYSICAL PERFORMANCE TREND ANALYSIS

RUNNING MOVING AVERAGE MODEL (RMAM)

ENTIRE STUDY GROUP

DAYS LOST PER LINE OF DUTY INJURY



Model One (1) was designed to test the physical performance of the Study Group throughout the Study Period by determining if there are any substantial differences in the rates of days lost per line of duty injury for each age category. Model One (1) was also constructed to determine if attainment and maintenance of superior physical fitness was effective is deterring the aging process in terms of days lost per line of duty injury, meaning that attainment of superior physical fitness would negate the aging process. Each of the dependent variables were measured at each Time Period in the Study Period and also at the end of the Study Period.

Overall Days Lost Per Line of Duty Injury (Entire Study Group)

Members of the entire Study Group lost an average of nearly eleven (10.7) days per line of duty injury by the end of the entire Study Period when calculating days lost per line of duty injury utilizing the specifically-designed Running Moving Average Model (RMAM). Member of the Younger Aged Sub Cohort lost approximately nine (9.3) days per line of duty injury while members of the Middle Age Sub Cohort lost ten and one-half (10.4) days per line of duty injury while members of the Older Aged Sub Cohort lost approximately twelve and one-half (12.4) days per line of duty injury based upon the final Running Moving Average Model (RMAM) calculation constructed specifically for Model One (1) based upon the data considerations and the endeavor of the central hypotheses. There was an average annual residual (error term, or an approximate equivalent to the standard error of the mean) per Time Period in the RMAM of 2.2 days, a modest improvement of less than the average annual residual of 2.4 days that would have resulted using the "Classic Moving Average Model" (CMAM), thereby enhancing the validity and utility of the RMAM as a model in trend analyses.

Members of the entire Study Group lost an average of nearly five (4.9) days per line of duty injury during Time 1 and the average days lost per line of duty increased steadily for the entire Study Group during the Study Period until Time 8, when the average days lost per line of duty injury for the entire Study Group peaked at nearly fifteen (14.9) days lost per line of duty injury. The average days lost per line of duty injury then moderated and did not vary substantially from the final average from Time Period 9 until the end of the Study Period. As noted in the previous chapter, the amount of line of duty injuries decreases significantly during Interval 3.

When specific age categories were compared during Time Period 1, members of the Younger Aged Sub Cohort lost slightly more than four (4.1) days per line of duty injury during Time Period 1, members of the Middle Aged Sub Cohort lost an average of slightly more than five days (5.1) days per line of duty injury during Time Period 1, and members of the Older Aged Sub Cohort lost approximately five and one half (5.6) days per line of duty injury. The mean days lost per line of duty injury in the RMAM for the Younger Aged Sub Cohort then increased two (2) days to slightly more than six (6.1) days per line of duty injury, increased more than two (2) days to approximately seven and one-half (7.4) days for the Middle Aged Sub Cohort, and increased nearly three (3) days to eight and one-half (8.5) days lost per line of duty injury for members of the Older Aged Sub Cohort during Time Period 2.

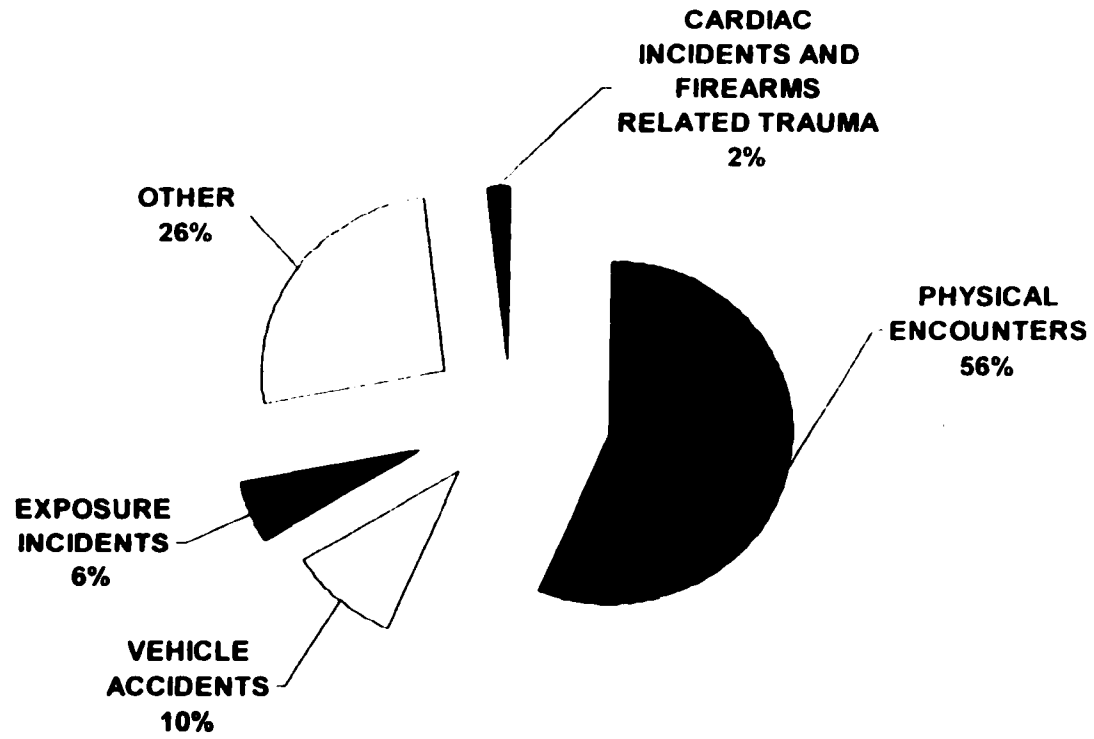
The days lost per line of duty injury increased steadily for each sub cohort during Interval 1. The entire Study Group averaged approximately eight days lost (7.8) per line of duty injury during Interval 1. The average days lost per line of duty injury during Interval 1 for the Younger Aged Sub Cohort was approximately seven (7.3) days, while

the Middle Age Sub Cohort also averaged approximately seven (7.2) days, and the Older Aged Sub Cohort averaged nearly nine (8.8) days lost per line of duty injury.

The average days lost per line of duty injury from the end of Interval 1 through the end of Interval 2 increased substantially for the entire Study Group from approximately eight (7.8) days to more than thirteen (13.1) days. The median age of the Younger Aged Sub Cohort was approximately aged thirty-two (32), the median age of the Middle Aged Sub Cohort was approximately aged thirty-three and one half (33.4), and the median age of the Older Aged Sub Cohort was approximately aged thirty-seven and one-half (37.5) by the end of Interval 2. The average days lost during Interval 2 for the Younger Aged Sub Cohort was nearly eleven (10.9) days, while the Middle Age Sub Cohort averaged approximately nearly thirteen (12.98) days lost, and the Older Aged Sub Cohort averaged approximately fifteen and one-half (15.46) days lost per line of duty injury during Interval 2.

The entire Study Group averaged more than eleven (11.2) days lost per line of duty injury during Interval 3, a decrease in the average loss from Interval 2 of more than two (2) days. The average days lost per line of duty injury during Interval 3 for the Younger Aged Sub Cohort was approximately ten (9.8) days, while the Middle Age Sub Cohort also averaged approximately eleven (11.1) days, and the Older Aged Sub Cohort averaged thirteen (13) days lost per line of duty injury during Interval 3.

LINE OF DUTY INJURIES
PERCENTAGE OF SUB TYPES OF INJURIES



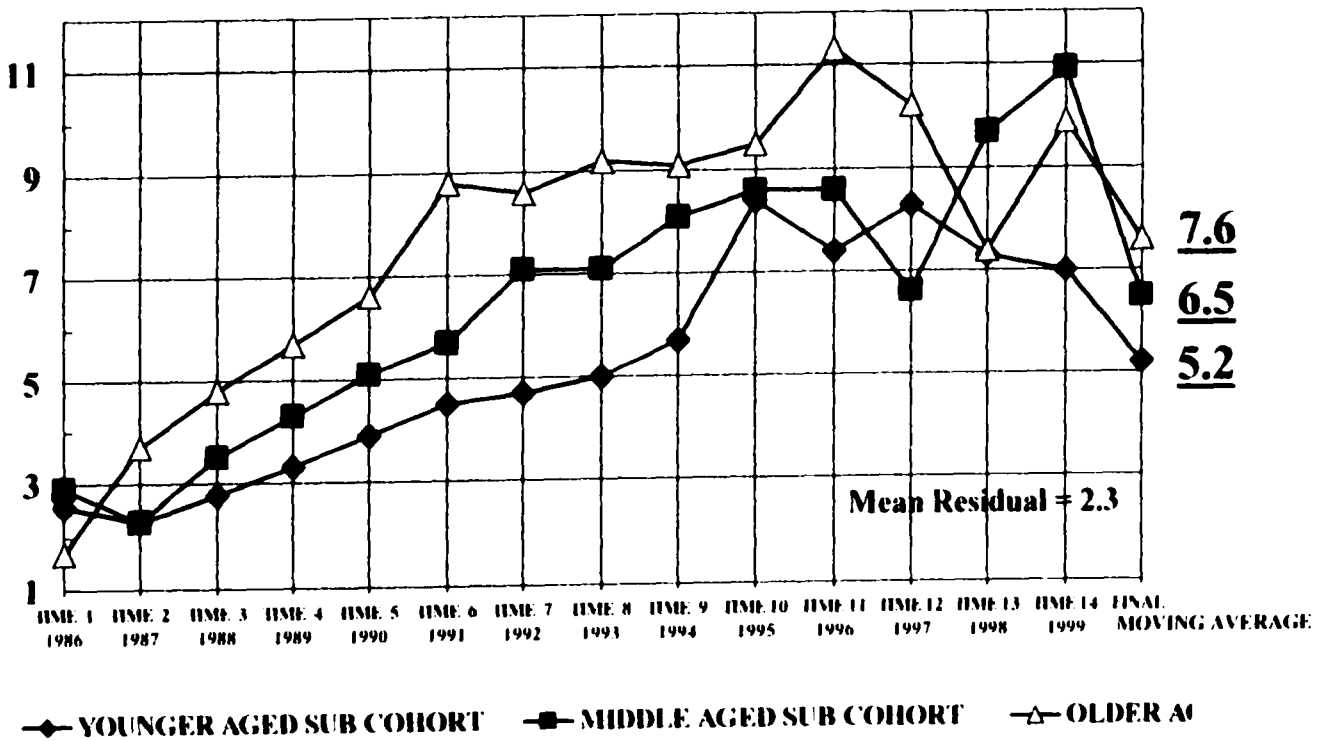
MODEL 1

PHYSICAL PERFORMANCE TREND ANALYSIS

RUNNING MOVING AVERAGE MODEL (RMAM)

ENTIRE STUDY GROUP

DAYS LOST PER LINE OF DUTY INJURY-PHYSICAL ENCOUNTERS



Days Lost from Line of Duty Injuries involving Physical Encounters (Entire Study Group)

Days lost from line of duty injuries involving physical encounters is the most critical variable in Model One (1). Line of duty injuries involving physical encounters exclude physical confrontations involving any type of weapon or police vehicle accident. Line of duty injuries involving physical encounters include injuries sustained while wrestling, restraining, and otherwise apprehending emotionally disturbed persons and criminal suspects and rescue missions such as running up stairs and jumping over fences. These types of injuries are most validly linked to the aging process because the line of duty injuries are the result of physical stress and strain on the physiological muscular and skeletal systems of the human body. For example, a weapon such as a blunt instrument or a knife used to injure a police officer during a confrontation will probably result in a similar serious injury regardless of age. Also, a serious motor vehicle accident will also result in a serious injury, regardless of age. However, an injury as the result of restraining a person during a physical confrontation or running and climbing may affect persons of various ages differently.

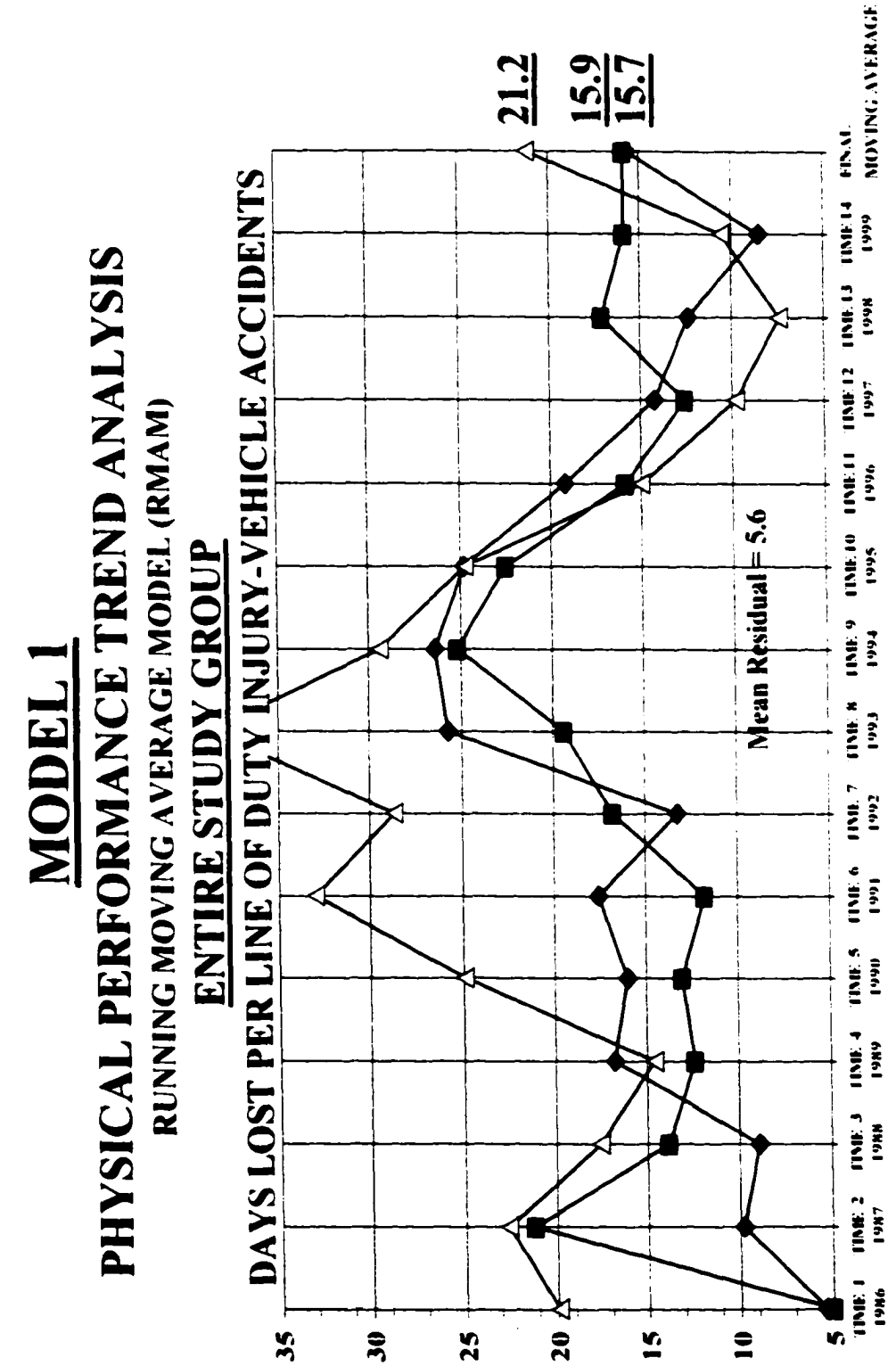
There were eight thousand forty-nine (8,049) line of duty injuries involving physical encounters (approximately 56% of the 14,279 total number of line of duty injuries) sustained by the entire Study Group during the entire Study Period. Members of the entire Study Group lost an average of approximately six and one-half (6.4) days per line of duty injury incurred during a physical encounter by the end of the entire Study Period when calculating days lost per line of duty injury utilizing the specifically-designed Running Moving Average Model (RMAM). The relationship between increasing days lost per injury and age category remained the same as the overall line of

duty injuries. Members of the Younger Aged Sub Cohort lost approximately five (5.2) days per line of duty injury while members of the Middle Age Sub Cohort lost six and one-half (6.5) days per line of duty injury and members of the Older Aged Sub Cohort lost seven and one-half (7.6) days per line of duty injury involving physical encounters.

The residual increases in importance as the Study Period progresses, considering there were fewer line of duty injuries involving physical encounter injuries. This raises the potential for variance within the data. The mean rate of residual per Time Period using the RMAM when calculating line of duty injuries incurred during physical encounters was two (2) days, slightly better that the mean residual (2.3 days) CMAM was utilized.

The entire Study Group lost a mean of three and one-half (3.7) days lost per line of duty injury involving a physical encounter during Interval 1. Members of the Younger Aged Sub Cohort lost an average of nearly three (2.9) days per line of duty injury involving a physical encounter during Interval 1 while members of the Middle Age Sub Cohort lost approximately three and one-half (3.6) days per line of duty injury involving a physical encounter during Interval 1 and the Older Aged Sub Cohort lost an average of four and one-half days (4.5) per line of duty injury involving a physical encounter during Interval 1.

The average days lost per line of duty involving physical encounters also increased steadily for the entire Study Group from Interval 1 through the end of Interval 2. The entire Study Group lost approximately seven and one half days (7.3) per line of duty injury involving a physical encounter during Interval 2, an increase of nearly three (3) full days from Interval 1 through Interval 2. The average days lost per line of duty



injury involving physical encounters increased (unlike overall line of duty injuries) through Interval 3 to almost nine (8.7) days per line of duty injury involving a physical encounter. This is a significant finding, considering that the days lost per line of duty injury stabilized during Interval 3, yet increased for injuries involving physical encounters. The Younger Aged Sub Cohort lost an average of five and one-half (5.6) days per line of duty injury involving a physical encounter during Interval 2 and seven and one-half (7.5) days during Interval 3. The Middle Aged Sub Cohort lost approximately seven and one-half (7.3) days per line of duty injury involving a physical encounter during Interval 2 and approximately eight (8.2) days during Interval 3. The Older Aged Sub Cohort lost an average of nine (9) days per line of duty injury involving a physical encounter during Interval 2 and nearly ten (9.7) days per line of duty injury involving a physical encounter during Interval 3.

Days Lost from Line of Duty Injuries involving Vehicle Accidents (Entire Study Group)

Days lost from line of duty injuries from vehicle accidents while police and law enforcement officers are on duty is the second most critical variable when ranking variables and their relationship to everyday policing and law enforcement tasks. There were a total of one thousand three hundred sixty-two (1.362) which was nearly 10% of all line of duty injuries. Line of duty injuries suffered by the entire Study Group during the Study Period that were the result of vehicle accidents. Members of the entire Study Group lost approximately eighteen (17.6) days per line of duty injury as a result of vehicle accidents utilizing the RMAM. Days lost from line of duty injuries involving police vehicle accidents were the function of age category; increasing age correlated with more days lost per line of duty injury, although the increase was very slight when

comparing the Younger Aged Sub Cohort and the Middle Aged Sub Cohort. Also, members of the Superior Fitness Sub Cohort lost fewer days than the entire Study Period, however, the relationship between increasing age category and increasing days lost per line of duty injury remained consistent with the entire Study Period.

Members of the Younger Aged Sub Cohort lost approximately fifteen and one-half (15.7) days per line of duty injury involving vehicle accidents, slightly fewer than the approximately sixteen (15.9) days lost per line of duty injury involving vehicle accidents suffered by members of the Middle Age Sub Cohort and substantially fewer than the approximately twenty-six (26.1) days lost per line of duty injury involving vehicle accidents by members of the Older Aged Sub Cohort. There was an average annual residual of five and one-half (5.6) days per Time Period when using the RMAM, a substantial improvement of the average annual residual of more than nine (9.3) days that would have resulted using the CMAM.

Days Lost from Line of Duty Injuries involving Exposure Incidents (Entire Study Group)

Days lost from line of duty injuries involving exposure incidences range from serious bites from animals and human beings, rescue missions in water, incidents where police officers were burned during rescue missions and exposure to persons with communicable diseases such as hepatitis and tuberculosis. This variable is important due to the prevalence of dangerous situations in policing and law enforcement that may result in these types of injuries. There were a total of eight hundred sixty-nine (869) line of duty injuries (approximately 6% of all line of duty injuries) suffered by the entire Study Group during the Study Period that were the result of various types of exposures. The

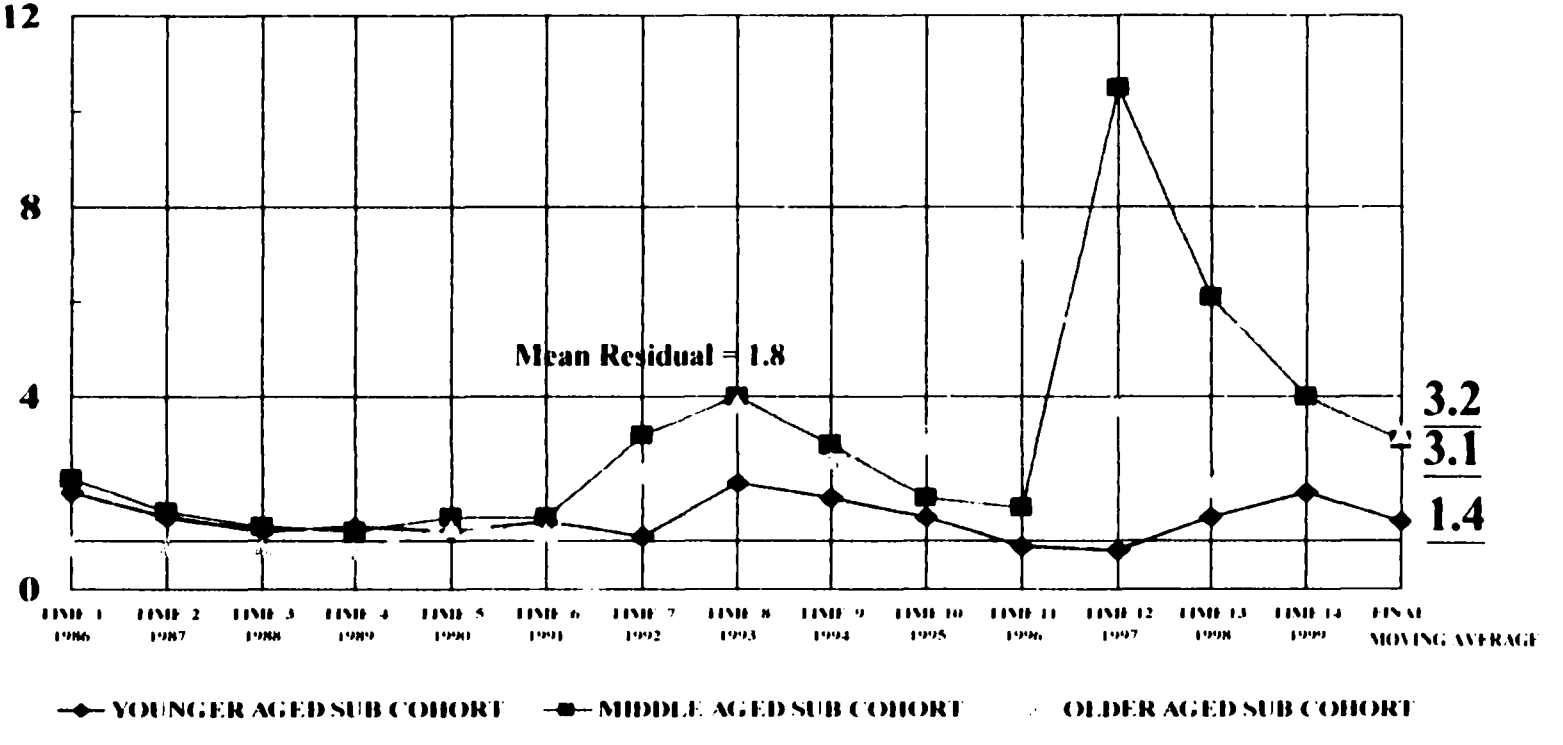
MODEL 1

PHYSICAL PERFORMANCE TREND ANALYSIS

RUNNING MOVING AVERAGE MODEL (RMAM)

ENTIRE STUDY GROUP

DAYS LOST PER LINE OF DUTY INJURY-EXPSOSURE INCIDENTS



relatively small proportion of these types of injuries undermines the Time Period-by-Time Period and perhaps the Interval-by-Interval analyses when comparing age categories and days lost. Members of the entire Study Group lost approximately two and one-half (2.6) days per line of duty injury as a result of exposures during the entire Study Period utilizing the RMAM. Days lost from line of duty injuries involving exposures were also the function of age category; increasing age correlated with more days lost per line of duty injury, although the increase was very slight when comparing the Middle Aged Sub Cohort and the Older Aged Sub Cohort.

Hypothesis Number Two (2)

Hypotheses Number Two (2) stated that **"There is also significant decline in physical performance amongst physically fit Police Officers. As physically fit Police Officers age, they are also likely to suffer longer recovery time periods for injuries sustained in the line of duty."** The central theme of Hypothesis Number (2) was to test the same primary dependent variable and seven (7) secondary dependent variables utilizing the same age-specific sub cohort members within the ***Superior Fitness Sub Cohort*** (SFSC).

Overall Days Lost Per Line of Duty Injury (Superior Fitness Sub Cohort)

Overall, the Younger Aged Sub Cohort, the Middle Aged Sub Cohort, and the Older Aged Sub Cohort members within the ***Superior Fitness Sub Cohort*** (SFSC) lost substantially fewer days per line of duty injury according to the RMAM of Model One (1) when compared to the Younger Aged Sub Cohort, the Middle Aged Sub Cohort, and the Older Aged Sub Cohort in the overall Study Group. Members of the SFSC lost an

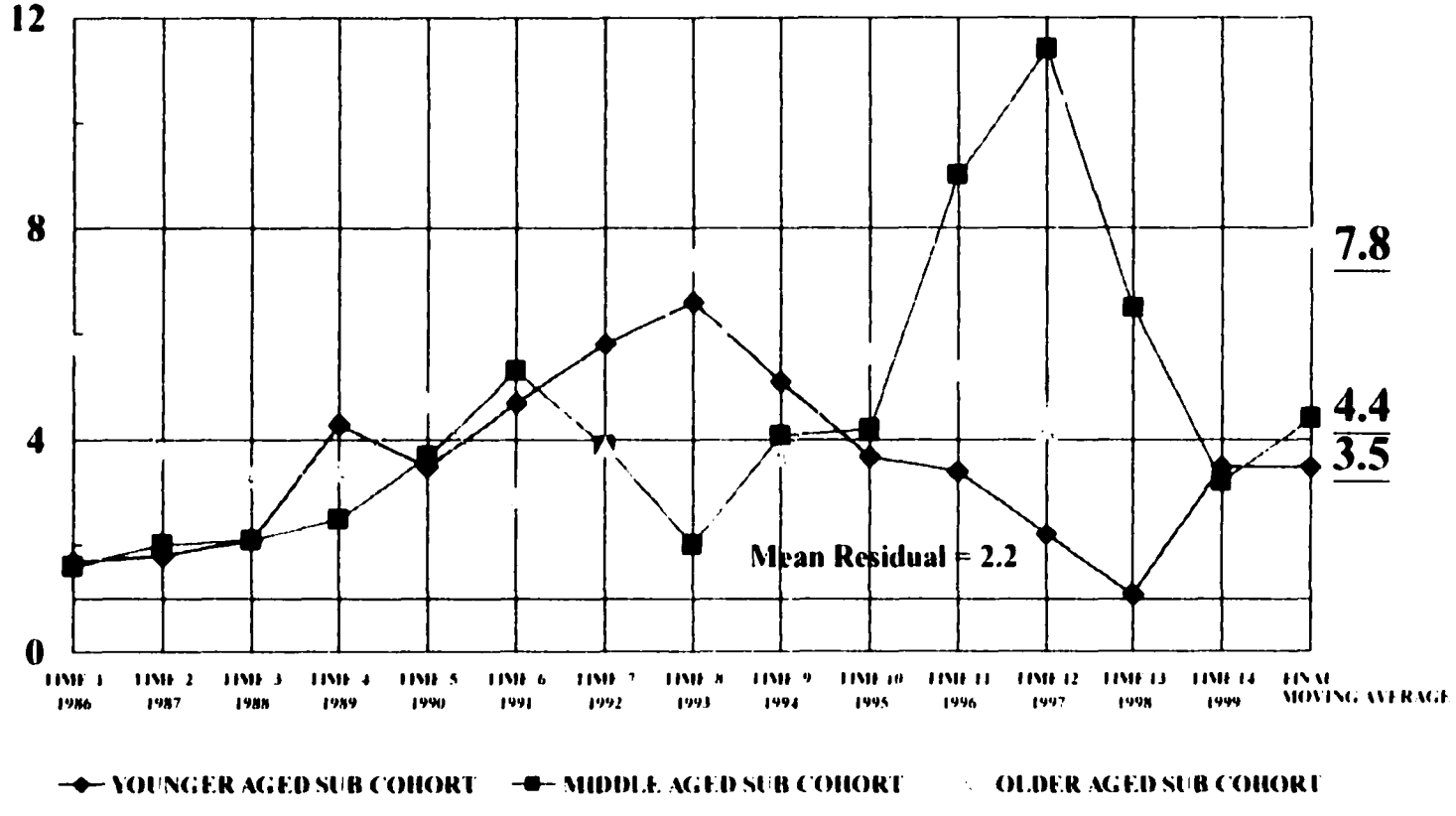
MODEL 1

PHYSICAL PERFORMANCE TREND ANALYSIS

RUNNING MOVING AVERAGE MODEL (RMAM)

SUPERIOR FITNESS SUB COHORT (SFSC)

DAYS LOST PER LINE OF DUTY INJURY



average of approximately five and one-half days (5.3) days per line of duty injury during the Study Period, nearly fifty percent (50%) fewer days lost per line of duty injury when compared to the entire Study Group. Members of the Younger Aged Sub Cohort within the SFSC lost three and one-half (3.5) days per line of duty injury while members of the Middle Age Sub Cohort within the SFSC lost approximately four and one-half (5.4) days per line of duty injury while members of the Older Aged Sub Cohort within the SFSC lost nearly eight (7.8) days per line of duty injury during the entire Study Period. The overall residual (standard error of the mean) in the RMAM was approximately two (2.2) days, slightly higher than the approximate two (2.1) days when using the CMAM.

The physical performance trend for the SFSC was very similar to the physical performance trend for the entire Study Group. Members of the Younger Aged Sub Cohort within the SFSC lost nearly two days (1.8) days per line of duty injury during Time Period 1. Members of the Middle Aged Sub Cohort within the SFSC also lost nearly two days (1.7) during Time Period 1 while members of the Older Aged Sub Cohort lost almost six (5.8) days during Time Period 1. This large loss of days was a statistically anomaly, due to the fact that there were only nine (9) line of duty injuries suffered by members of the Older Aged Sub Cohort within the SFSC during Time Period 1. The RNAM protects against these anomalies that may occur during single Time Periods throughout the Study Period. The days lost increased steadily throughout Interval 1, although the days lost for members of the SFSC were substantially less than the overall Study Group.

Members of the entire SFSC lost slightly more than three (3.1) days per line of duty injury during Interval 1. Members of the Younger Aged Sub Cohort within the

SFSC lost approximately three (2.7) days per line of duty during Interval 1 while members of the Middle Aged Sub Cohort within the SFSC lost approximately two and one-half days (2.4) days per line of duty injury during Interval 1, and members of the Older Aged Sub Cohort within the SFSC lost approximately four (4.2) days per line of duty injury during Interval 1 and the days lost per ling of duty injury increased slightly to approximately four and one-half (4.6) days lost per line of duty injury by the end of Interval 2. However, the SFSC, unlike the entire Study Group, experienced a substantial increase in days lost per line of duty injury from Interval 2 through the end of Interval 3. The entire SFSC lost nearly nine days (8.7) days per line of duty injury during Interval 3, an increase of nearly ninety (90%) from Interval 2.

Members of the Younger Aged Sub Cohort within the SFSC lost an average of more than five (5.2) days per line of duty during Interval 2 and an two and one-half (2.5) days per line of duty injury during Interval 3 while members of the Middle Aged Sub Cohort within the SFSC lost an average of nearly four (3.9) days per line of duty injury during Interval 2 and slightly more than five (5.1) days per line of duty injury during Interval 3. Members of the Older Aged Sub Cohort lost an average of five (4.7) days per line of duty injury during Interval 2 and more than sixteen (16.2) days per line of duty injury during Interval 3.

The overall comparisons of the entire Study Group and Superior Fitness Sub Cohort (SFSC) in overall days lost per line of duty injury are significant in proving the central theme of Hypothesis Number Two (2) in that attainment of the superior physical fitness will deter, but will not stop the aging process; as measured by longer periods of recovery time for older police officers. The Younger Aged Sub Cohort, throughout the

entire Study Period, averaged more than nine days (9.3) days lost per line of duty injury. The Middle Aged Sub Cohort lost more than one full day more (10.4 days per line of duty injury) than the Younger Aged Sub Cohort and the Older Aged Sub Cohort lost two (2) full days more (12.4 days lost per line of duty injury) than the Middle Aged Sub Cohort and more than three (3) full days more than the Younger Aged Sub Cohort per line of duty injury.

However, the Younger Aged Sub Cohort *within the Superior Fitness Sub Cohort* lost only three and one half (3.5) days per line of duty injury, while the Middle Aged Sub Cohort *within the Superior Fitness Sub Cohort* lost an average of four and one-half (4.6) days per line of duty injury and the Older Aged Sub Cohort *within the Superior Fitness Sub Cohort* lost an average of nearly nine (8.7) days per line of duty injury throughout the entire Study Period. The Younger Aged Sub Cohort, the Middle Aged Sub Cohort, and the Older Aged Sub Cohorts within the Superior Fitness Sub Cohort lost fewer days per line of duty injury throughout the Study Period than the entire Study Group but at similar rates with respect to age categories. The Middle Aged Sub Cohort within the Superior Fitness Sub Cohort (SFSC) lost more days than the Younger Aged Sub Cohort within the SFSC and fewer days than the Older Aged Sub Cohort within the SFSC.

Days Lost from Line of Duty Injuries involving Physical Encounters (Superior Fitness Sub Cohort)

The Younger Aged Sub Cohort and the Middle Aged Sub Cohort members within the SFSC lost substantially fewer days per line of duty injury involving physical encounters according to the RMAM of Model One (1) when compared to the Younger Aged Sub Cohort and the Middle Aged Sub Cohort overall Study Group. However, members of the Older Aged Sub Cohort within the SFSC lost more days per line of duty

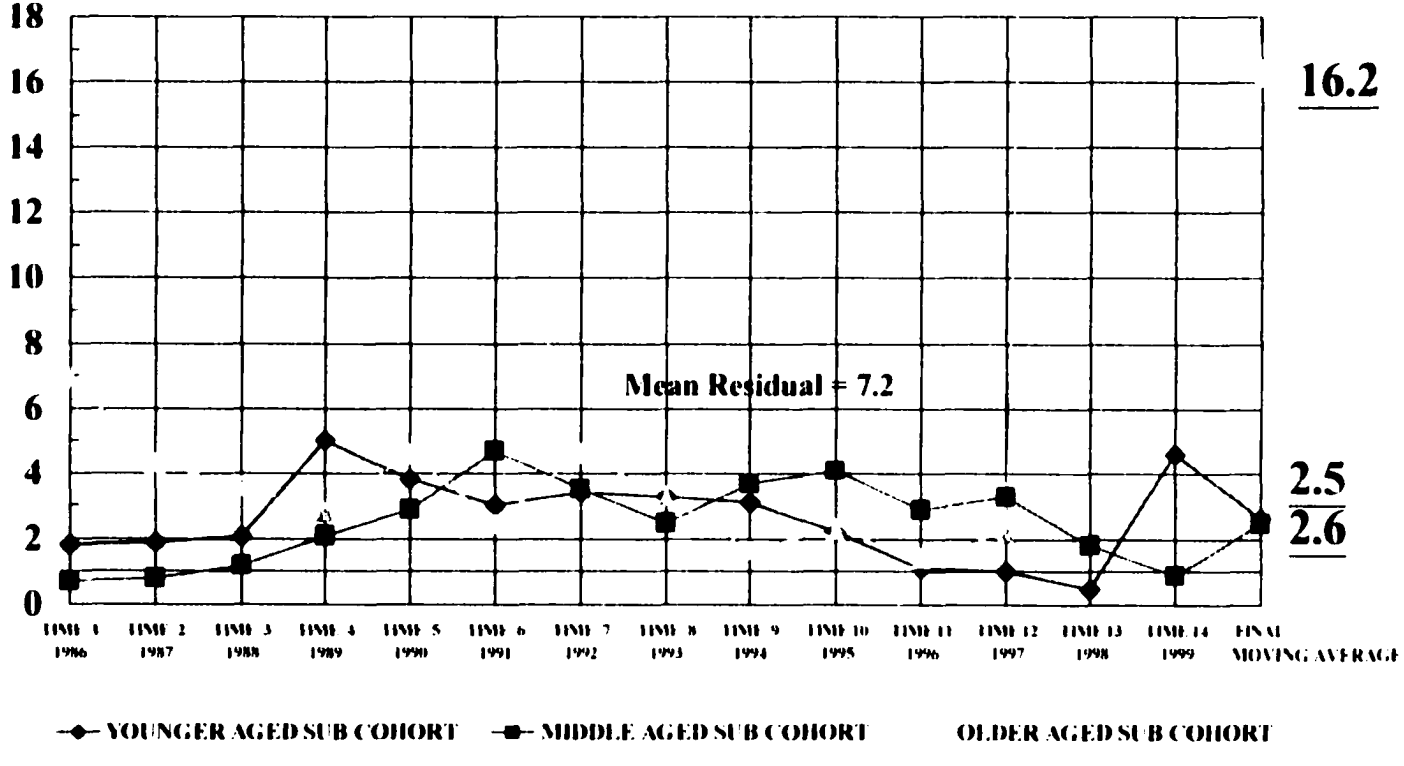
MODEL 1

PHYSICAL PERFORMANCE TREND ANALYSIS

RUNNING MOVING AVERAGE MODEL (RMAM)

SUPERIOR FITNESS SUB COHORT (SFSC)

DAYS LOST PER LINE OF DUTY INJURY-PHYSICAL ENCOUNTERS



injury involving physical encounters than members of the Older Aged Sub Cohort in the overall Study Group. Members of the SFSC lost an average of approximately eight and one-half days (8.5) days per line of duty injury involving a physical encounter during the Study Period, however, members of the Younger Aged Sub Cohort within the SFSC lost approximately two and one-half (2.6) days per line of duty injury involving a physical encounter (compared to the 5.2 days lost per line of duty injury involving a physical encounter of the entire Younger Aged Sub Cohort) and members of the Middle Aged Sub Cohort also lost two and one-half (2.5) days per line of duty injury involving a physical encounter (compared to the 6.5 days lost per line of duty injury involving a physical encounter of the entire Middle Aged Sub Cohort). However, members of the Older Aged Sub Cohort within the SFSC averaged *sixteen* (16.2) days lost per line of duty injury involving a physical encounter, nearly double the amount of days lost per line duty injury involving a physical encounter suffered by the overall Older Aged Sub Cohort. This increased amount of days lost was due to the decreased amount of line of duty injuries and potential for variation. Although the RMAM controlled for a portion of this variation, (the RMAM mean residual was 19.5 versus 30.7 utilizing the CMAM), the decreased number of line of duty injuries increased the potential for the variation.

Members of the entire SFSC lost slightly fewer than three (2.9) days per line of duty injury involving a physical encounter during Interval 1, nearly one (1) full day less than the entire Study Group's Interval 1 average days lost per line of duty injury involving physical encounters. Members of the Younger Aged Sub Cohort within the SFSC lost approximately three (2.9) days per line of duty injury involving a physical encounter during Interval 1 while members of the Middle Aged Sub Cohort within the

SFSC lost one and one-half (1.5) days per line of duty injury involving a physical encounter and members of the Older Aged Sub Cohort lost approximately four and one-half (4.4) days per line of duty injury involving a physical encounter during Interval 1.

Members of the Younger Aged Sub Cohort within the SFSC lost three (3) days per line of duty injury involving a physical encounter during Interval 2 while members of the Middle Aged Sub Cohort within the SFSC lost nearly four (3.7) days per line of duty injury involving a physical encounter and members of the Older Aged Sub Cohort lost slightly fewer than three (2.9) days per line of duty injury involving a physical encounter during Interval 2. Members of the Younger Aged Sub Cohort within the SFSC lost fewer than two (1.8) days per line of duty injury involving a physical encounter during Interval 3 while members of the Middle Aged Sub Cohort within the SFSC lost approximately two (2.2) days per line of duty injury involving a physical encounter and members of the Older Aged Sub Cohort lost approximately forty-eight (47.5) days per line of duty injury involving a physical encounter during Interval 3. When an outlier line of duty injury was removed from the analysis, members of the Older Aged Sub Cohort within the SFSC lost slightly more than two (2.3) days per line of duty injury involving a physical encounter during Interval 3.

Days Lost from Line of Duty Injuries involving Vehicle Accidents (Superior Fitness Sub Cohort)

Overall, the SFSC lost approximately eight and one-half (8.4) days per line of duty injury involving vehicle accidents. The average annual residual using the RMAM was approximately five and one-half (5.6), a substantially improvement from the nearly

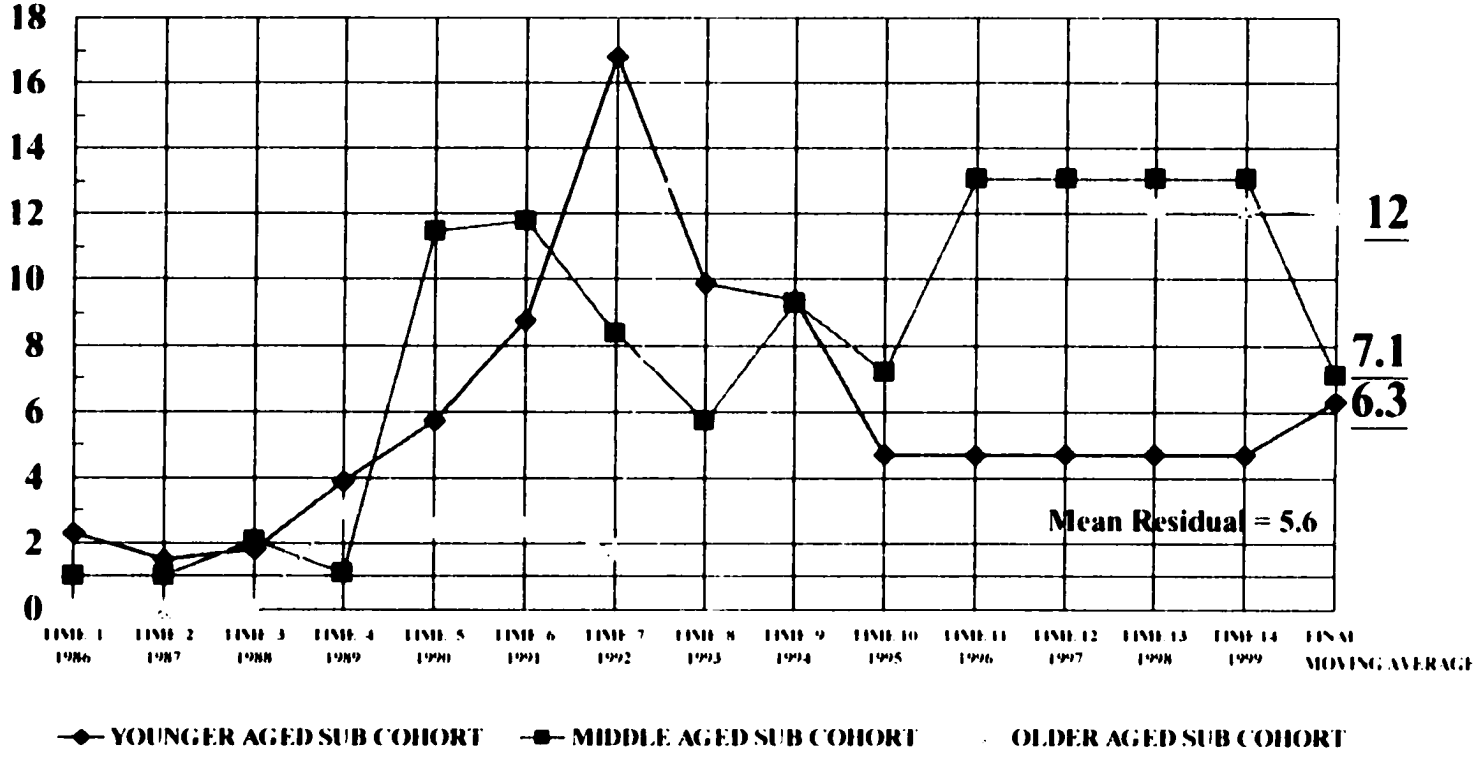
MODEL 1

PHYSICAL PERFORMANCE TREND ANALYSIS

RUNNING MOVING AVERAGE MODEL (RMAM)

SUPERIOR FITNESS SUB COHORT (SFSC)

DAYS LOST PER LINE OF DUTY INJURY-VEHICLE ACCIDENTS



eight (7.7) days of the CMAM. Members of the Younger Aged Sub Cohort within the SFSC lost approximately six and one half (6.3) days per line of duty injury involving vehicle accidents while members of the Middle Aged Sub Cohort lost approximately seven (7.1) days and members of the Older Aged Sub Cohort lost twelve (12) days per line of duty injury involving vehicle accidents over the course of the entire Study Period.

When specific age categories were compared throughout the Study Period, the entire Study Group lost increasing days per line of duty injury involving vehicle accidents as the Study Period progressed consistent with the overall line of duty injuries. Days lost steadily increased through Interval 1 and peaked near the end of Interval 2, then decreased through Interval 3. There also was a substantial reduction in the overall number of line of duty injuries as the result of vehicle accidents during Interval 3. The entire Study Group averaged nearly fifteen (14.8) days lost per line of duty injury involving a vehicle accident during Interval 1, nearly twenty-four (23.9) days during Interval 2, and approximately thirteen and one-half (13.3) days during Interval 3. The Younger Aged Sub Cohort lost eleven and one-half (11.4) days during Interval 1, twenty-one and one-half (21.5) days during Interval 2, and thirteen and one-half (13.5) days during Interval 3. The Middle Aged Sub Cohort lost approximately thirteen (13.1) days during Interval 1, approximately nineteen (19.1) days during Interval 2, and approximately fifteen and one-half (15.4) days during Interval 3. The Older Aged Sub Cohort lost nearly twenty (19.9) days during Interval 1, nearly thirty-one (30.9) days during Interval 2, and approximately ten and one-half (10.7) days during Interval 3.

The SFSC lost nearly three (2.8) days lost per line of duty injury involving a vehicle accident during Interval 1, nearly ten and one-half (10.7) days during Interval 2,

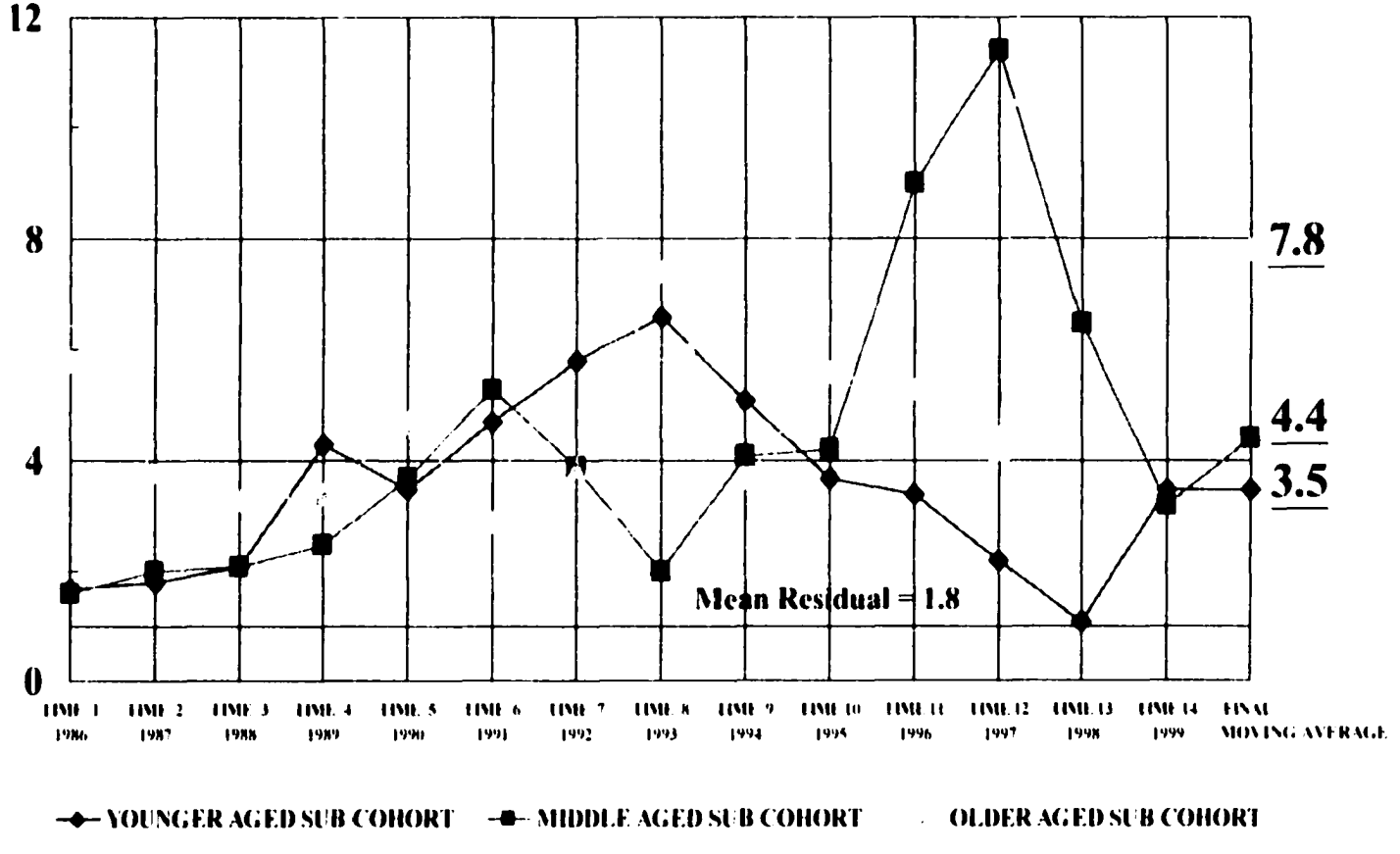
MODEL 1

PHYSICAL PERFORMANCE TREND ANALYSIS

RUNNING MOVING AVERAGE MODEL (RMAM)

SUPERIOR FITNESS SUB COHORT (SFSC)

DAYS LOST PER LINE OF DUTY INJURY-EXPOSURE INCIDENTS



and approximately twelve and one-half days (12.5) days during Interval 3. The overall days lost per line of duty injury involving a vehicle accident were significantly lower during Interval 1 and Interval 2 and slightly lower in Interval 3 than the entire Study Group. The Younger Aged Sub Cohort within the SFSC lost three (3) days during Interval 1, nearly ten (9.9) days during Interval 2, and four (4) days during Interval 3. The Middle Aged Sub Cohort lost approximately six and one-half (6.6) days during Interval 1, eight and one-half (8.5) during Interval 2. There were no members of the Middle Aged Sub Cohort within the SFSC that suffered a line of duty injury involving a vehicle accident during Interval 3. The Older Aged Sub Cohort within the SFSC lost nearly three (2.8) days during Interval 1, approximately eight and one-half (8.6) days during Interval 2, and twelve (12) days during Interval 3. The decreased amount of line of duty injuries suffered by the SFSC because of their small number, particularly during Interval 3 undermines validity, making generalizations when comparing sub cohorts problematic with this set of variables when analyzing trends during a specific Interval. The entire Study Period should be analyzed in these types of instances.

Days Lost from Line of Duty Injuries involving Exposure Incidents (Superior Fitness Sub Cohort)

The SFSC lost slightly more (2.8) days per line of duty injury due to exposures; however, the small number of these types of injuries renders comparisons inadequate when making generalizations. The average annual residual utilizing the RMAM was slightly fewer than two (1.8) days, significantly better than the average annual residual of approximately four and one-half (4.3) days if the CMAM was utilized. As stated previously, the residual terms increase in importance as the potential for variance increases with decreasing amounts of line of duty injuries.

The entire SFSC lost slightly more than seven (7.1) days per line of duty injury involving exposures during Interval 3. There were only thirty-two (32) of these type of line of duty injuries suffered by members of the SFSC during the entire Study Period, rendering age category comparisons within the SFSC of limited value.

MEAN LINE OF DUTY INJURY DAYS LOST FROM CARDIAC INCIDENTS DURING ENTIRE STUDY PERIOD

ENTIRE STUDY GROUP AND SUPERIOR FITNESS SUB COHORT (SFSC)

STUDY GROUP	MEAN DAYS LOST PER LINE OF DUTY INJURY FROM CARDIAC INCIDENTS DURING ENTIRE STUDY PERIOD
ENTIRE STUDY GROUP	**7.1**
YOUNGER AGED SUB COHORT	**4.6**
MIDDLE AGED SUB COHORT	**7.0**
OLDER AGED SUB COHORT	**9.8**
ENTIRE SUPERIOR FITNESS SUB COHORT (SFSC)	**9.8**
YOUNGER AGED SUB COHORT WITHIN SFSC	**4.0**
MIDDLE AGED SUB COHORT WITHIN SFSC	**5.1**
OLDER AGED SUB COHORT WITHIN SFSC	**20.4**

Days Lost from Line of Duty Injuries from Cardiac incidents (Entire Study Group and Superior Fitness Sub Cohort)

Members of the entire Study Group suffered one hundred fifty-five (155) line of duty injuries resulting in complaints of conditions effecting the cardio-pulmonary system. These types of injuries, although small in percentage of injuries, are significant given their seriousness and pension structure of the NYPD as previously noted. Police officers

in the NYPD receive a disability pension automatically amounting to seventy-five percent (75%) (known as the "Heart Bill") of their current salary if their cardiac system suffers significant damage while they are police officers (New York State General Municipal Law, 2003). Cardiac incidents, regarding their frequency and relation to age category, will be analyzed more intensively in Model Two (2).

MEAN LINE OF DUTY INJURY DAYS LOST FROM CARDIAC INCIDENTS DURING PHYSICAL ENCOUNTERS DURING ENTIRE STUDY PERIOD

ENTIRE STUDY GROUP AND SUPERIOR FITNESS SUB COHORT (SFSC)

STUDY GROUP	MEAN DAYS LOST PER LINE OF DUTY INJURY FROM CARDIAC INCIDENTS DURING ENTIRE STUDY PERIOD
ENTIRE STUDY GROUP	**2.8**
YOUNGER AGED SUB COHORT	**2.9**
MIDDLE AGED SUB COHORT	**2.7**
OLDER AGED SUB COHORT	**2.8**
ENTIRE SUPERIOR FITNESS SUB COHORT (SFSC)	**1.7**
YOUNGER AGED SUB COHORT WITHIN SFSC	**4.0**
MIDDLE AGED SUB COHORT WITHIN SFSC	**N/A**
OLDER AGED SUB COHORT WITHIN SFSC	**5.0**

Days Lost from Line of Duty Injuries from Cardiac incidents during Physical Encounters (Entire Study Group and Superior Fitness Sub Cohort)

One hundred forty-five (145) line of duty injuries involving cardiac incidents were suffered during physical encounters. A distinction was established based on the operational characteristics of policing and law enforcement functions and the physical stresses and strains on police and law enforcement officers' everyday tasks. The criteria for the distinction were similarly based on the distinction between a regular line of duty injury and a line of duty injury suffered during a physical encounter. The entire Study Group lost nearly three (2.8) days per line of duty injury resulting in a cardiac injury during a physical encounter. However, there was virtually no variance in the amount of days lost relative to the age categories. The Younger Aged Sub Cohort lost nearly three (2.8) days per injury as did the Middle Aged Sub Cohort (2.9) days and the Older Aged Sub Cohort (2.7). The entire Superior Fitness Sub Cohort lost nearly two (1.7) days per line of duty injury resulting in a cardiac incident involving a physical encounter, however, the amount of line of duty injuries for both the entire Study Group and SFSC was too small to extract any valid conclusions regarding a trend analysis over the course of the entire Study Period.

Days Lost from Line of Duty Injuries from incidents involving Firearms incident trauma (Entire Study Group and Superior Fitness Sub Cohort)

There were two hundred sixty-five (265) line of duty incidents involving trauma as the result of a firearms incident. The many reasons why police or law enforcement officers report that they suffer (and how much suffering) from trauma is outside the domain and scope of this type of research. When and if someone suffers from a traumatic incident can be related to physical fitness, however, it should be studied

primarily within psychological research contexts. Therefore, a physical performance trend analysis over a period of time is of no utility, given the type and limited amount of injuries. Overall, the entire Study Group lost approximately six (5.7) days per line of

MEAN LINE OF DUTY INJURY DAYS LOST FROM FIREARMS-RELATED TRAUMA DURING ENTIRE STUDY PERIOD

ENTIRE STUDY GROUP AND SUPERIOR FITNESS SUB COHORT (SFSC)

STUDY GROUP	MEAN DAYS LOST PER LINE OF DUTY INJURY DURING FROM FIREARMS-RELATED TRAUMA DURING ENTIRE STUDY PERIOD
ENTIRE STUDY GROUP	**5.7**
YOUNGER AGED SUB COHORT	**1.5**
MIDDLE AGED SUB COHORT	**13.5**
OLDER AGED SUB COHORT	**2.0**
ENTIRE SUPERIOR FITNESS SUB COHORT (SFSC)	**5.7**
YOUNGER AGED SUB COHORT WITHIN SFSC	**3.3**
MIDDLE AGED SUB COHORT WITHIN SFSC	**10.9**
OLDER AGED SUB COHORT WITHIN SFSC	**2.9**

duty injury involving trauma from a firearms incident over the course of the entire Study Period. The Younger Aged Sub Cohort lost one and one-half (1.5) days, the Middle Aged Sub Cohort lost thirteen and one-half (13.5) days, and the Older Aged Sub Cohort lost two (2) days, and the entire Superior Fitness Sub Cohort (SFSC) also lost approximately five and one-half days per line of duty injury involving trauma from a firearms incident. The substantial variance in the Middle Aged Sub Cohort is the result of one (1) incident, when that outlier is removed, the average days lost is reduced to one and one-half (1.5) days.

Overall, the entire Study Group lost approximately seven (7.1) days per line of duty injury involving a cardiac incident throughout the entire Study Period. Members of the Younger Aged Sub Cohort lost approximately four and one-half (4.6) days per line of duty injury involving a cardiac incident, members of the Middle Aged Sub Cohort lost seven (7.0) days, and members of the Older Aged Sub Cohort lost nearly ten (9.8) days per line of duty injury involving a cardiac incident. The mean annual residual for the entire Study Group utilizing the RMAM was two (2.1) days, a slight improvement from the CMAM of nearly two and one-half (2.3) days average residual. Members of the Younger Aged Sub Cohort lost two (2) days per line of duty injury involving a cardiac incident during Interval 1 and slightly more than five (5.1) days during both Interval 2 and Interval 3. Members of the Middle Aged Sub Cohort lost approximately ten and one-half (10.4) days during Interval 1, four and one-half (4.7) days during Interval 2, and approximately four and one-half (4.4) days during Interval 3. Members of the Older Aged Sub Cohort lost nearly two (1.8) days per line of duty injury involving a cardiac incident during Interval 1, fifteen and one-half (15.5) days during Interval 2, and nearly sixteen and one-half (16.4) days during Interval 3. Members of the entire Superior Fitness Sub Cohort (SFSC) suffered ten (10) line of duty injuries involving a cardiac incident during the Study Period, rendering physical performance trends over the entire Study Period of limited utility. Members of the SFSC lost nearly ten (9.8) days per line of duty injury involving a cardiac incident. However, the large average annual residual of slightly more than six (6.1) days is tantamount to the variability due to the amount of injuries.

Hypothesis Number Three (3)

Model Two (2), the **Physical Performance Major Health Event Probability Analysis** was constructed exclusively to test Hypothesis Number Three (3), that stated **"As Police Officers Age, they are more likely to suffer from a debilitating injury or cardiovascular disease resulting in a disability pension."** Model Two (2) was constructed as a complement to the Physical Performance Trend Analysis. The research endeavor for Hypothesis Number Two (2) was to test the relationship between increasing age and the likelihood of obtaining a disability pension. Given the significance and rarity of chronic sick designation as a health event, chronic sick designation was incorporated as a variable in Model Two (2).

Model Two (2)

Physical Performance Major Health Event Probability Analysis

The intent of Model Two (2) was to measure the presence or absence of a correlation between age category and significant one-time health events occurring during Interval 1, Interval 2, and Interval 3. The dependent variables in the logistic regression equation were seven variables in Interval 1 (line of duty injury suffered in the Police Academy, Chronic Sick Designation during Interval, Heart Disability Application, Accident Disability Application, Ordinary Disability Application, a Cardiac Incident, and three (3) or more line of duty injuries suffered by those members of the Study Group in the top twentieth (20^{th}) percentile in terms of Exposure and Activity). Six (6) dependent variables were used for analyses in Interval 2 and Interval 3, Chronic Sick Designation during Interval, Heart Disability Application, Accident Disability Application, Ordinary Disability Application, a Cardiac Incident, and three (3) or more line of duty injuries

suffered by those members of the Study Group in the top twentieth (20^{th}) percentile in terms of Exposure and Activity). The entire Study Period was used for three (3) dependent variables, Heart or Accident Disability Application, Any Disability Application, and Any Cardiac Incident.

As noted in Chapter Eight (8), the dependent variables were coded and scaled for Model Two (2) as a "yes" or "no" answer to determine the percentage increase or decrease in the likelihood of a significant major health event with increasing age. The significant variables during Interval 1 were line of duty injury in the Police Academy and Chronic Sick Designation. A one (1) unit increase in age category from the Younger Aged Sub Cohort to the Middle Aged Sub Cohort or Middle Aged Sub Cohort to the Older Aged Sub Cohort increases the chances of injury in the line of duty while in training at the Police Academy by one percent (1%).

The Middle Aged Sub Cohort had a one percent (1%) greater likelihood of getting injured in the line of duty at the Police Academy than the Younger Aged Sub Cohort and the Older Aged Sub Cohort had a one percent (1%) greater likelihood than the Middle Aged Sub Cohort of getting injured in the line of duty while in training at the Police Academy. This variable was significant beyond the .05 level, ($p = .03$) meaning that the results are truly based on the data ninety five percent (95%) of the time and not due to chance. Statistical models using categorical (as opposed to continuous) data variables are generally considered significant when the level of significance is more than 90% ($p < .10$).

The Middle Aged Sub Cohort had a two percent (2%) decreased likelihood of being designated chronic sick than the Younger Aged Sub Cohort and members of the

Older Aged Sub Cohort had a two percent (2%) decreased likelihood than the Middle Aged Sub Cohort being designated chronic sick, meaning that within the Study Group, increasing age lessens the chances of chronic sick designation. This variable was significant beyond the .01 level (p = .009).

The significant variables during Interval 2 were Chronic Sick Designation, Heart Disability Applications and Cardiac Incidents. Members of the Study Group decreased the likelihood of Chronic Sick designation by three percent (3%) with each successive increase in age category during Interval 2 and this variables equation was significant (p = .004) beyond the .01 level. Members of the Study Group increased their likelihood of filing for Heart Disability Applications slightly more than two percent (2.2%) and cardiac incidents (2.3%) with each increase in age category. The Heart Disability dependent variable equation was significant (p = .001) beyond the .01 level and the Cardiac Incident was significant (p = .0004) was also significant beyond the .01 level.

The significant variables during Interval 3 were also Chronic Sick Designation, Heart Disability Applications, and Cardiac Incidents. Members of the Study Group decreased the likelihood of Chronic Sick designation by approximately two and one half (2.3%) percent with each successive increase in age category during Interval 3 and this variable's equation was significant (p = .004) beyond the .01 level. Members of the Study Group increased their likelihood of filing for Heart Disability Applications three percent (3%) and cardiac incidents nearly three and one half percent (3.4%) with each increase in age category during Interval 3.

MODEL TWO (2)

Physical Performance Major Health Event Probability Analysis
Dependent Variable Co-Efficient Values, Percentage Change, and Levels of Significance

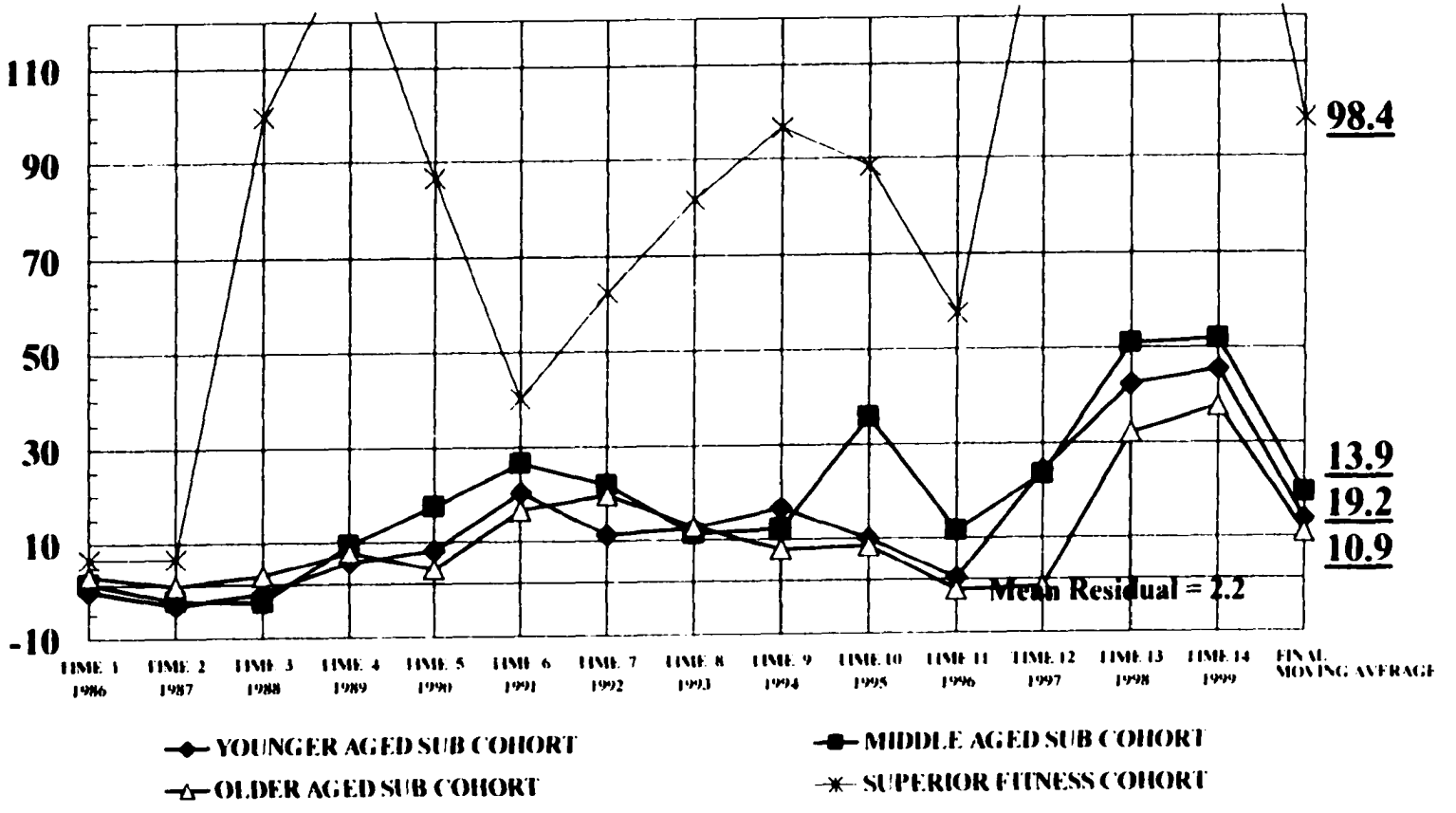
	Beta Co-efficient Value	Percentage Change With increasing Age Category	Significance
INTERVAL 1			
Police Academy Injury	**.25**	**1 %**	***p* < .05 (.03)**
Chronic Sick Designation	**-.20**	**- 2 %**	***p* < .01 (.009)**
Disability Application - Heart	.16	.3 %	.28
Disability Application - Accident	-.11	-.4 %	.41
Disability Application - Ordinary	-.09	-.3 %	.51
Cardiac Incident	.20	.4 %	.28
3 or More Line of Duty Injuries involving Physical Encounter (Top 20th Percentile)	-.03	-.7 %	.79
INTERVAL 2			
Chronic Sick Designation	**-.27**	**-3 %**	***p* < .01 (.004)**
Disability Application – Heart	**.46**	**2.2 %**	***p* < .01 (.001)**
Disability Application - Accident	.04	.3 %	.70
Disability Application - Ordinary	.03	.3 %	.76
Cardiac Incident	**.49**	**2.3 %**	***p* < .01 (.000)**
3 or More Line of Duty Injuries involving Physical Encounter (Top 20th Percentile)	-.09	- 2 %	.33
INTERVAL 3			
Chronic Sick Designation	**-.22**	**-2.3 %**	***p* < .01 (.004)**
Disability Application – Heart	**.41**	**3 %**	***p* < .01 (.001)**
Disability Application - Accident	.004	.1 %	.96
Disability Application - Ordinary	.05	.7 %	.52
Cardiac Incident	**.50**	**3.4 %**	***p* < .01 (.000)**
3 or More Line of Duty Injuries involving Physical Encounter (Top 20th Percentile)	-.07		.38
ENTIRE STUDY PERIOD			
Disability Application - Heart or Accident	.07	1 %	.43
Disability Application-Any	.1	1 %	.20
Cardiac Incident	**.40**	**2 %**	***p* < .01 (.002)**

MODEL 3

POLICING PERFORMANCE TREND ANALYSIS

RUNNING MOVING AVERAGE MODEL (RMAM)

ENTIRE STUDY GROUP AND ENTIRE SUPERIOR FITNESS SUB COHORT

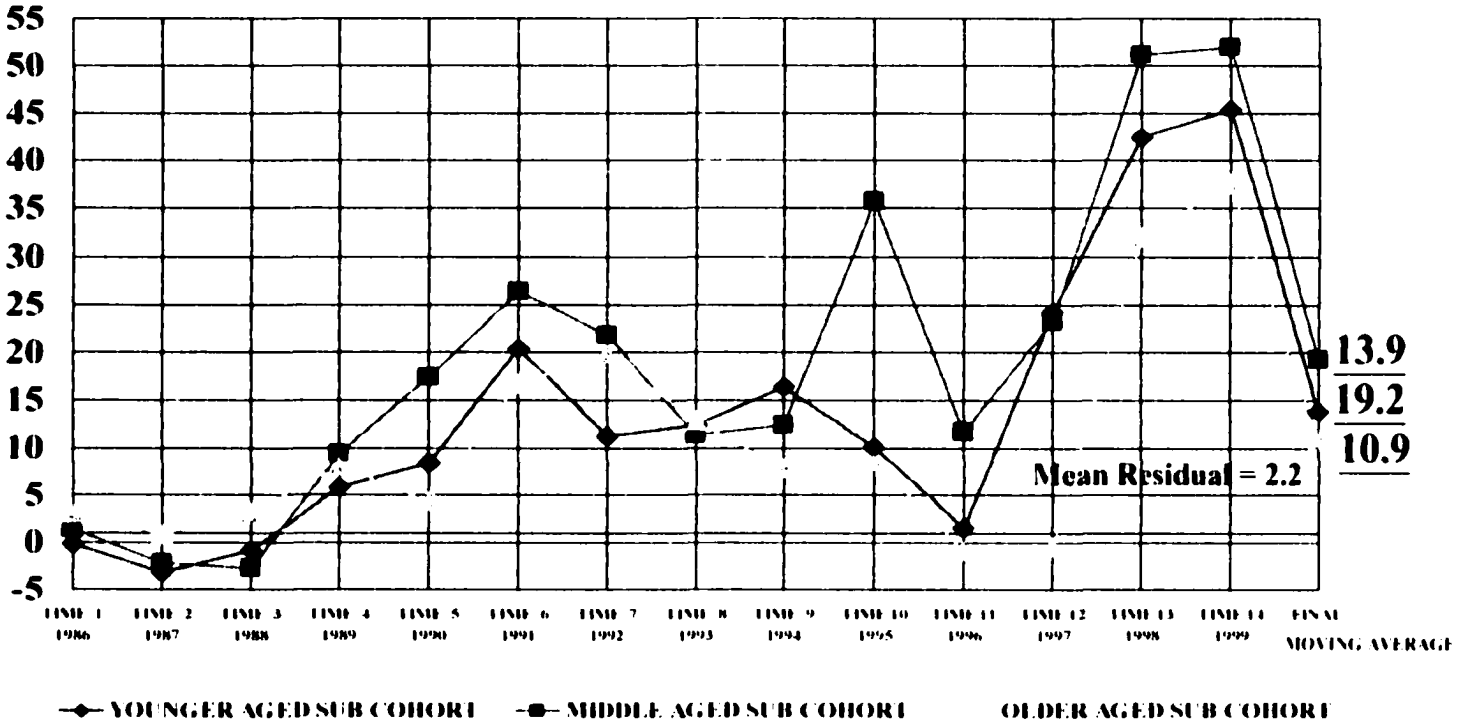


MODEL 3

POLICING PERFORMANCE TREND ANALYSIS

RUNNING MOVING AVERAGE MODEL (RMAM)

ENTIRE STUDY GROUP EXCLUDING SUPERIOR FITNESS SUB COHORT



The Heart Disability dependent variable equation was significant (p = .001) beyond the .01 level and Cardiac Incidents were significant (p =.000) significant beyond the .01 level.

Three (3) major health event variables were analyzed for the entire Study Period, Heart or Accident Disability Application, Any Disability Application and Cardiac Incidents and the only significant variable equation of these three (3) dependent variables was Cardiac Incidents. Members of the Study Group had a two percent (2%) increase in the likelihood of suffering a Cardiac Incident with each increasing age category during the entire Study Period. This equation was significant (p = .002) beyond the .01 level.

Four (4) major health event variables analyzed in Model Two (2) were significant, line of duty injury while at training at the Police Academy, chronic sick designation, Heart Disability applications, and Cardiac Incidents. Although the percentage increases and decreases in the dependent variables are small with increases in the independent variables, they should be considered notable considering the size of the Study Group. For example, a three percent (3%) increase translates to the Study Period of approximately fifty (50) to sixty (60) members of the Study Group, depending on during what Time Period or Interval the Study Group is being measured, therefore, the four (4) significant variables should be considered valid measures of the Study Groups major health event performance.

Model Three (3)

Policing Performance Trend Analysis

Model Three (3) was constructed similar to Running Moving Average Model (RMAM) of Model One (1), however, Model Three (3) was designed as a complement to

Model One (1) and Model Two (2) in that it measured policing performance over the course of the entire Study Period and during each successive Time Period and Intervals as opposed to physical and health performance that was measured in Model One (1) and Model Two (2). The purpose of constructing Model Three (3) was to supplement the three (3) central hypotheses. For example, if there are significant and substantially differences in physical performance, are there other positive policing performance attributes that balances the negative physical performance, if any, of older police officers? Model Three (3) was constructed to contribute to the triangulation and comprehensiveness of the performance of the entire Study Group.

Thirteen (13) policing performance variables were coded and scored based upon the Policing Performance Scale (PPS) point system and these scores were calculated over the course of the Study Period to measure variances in policing performance relative to age categories throughout the Study Period. As noted previously, the policing performance of the Younger Aged Sub Cohort, the Middle Aged Sub Cohort, the Older Aged Sub Cohort, and the entire Superior Fitness Sub Cohort (SFSC) were compared and contrasted in Model Three (3).

The SFSC clearly outperformed the entire Study Group during the entire Study Period with a final PPS score of ninety-eight (98) points. The Younger Aged Sub Cohorts final PPS score was nearly fourteen (13.9) points, the Middle Aged Sub Cohort final PPS score was slightly more than nineteen (19.2) points, and the Older Aged Sub Cohort final PPS score was nearly eleven (10.9) points. The average annual residual for Model Three (3) utilizing the RMAM was nearly fifteen (14.7) points, signifying

significant variance but also an improvement over the average annual residual of slightly more than sixteen (16.1) points when utilizing the CMAM.

The PPS point scores were relatively small due to the lack of eligibility for promotions for Study Group members during the first two (2) years of the Study Period but then increased substantially during the entire Study Period. The largest increase occurred during Interval 3. The PPS point score mean for the entire Study Group (excluding the SFSC) during Time Period 1 was nearly one and one-half (1.4) and by Time Period 14, the PPS point score mean was forty-five (45). The PPS point score for the Younger Aged Sub Cohort during Time 1 was approximately negative one tenth (-.13) while the Middle Aged Sub Cohort scored nearly one and one-half (1.4) and the Older Aged Sub Cohort scored nearly three (2.94) on the PPS during Time Period 1. The (SFSC) scored nearly seven (6.8) during Time Period 1.

The entire Study Groups PPS point score mean for Interval 1 was three and one-half (3.5) and the Superior Fitness Sub Cohort PPS point score mean was sixty-seven and one-half (67.5). The Younger Aged Sub Cohort PPS point score mean during Interval 1 was two (2), the Middle Aged Sub Cohort PPS point score mean during Interval 1 was approximately four and one-half (4.7), and the Older Aged Sub Cohort PPS point score mean during Interval 1 was nearly four (3.8) during Interval 1.

The PPS point score means increased substantially during Interval 2 and Interval 3. The entire Study Groups PPS point score mean for Interval 2 was nearly sixteen and one-half (16.3) during Interval 2 and approximately twenty-six and one-half (26.7) during Interval 3. Once again, the SFSC substantially outperformed the entire Study Group with a mean PPS point score during Interval 2 of nearly seventy-four (73.8) during Interval 2

and nearly one hundred sixty-eight (167.8) during Interval 3. The Younger Aged Sub Cohort PPS point score mean during Interval 2 was nearly sixteen (15.9) during Interval 2 and approximately twenty-eight and one-half (28.4) during Interval 3. The Middle Aged Sub Cohort PPS point score mean during Interval 2 was nearly twenty-one and one-half (21.6) during Interval 2 and thirty-four and one-half (34.5) during Interval 3. The Older Aged Sub Cohort PPS point score mean during Interval 2 was slightly more than thirteen (13.2) and slightly more than seventeen (17.1) during Interval 3.

Overall, the SFSC substantially and consistently outperformed the entire Study Group relative to overall policing performance throughout the Study Period while the Middle Aged Sub Cohort outperformed both the Younger Age Sub Cohort and the Older Aged Sub Cohort when the SFSC was excluded.

Model One (1), Model Two (2), and Model Three (3) were designed to test the physical and policing performance of the Study Group over the entire Study Period and during the annual Time Periods and Intervals to test the central hypotheses of the analysis. The portion of Hypothesis Number One (1) was clearly proven with respect to amount of recovery time for injuries sustained in the line of duty. Model One (1) clearly exhibited that the physical performance of police officers declines substantially as they age, even when controlling for attainment of superior and sustained physical fitness. However, the descriptive statistics revealed that younger police officers were more likely to report sick although older police officers averaged more days on sick report per occurrence. Therefore, the sick leave portion of Hypothesis Number One (1) remains unproven based upon the results of this research.

Hypothesis Number Two (2) was clearly proven. The physically fit Superior Fitness Sub Cohort (SFSC) did out perform the entire Study Group; however, the decline in physical performance was also a function of age. Older, physically fit members of the SFSC required longer periods of recovery time for injuries sustained in the line of duty when compared to younger, physically fit members of the SFSC during the course of the Study Period.

Overall, Hypothesis Number Three (3) met with mixed findings regarding disability pensions. However, Hypothesis Number Three (3) was clearly proven with respect to prevalence of cardiovascular disease and aging police officers. However, there was no clear evidence that disability pensions were more prevalent with aging police officers. Model Two (2) analyzed significant one-time health events over the entire Study Period. The only clear conclusions from the findings obtained from the analyses in Model Two (2) were that older police officers were more likely than younger police officers to incur a cardiac injury and that younger police officers more likely than older police officers to be designated as chronic sick.

Model Three (3) was intended to measure the overall policing performance of the entire Study Group to determine if there are any correlation between age and policing performance. The entire Superior Fitness Sub Cohort (SFSC) clearly outperformed the entire Study Group. When the SFSC was excluded, the Middle Aged Sub Cohort outperformed both the Younger Aged Sub Cohort and the Older Aged Sub Cohort. The Younger Aged Sub Cohort fared slightly better than the Older Aged Sub Cohort relative to policing performance throughout the Study Period.

MEAN RESIDUALS WHEN COMPARING RUNNING MOVING AVERAGE MODEL (RMAM) WITH CLASSIC MOVING AVERAGE MODEL (CMAM)

MODEL ONE (1) AND MODEL THREE (3)

VARIABLES	MEAN RESIDUAL	
	RMAM	CMAM
MODEL ONE (1)		
ENTIRE STUDY GROUP		
DAYS LOST PER LINE OF DUTY INJURY	2.2	2.4
DAYS LOST PER LINE OF DUTY INJURY-PHYSICAL ENCOUNTERS	2.3	2.4
DAYS LOST PER LINE OF DUTY INJURY-VEHICLE ACCIDENTS	5.6	7.7
DAYS LOST PER LINE OF DUTY INJURY-EXPOSURE INCIDENTS	1.8	4.3
SUPERIOR FITNESS SUB COHORT (SFSC)		
DAYS LOST PER LINE OF DUTY INJURY	2.2	2.1
DAYS LOST PER LINE OF DUTY INJURY-PHYSICAL ENCOUNTERS	7.2	11.0
DAYS LOST PER LINE OF DUTY INJURY-VEHICLE ACCIDENTS	5.6	7.7
DAYS LOST PER LINE OF DUTY INJURY-EXPOSURE INCIDENTS	1.8	4.3
MODEL THREE (3)		
ENTIRE STUDY GROUP AND ENTIRE SFSC	24.4	32.5
ENTIRE STUDY GROUP EXCLUDING SFSC	14.7	16.1

V. POLICY ISSUES AND IMPLICATIONS FOR EXISTING LITERATURE

Chapter Eleven

Conclusion, Discussion, and Policy Issues

Conclusion

This research has attempted to build upon prior studies of policing and aging by conducting a sound and lengthy methodological design that accurately captures the complex phenomena of aging, work performance, and physical decline with age and the effect that decline may have on work ability and policing performance. The decline of work ability and work performance in policing, from an organizational policy perspective, may be costly in various terms relative to personnel resources and necessary management objectives. Government resources, particularly public safety monetary budgets are perpetually strained and under increasing pressure given the increased costs of public safety due to the need for effective policing and law enforcement. Also, contemporary terrorism awareness and consequent additional expenditures for homeland security protections adds to the financial strains of already-burdened large urban police agencies in cities such as New York, Washington D.C., Philadelphia, Boston, Chicago, and Los Angeles. Police and law enforcement agencies must now realize the most efficient utilization of their personnel resources, particularly micro-management of line and supervisory staff to achieve the objectives of the agency in the most cost effective manner.

The central hypotheses of this attempted to determine if there were any significant correlations to physical and performance declines of police officers in the New York Police Department (NYPD) as they age. The Study Group consisted of three thousand

twelve (3,012) police officers hired by the NYPD during the calendar year 1985 and their physical and policing performance were analyzed for approximately fifteen (15) calendar years (the Study Period) through December 31, 2000. The Study Group was divided evenly into three (3) separate "sub cohorts" (three (3) separate groups, lowest 33rd percentile, middle 33rd percentile, and oldest 33rd percentile) based upon their chronological ages at time of appointment to the NYPD. The youngest aged sub cohort was entitled the "Younger Aged Sub Cohort", the middle-aged sub cohort was entitled the "Middle Aged Sub Cohort", and the oldest aged sub cohort was entitled the "Older Aged Sub Cohort." Additionally, another sub cohort, entitled the "Superior Fitness Sub Cohort" (SFSC) consisted of ninety-one (91) Study Group members extracted from the entire Study Group based upon their attainment of superior physical fitness in the Police Academy and throughout the Study Period. The SFSC was compared to the entire Study Group. Additionally, the SFSC was dividend into three (3) aged sub cohorts based upon the age categories of the aged sub cohorts within the Study Group for analyses within the SFSC.

Three (3) separate statistical models were specifically designed and constructed to test the central hypotheses, Model One (1), Model Two (2), and Model Three (3). Model One (1) was entitled the "Physical Performance Trend Analysis" and Model One (1) measured the physical performance of the Study Group relative to days lost per line of duty injury for all of the fourteen thousand two hundred seventy-nine (14,279) line of duty injuries suffered by the Study Group over the course of the Study Period. The Policing Exposure and Activity Rate Score was also created and employed for Model One (1) to control for the variations in policing assignments and tasks and workload and

motivation of individual police officers. Model Two (2) was entitled the "Physical Performance Major Health Event Probability Analysis" and Model Two (2) measured the log-likelihood of a major health event occurring to a member of the Study Group and compared the likelihood amongst the Younger Aged Sub Cohort, the Middle Aged Sub Cohort, and the Older Aged Sub Cohort. Model Three (3) was entitled the "Policing Performance Trend Analysis" and Model Three (3) compared the policing performance as measured by positive performance measures such as promotions, arrest activity, performance ratings and negative policing measures such as civilian complaints and disciplinary performance of the Study Group through the course of the Study Period based upon a point scale system constructed under the Policing Performance Scale (PPS). The three (3) models were constructed to comprehensively measure and test policing performance of the Study Group, the selected Sub Cohorts both throughout the entire Study Period and at annual time periods and at specific blocks of time periods.

Model One (1)

Physical Performance Trend Analysis

Model One (1) tested the physical performance of the Study Group throughout the Study Period as measured by days lost (or days out of work from "recovery time") as the result of line of duty injuries. Overall, there was a significant and substantial correlation between age category and days lost per line of duty injury. The oldest police officers spent more days recovering from line of duty injuries than younger police officers. The Older Aged Sub Cohort, lost three (3.1) more days per line of duty injury than the Younger Aged Sub Cohort and two (2) more days per line of duty injury than the Middle Aged Sub Cohort. Given the rate and frequency that NYPD police officers sustain line of

duty injuries, this finding was very significant. When the line of duty injuries were more closely analyzed into the circumstances and type of line of duty injuries, the relationship remained the same as the overall days lost per line of duty injury. The primary "sub type" of line of duty injury analyzed were line of duty injuries involving physical encounters. This sub type of line of duty injuries were analyzed because of their association of common policing tasks and amount of days lost per line of duty injury while effectuating these tasks. Once again, the older the police officer, the more days that were lost per line of duty injury. Overall throughout the Study Period, the average days lost for these types of line of duty injuries for the Older Aged Sub Cohort was nearly two and one-half (2.4) days more than the Younger Aged Sub Cohort and slightly more than one (1.1) more day than the Middle Aged Sub Cohort.

Line of duty injuries suffered during vehicle accidents while on duty was another sub type of line of duty injury closely analyzed due to the primacy of everyday policing tasks. Police officers in the Older Aged Sub Cohort lost slightly more than five (5.3) days than the Middle Aged Sub Cohort. The Middle Aged Sub Cohort lost only one-fifth (.2) more days per line of duty injury than the Younger Aged Sub Cohort, a nominal increase. Other sub types of line of duty injuries analyzed were exposure incidents to certain exposures such as human and animal bites and certain communicable diseases such as tuberculosis. The increase in days lost for these types of injuries when correlated to age category was nominal. Police officers in the Older Aged Sub Cohort lost slightly more than three (3.2) days per line of duty injury involving exposure incidences, while police officers in the Middle Aged Sub Cohort also lost slightly more than three (3.1) days per line of duty injury involving these types of injuries while police officers in the

Younger Aged Sub Cohort lost slightly more than one (1.2) days per line of duty injury involving these type of injuries. Other sub types analyzed were line of duty injuries involving cardiac incidents and line of duty injuries as the result of trauma from use of firearm incidences. These sub type of line of duty injuries were too small in number to make any valid comparisons and conclusions.

The Superior Fitness Sub Cohort (SFSC) was compared to the rest of the Study Group but the main focuses of the comparisons were the aged sub cohorts within the SFSC. The purpose of these analyses was to test the relationship between physical decline and age when controlling for superior physical fitness. The entire SFSC lost one (1) less day per line of duty injury when compared to the entire Study Group throughout the entire Study Period, however, the relationship between the aged sub cohorts *within* the SFSC was the same as the entire Study Group, the Older Aged Sub Cohort within the SFSC lost more days than the Middle Aged Sub Cohort within the SFSC. The Middle Aged Sub Cohort within the SFSC lost more days than the Younger Aged Sub Cohort within the SFSC. The relationship also remained the same for the sub type of line of duty injuries; physical encounters, vehicle accidents, and exposure incidents. The SFSC generally lost fewer days than the entire Study Group, however, older police officers within the SFSC loss fewer days per line of duty injury than younger police officers.

Model Two (2)

Physical Performance Major Health Event Probability Analysis

The purpose of Model Two (2) was to measure significant one time health events that are hard to measure over the course of a long period of time such as the fifteen (15) year period used for this research based on the significance of the event. Model Two (2)

also differed significantly in the statistical model employed. Model Two (2) utilized a non-linear, log-likelihood percentage ratio of two (2) possible outcomes. Two (2) major health events proved significant when comparing the Younger Aged Sub Cohort, the Middle Aged Sub Cohort, and the Older Aged Sub Cohort. The SFSC was not analyzed in Model Two (2) due to the possible distortion of results because of their small number. During the entire Study Period, the likelihood of a cardiac incident increased by two percent (2%) as age category increased by one (1) unit, meaning that the Middle Aged Sub Cohort had a two percent (2%) greater chance of a cardiac incident than the Younger Aged Sub Cohort and the Older Aged Sub Cohort had a two percent (2%) greater chance of a cardiac incident than the Middle Aged Sub Cohort and a four percent (4%) greater chance of a cardiac incident than the Younger Aged Sub Cohort. This increase in chances of a cardiac incident was also consistent throughout the Study Period, as each five (5) year-interval was tested.

The other significant variable tested in Model Two (2) was chronic sick designation. The likelihood of chronic sick designation decreased with age category at every interval tested. Older police officers were consistently less likely than younger police officers to be designated chronic sick. During the first five (5) year period of the Study Period, the likelihood of chronic sick designation decreased by two percent (2%) with each successive increase in age category, three percent (3%) during the next five (5) year interval, and approximately two and one-half (2.3%) percent during the last five (5) year interval.

Model Three (3)

Policing Performance Trend Analysis

Model Three (3), the "Policing Performance Trend Analysis" analyzed the policing performance of the aged sub cohorts within the entire Study Group and the entire Superior Fitness Sub Cohort (SFSC) and compared their policing performance throughout the Study Period. The entire Study Group, individual sub cohorts, and SFSC, improved their policing performance dramatically throughout the Study Period. When individual age sub cohorts and the SFSC were compared, the SFSC substantially outperformed the entire Study Group and all of the aged sub cohorts. The Middle Aged Sub Cohort outperformed the Older Aged Sub Cohort and the Younger Aged Sub Cohort outperformed the Older Aged Sub Cohort when the SFSC was excluded from the analysis.

The Central Hypotheses

Hypothesis One (1)

"As Police Officers age, they suffer from substantially longer periods of recovery from injuries suffered in the line of duty and use more sick leave time for both injuries sustained in the line of duty and regular illnesses."

Hypotheses One (1) was both proved and disproved. Model One (1) clearly proved that as police officers age, they suffer from substantially longer periods of recovery from injuries, specifically line of duty injuries. The physical decline, consistent with aging and physical performance research, is steady throughout the middle twenties and early thirties but then accelerates in the middle thirties. Therefore, substantial decrement begins in the middle thirties and then stabilizes toward the end of the police

officers' careers, possible due to a reduction in exposure to dangerous conditions. The majority of line of duty injuries occur during the police officers first ten years thereby limiting the decrement analysis to the first two (2) intervals for overall line of duty injuries. Days lost from injuries involving physical encounters stabilized during Interval 3, but did not decrease at the same rate of the overall line of duty injuries.

The second half of Hypotheses One (1) remains unproven. Although older police officers use more sick days per sick occasion, younger police officers are more likely to report sick and be designated chronic sick. There was also no relationship regarding sick occurrences and sick days lost and the Superior Fitness Sub Cohort. Regarding regular sicknesses and the entire Study Group, there is a direct correlation between age and days lost, increasing age category increases the amount of days lost, however, the increase is not substantial.

Hypothesis Number Two (2)

"There is also significant decline in physical performance amongst physically fit Police Officers. As physically fit Police Officers age, they are also likely to suffer longer recovery time periods for injuries sustained in the line of duty."

Hypotheses Number Two (2) was clearly proven. Comparing the Superior Fitness Sub Cohort (SFSC) to the entire Study Group and comparing and contrasting the aged sub cohorts within the SFSC displays substantially evidence to prove the postulates of Hypotheses Two (2). Physically fit older police officers lost more days per line of duty injury than younger, physically fit police officers.

Hypothesis Number Three (3)

"As Police Officers age, they are more likely to suffer from a debilitating injury or cardiovascular disease resulting in a disability pension."

Hypotheses Number Three (3) was fragmentally proven, but overall, it was disproved. Older police officers were more likely to suffer cardiovascular disease resulting in a disability pension; however, there was neither a substantial or significant correlation between age category and other debilitating injuries resulting in disability pensions.

DISCUSSION

This research, as any research analyses, was limited to available measures of policing performance. This research could not possibly measure all aspects related to policing, aging and the correlation between aging and police performance. Older persons, and therefore, older police and law enforcement officers, are generally more mature. However, maturity and life experience and utilization of life experience as a positive policing measure is hard to capture and quantify. Common sense dictates that the general public would probably prefer to interact with older, mature police officers and that mature police officers make better overall employees. General courtesy and helpfulness during public interactions were not measured in this study. Other measures of police performance such as thoroughness in completing basic day-to-day tasks such as proper field investigations adequate dispute resolutions were also not measured. Also, the ability to function as part of a team, a necessary skill in policing, was also not measured. Some of these concepts in policing and law enforcement are nearly impossible to measure; therefore, the scope of this research does have limitations. The analyses in Model Three (3) were dependent on performance evaluations, assessments that are often

"regressed to the mean" that result in protecting lower performing police officers and while failing to distinguish higher performing police officers.

Younger police officers were also more likely to attain promotions and change work assignments than older police officers. Does this mean that younger police officers are more motivated, or does it mean that older police officers are more stable and content police employees? This is another phenomena that is impossible to infer from the quantitative descriptive statistics.

There was also not an equal distribution of the Study Group. The Younger Aged Sub Cohort and the Middle Aged Sub Cohort were much closer in age than the Middle Age Sub Cohort and the Older Aged Sub Cohort. The mean of the Younger Aged Sub Cohort upon appointment was nearly age twenty-one (21) with a standard deviation of slightly more than one-half (.6), the mean of the Middle Aged Sub Cohort was nearly aged twenty three and one-half (23.5) with a standard deviation of nearly one (.8) while the mean of the Older Aged Sub Cohort was nearly age twenty-eight (27.7) with a standard deviation nearly two (1.9), meaning that their was more variation in the Older Aged Sub Cohort and the Older Aged Sub Cohort covered a wider range of ages. Therefore, the Older Aged Sub Cohort was actually more distinct than the Younger Aged and Middle Aged Sub Cohort and the aged sub cohorts were not three (3) truly even age categories.

As noted previously, this research can only be generalized to large urban police and law enforcement agencies. Many medium and smaller police and law enforcement agencies do not have the workload, operational characteristics, rate of employee turnover, or the transitory nature of large police and law enforcement agencies.

POLICY ISSUES

Policy considerations related to policing personnel issues compel policy makers to achieve management objectives while preserving valuable resources and protecting individual rights. Age restriction policy decisions are particularly difficult, considering the discriminatory nature of the policies and the life experience lost if older applicants are excluded. Policy issues regarding age restriction policies are sometimes dependent on analyses related to the maximization of resources.

Police officers in the Older Aged Sub Cohort lost nearly twelve and one-half (12.4) days per line of duty injury while the Younger Aged Sub Cohort lost more than nine (9.3) days per line of duty injury over the course of the entire Study Period. However, the entire Study Group averaged nearly five (4.7) line of duty injuries during the course of the Study Period, but the Younger Aged Sub Cohort members averaged approximately five and one-half (5.4) line of duty injuries during the Study Period. The Middle Aged Sub Cohort members averaged approximately four and one-half (4.7) line of duty injuries during the Study Period, and the Older Aged Sub Cohort averaged slighty less than four and one-half (4.3) line of duty injuries during the Study Period. A consistently higher percentage of the Younger Aged Sub Cohort members were injured in the line of duty when compared with the Middle Aged Sub Cohort and the Older Aged Sub Cohort throughout the Study Period, both in the entire Study Group and within the SFSC. The SFSC averaged approximately three and one-half (3.4) line of duty injuries during the Study Period and lost only five and one-half (5.4) days per line of duty injury during the entire Study Period and were injured in the line of duty at a substantially lower rate than the entire Study Group.

Another consideration for policymakers is the four percent (4%) increase in cardiac incidents. This small increase may not yield enough evidence to lower the maximum appointment age or the mandatory retirement age but policymakers must also consider that any change in removing the age restriction policies allowing older police officer candidates to join the NYPD or allow incumbent police officers to remain beyond the mandatory retirement age of sixty-three (63) will certainly lead to higher rates of cardiac incidences based upon the increased rates of cardiac incidences with increasing age in the general population (American Heart Association, 2003) leading to greater losses of valuable police personnel resources. The Older Aged Sub Cohort suffered double the rate of cardiac injuries (56 versus 28) in the line of duty than members of the Younger Aged Sub Cohort. This potential loss of resources based on future "Heart Bill" disability applications and retraining costs for new police officers to replace the police officers leaving on disability pensions can be significant.

Although members of the Younger Aged Sub Cohort were more likely to be designated chronic sick and report sick more often, the Older Aged Sub Cohort members lost more total sick days than the Younger Aged Sub Cohort and the Younger Aged Sub Cohort lost more total days than the Middle Aged Sub Cohort. However, serious sicknesses were directly correlated with age, an increase in age category lead to an increase in days lost. This also translates into higher monetary costs.

Currently, the minimum appointment age in the NYPD is age twenty-one (21), the maximum appointment age is age thirty-five (35) (NYPD, 2003) and the mandatory retirement age is age sixty-three (63). The policy issues involved related to this research are raising the minimum appointment age from aged twenty-one (21), retaining,

modifying, or removing the mandatory appointment age of thirty-five (35), and retaining, modifying, or removing the mandatory retirement age of age sixty-three (63).

Although Model Three (3) was constructed as a complement to Model One (1) and Model Two (2), the findings relative to the performance of the Superior Fitness Sub Cohort (SFSC) warrants further study regarding possible policy changes such as increasing incentives to attain and then maintain superior physical fitness. The SFSC substantially outperformed the entire Study Group in both physical and policing performance and are proven to be cost-effective. Although the cause and effect relationship between attainment of superior physical fitness and employee motivation is unclear, the outstanding physical and policing performance of the SFSC warrants further research, considering management objectives from a cost-benefit analysis perspective. The Older Aged Sub Cohort within the SFSC lost nearly eight (7.8) days per line of duty injury (although they were injured at approximately the same rate of the entire Study Group, 4.6 line of duty injuries per SFSC member) while the Younger Aged Sub Cohort within the entire Study Group lost more than nine (9.3) days per line of duty injury. Not only did the SFSC outperform the entire Study Group in terms of more promotions and less negative complaints, they were significantly less costly employees in terms of days lost from line of duty injuries and sick occurrences.

A daunting task for any policy maker when implementing discriminatory policies is the cost-benefit analysis and the prospective damage to human capital. Age restriction policies, as proven by this research, are cost-effective and even necessary for public safety in the absence of a coherent and sustained physical fitness-testing program for all police officers. The answer to one question remains elusive; Is the monetary savings and

risk to public safety worth the risk violating individual rights, and the possible risk to indignation of prospective candidates and incumbent employees and losing older candidates with valuable life experience? This is a perpetual policy-balancing act and must be incorporated in any discussion and recommendation when considering age restriction policies. Age restriction policies and future research investigating the necessity of age restriction policies should be agency-specific, based upon all available measures of policing performance within the police and law enforcement agency, and continually reviewed to maintain the balance of resource preservation, public safety, and fundamental fairness.

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