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Life Expectancy in Police Officers: A Comparison with the U.S. General Population

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Abstract: *Previous epidemiological research indicates that police officers have an elevated risk of death relative to the general population overall and for several specific causes. Despite the increased risk for mortality found in previous research, controversy still exists over the life expectancy of police officers. The goal of the present study was to compare life expectancy of male police officers from Buffalo New York with the U.S. general male population utilizing an abridged life table method. On average, the life expectancy of Buffalo police officers in our sample was significantly lower than the U.S. population (mean difference in life expectancy =21.9 years; 95% CI: 14.5-29.3; p<0.0001). Life expectancy of police officers was shorter and differences were more pronounced in younger age categories. Additionally, police officers had a significantly higher average probability of death than did males in the general population (mean difference= 0.40; 95% CI: 0.26,-0.54; p<0.0001). The years of potential life lost (YPLL) for police officers was 21 times larger than that of the general population (Buffalo male officers vs. U.S. males = 21.7, 95% CI: 5.8-37.7). Possible reasons for shorter life expectancy among police are discussed, including stress, shift work, obesity, and hazardous environmental work exposures.* [International Journal of Emergency Mental Health and Human Resilience, 2013, 15(4), pp. 217-228].

Key words: *Police, mortality, life expectancy, years of potential life lost*

Introduction

Policing in the United States presently consists of over 883,000 sworn officers and is projected to rise to 968,000 officers by 2018 (Bureau of Labor Statistics, http://www.bls.gov/). Previous epidemiological research indicates that police officers have an increased risk for death above that of the general population from many types of disease. Vena,

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Violanti, Marshall, and Fiedler (1986) found that city of Buffalo, NY police officers had increased rates for arteriosclerotic heart disease, digestive cancers, cancers of the lymphatic and hematopoietic tissues, brain cancer, and esophageal cancer. Feuer and Rosenman (1986) reported that police and firefighters in New Jersey had significantly increased proportionate mortality ratios (PMRs) for arteriosclerotic heart disease, digestive and skin cancers, and skin diseases. Demers, Heyer and Rosenstock (1992) compared police and firefighters in three cities in the U.S. and found police to have higher rates for all causes of death combined. Forastiere, Perucci, DiPietro, Miceli, Rapiti, Bargagli, and Borgia (1994) studied a cohort of urban policemen in Rome, Italy, and found increased death rates for ischemic heart disease in officers less than 50 years of age [Standardized Mortality Ratio (SMR)=1.63], colon cancer (SMR=1.47), bladder cancer (SMR=1.27), non-Hodgkin's lymphoma (SMR=1.51), and melanoma (SMR=2.34). Bladder cancer death rates were significantly increased for patrol car drivers (odds ratio (OR) =5.14) and kidney cancer for motorcycle officers (OR=2.27).

Violanti, Vena, and Petralia (1998) examined a 40-year police cohort of 2,593 officers (1950-1990). Results suggest that police officers have higher mortality rates from specific diseases and on average die earlier than the U.S. general population. Mortality from all causes of death combined was significantly higher [SMR =1.10; 95% confidence interval (CI) =1.04-1.17] than the U.S. general population. Mortality from arteriosclerotic heart disease was slightly yet significantly elevated (SMR=1.20; 95% CI=1.01-1.43) in officers with 10-19 years of service and represented the majority of excess deaths among diseases of the circulatory system. The average age of death for officers was 66 years of age.

Joseph and colleagues (2009) found that officers had increased levels of atherosclerosis when compared with a similarly aged civilian population sample from the same geographical region. In addition to having higher risk for traditional cardiovascular disease (CVD) risk factors, officers also have higher levels of non-traditional CVD risk factors, including a non-day shift, depression, and less sleep as compared to the U.S. general population (Hartley, Burchfiel, Fekedulegn, Andrew, & Violanti, 2012). In a study of male and female police officers from Buffalo, NY and Spokane, WA, depressive symptoms were associated with an increasing number of metabolic syndrome components and with higher odds of having the individual metabolic syndrome components (increased odds of 47.6% for hypertriglyceridemia, 51.8% for hypertension, and 56.7% for glucose intolerance based on a 5-unit increase in depression score) among Spokane male police officers (Hartley, Fekedulegn, Barbosa-Leiker, Violanti, Andrew, & Burchfiel, 2012).

The Present Study

Despite the increased risk for mortality found in previous research, controversy still exists over the life expectancy of police officers. Some of the research suggests that there is no significant difference in life expectancy between police and geographically similar working populations. An often quoted study is that of Raub (1987) that compared State Police Retirees to actuarial standard tables in the state of Illinois. Results indicated that police officers who retired during a 33-year period were more likely to be alive than other state employees. However, the study did not take into account officers' retirement age, which may have been younger than the population used to construct the actuarial tables. Mortality data on the Illinois troopers was also limited as only 10% had died at the time the study was conducted. Another study, the CalPERS Experience Study (2010) reported that California police officers lived to be approximately the same age as other state employees after retirement. However, estimates were based on the expected rather than observed age of death. Additionally, the CalPERS spanned a period of only ten years. It was unknown how complete the ascertainment of vital status was for public safety personnel.

Other studies suggest that police officers are more susceptible to earlier mortality than other populations. Franke, Collins, and Hinz (1998) in an assessment of Iowa Department of Public Safety retirees, reported a greater prevalence of self-reported diabetes, body mass index and tobacco use. After controlling for the conventional risk factors, the law enforcement occupation was still a risk factor for CVD (odds ratio=2.34, 95% CI=1.71 – 3.28). Franke et al. (1998) suggested that the law enforcement profession was associated with increased CVD prevalence not due to conventional risk factors. A recent study by Brandl and Smith (2013) found that police officers died at an earlier age than did a geographically similar employee population. Brandl compared Detroit police officers with city employees in length of retirement and age of death ($n = 7{,}325$). Retired officers died significantly younger than other retired city employees and had significantly shorter retirements prior to death.

Taking into consideration past evidence of the increased risk of mortality among police officers and the lack of research on police life expectancy, the goal of the present study was to compare life expectancy and the probability of death of male police officers from Buffalo New York vs. the U.S. general male population. This goal was accomplished by construction of an abridged life table. Additionally, we compared the ratio of years of potential life lost (YPLL) between these two populations. YPLL is an estimate of the average years a person would have lived if they had not died prematurely (Gardner & Sanborn, 1990). YPLL was calculated by subtracting the actual age of death from a predetermined minimum age. For the present study, we calculated YPLL based on an end point of the age of 75.64 years which is the average life expectancy for white males in the United States (National Center for Health Statistics, CDC, http://www.cdc.gov/nchs/fastats/lifexpec.htm).

METHODS

Sample

The police sample mortality cohort for this study consisted of 2,800 officers from Buffalo New York. Due to the small number of women and minority police officers in the cohort, analysis was limited to white males. Officers were also excluded from this analysis if they had died or were lost to follow-up before 1980, if they lacked a birth or hire date, or if they had worked < 5 years for the Buffalo, New York Police Department between January 1, 1950 and December 31, 2005. Those lost to follow-up were less than 5% of the sample. The employment status for white male officers was as follows: 14% were current officers, 65% had retired, 13% died in action (65% due to CHD and malignant neoplasms, 10% due to external causes), 7% resigned or left service, and 2% were unknown. After exclusions, the study sample consisted of 2,761 white male officers. Sources of follow-up included the benefit and pension programs of the city of Buffalo, the New York State Retirement System, New York State Vital Statistics Division, Buffalo Police employment records, Buffalo Police Association publications, obituaries, and the National Death Index (NDI). Death certificates were coded by state nosologists according to the International Classification of Diseases (ICD) revision in effect at the time of death. Codes were subsequently converted for analysis to the 8th ICD Revision (1968). Centers for Disease Control and Prevention vital statistics data were used to estimate the mortality rate of U.S. white males for the same time period as the police (1950 -2005) (National Center for Health Statistics, CDC).

Life Expectancy Tables

An abridged life table method utilizing five year age categories was used in this study since police officers represent a small portion of the U.S. population and single year ages would yield sparse data. Lower age categories were not included (<1 year, 1-4, 5-9, 10-14, 15-19, 20-24) as the starting age for police officers in the United States is generally 20-25 years of age. Life table age categories ranged from 25 to 85 years of age, starting at 25-29 and extending to 80-84 years. In cases where age of death was not reported it was calculated from date of birth and year of death. Since estimations of the probability of death are based on an abridged life table (5-year age categories), it was not necessary to adjust for random and misreported ages of death. This calculation would only be necessary when estimating probability of death for single years of age. Life expectancy and probability of death for both groups were estimated using the following formulation:

$(x, x+n)$: Age interval of interest where n is the length of the age interval

${}_nm_x$: Age-specific mortality rate for the age interval $(x, x+n)$

${}_nq_x$: Probability of dying in the age interval $(x, x+n)$

${}_nq_x = 1 - \exp(-n \times {}_nm_x)$ where exp is base of natural log (2.71828…)

I_x: Number of individuals surviving to the beginning of the age interval $(x, x+n)$

Number of individuals alive at the beginning of age x

$I_{x+n} = I_x \times (1 - {}_nq_x)$

${}_nd_x$: The number of individuals who die in the age interval $(x, x+n)$

${}_nd_x = I_x \times {}_nq_x$

${}_nL_x$: Person-years of life in the age interval $(x, x+n)$:

The number of years of life lived by the cohort within the indicated age interval

${}_nL_x = {}_nd_x \div {}_nm_x$

T_x: Total person-years of life contributed by the cohort after attaining age x

Total number of age left to be lived by all individuals who survive to the beginning of age category x

$T_x = \sum_x^{end\ of\ table} nLx$

e_x^0: Life expectancy (expected life at specified age x)

Mean number of age remaining until death for individual surviving to the beginning of age category x

$e_x^0 = T_x \div I_x$

Years of Potential Life Lost

To compute YPLL, the age-specific mortality data for U.S. white males and police officers were applied to a theoretical starting point population size of 100,000. The number of deaths for each age category was multiplied by the years of life lost (the difference between the end point age -75 years- and the midpoint of the age category) to provide an age-specific YPLL. The age-specific total YPLL were then summed to obtain the total for each age group. A ratio of YPLL between U.S. and police males was calculated.

RESULTS

Table 1 describes life expectancy and probability of death for U.S. white males vs. white male police officers. For each five year age category, from 25-85 years of age, police officers had a lower life expectancy than the U.S. population (Figure 1). The life expectancy of police officers was shorter and differences were more pronounced for younger ages. For example, an officer who lived to the beginning of age 50 during the period 1950-2005 was expected to live only 7.8 additional years while a U.S. white male for the same period was expected to live an additional 35 years. On average, the life expectancy of white male police officers in our sample was significantly lower than the U.S. white male population (mean difference in life expectancy = 21.9 years; 95% CI: 14.5-29.3; $p<0.0001$).

The probability of death was also higher among the police across all age categories (Figure 2). For example, a male police officer in the 50-54 year age category had close to a 40% probability of death compared to a 1% probability for males in the general population in that same age category. Overall, male police officers had a significantly higher average probability of death than did males in the general population (mean difference = 0.40; 95% CI: 0.26-0.54; $p<0.0001$).

Table 1.
Life expectancy and probability of death for US white male and Buffalo white male police officers.

Age Interval* (x, x+n)	U.S. Males		Male Police Officers	
	Probability of death**	Life expectancy (years)	Probability of death	Life expectancy (years)
25-29	0.001513	59.68337	0.00000	23.83368
30-34	0.001701	54.77003	0.07317	18.83368
35-39	0.002294	49.85909	0.15200	15.12316
40-44	0.003497	44.96799	0.17143	12.38581
45-49	0.005546	40.11701	0.32768	9.43116
50-54	0.008881	35.32679	0.39286	7.80932
55-59	0.013899	30.62093	0.56383	6.24481
60-64	0.021507	26.01730	0.51752	6.08567
65-69	0.032454	21.53419	0.66006	4.93176
70-74	0.048535	17.17265	0.70141	4.65351
75-79	0.072989	12.92111	0.66187	4.71227
80-84	0.111578	8.74163	0.72464	4.04267
85+	0.189792	4.52552	0.75904	3.10240

* Age interval started at 25-29 years of age- average age category of occupational entry for police officers in the U.S.
** Probability of death for US white males was based on data from National Center for Health Statistics, CDC

Figure 1.
Comparison of life expectancy: Buffalo white male police officers vs. U.S. white male population.

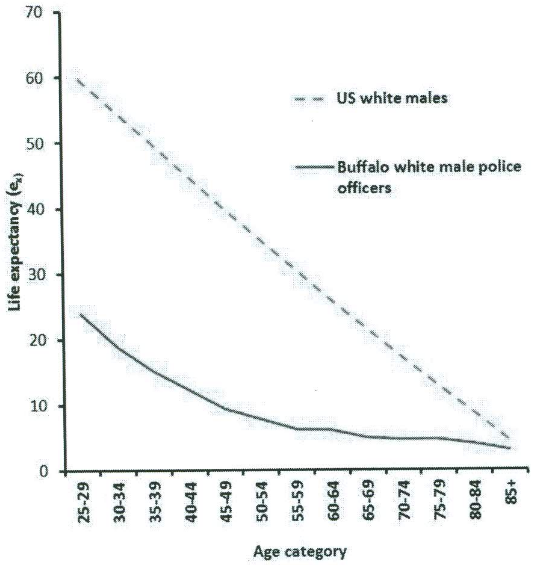


Figure 2.
Probability of Death: Buffalo white male police officers vs. U.S. male population.

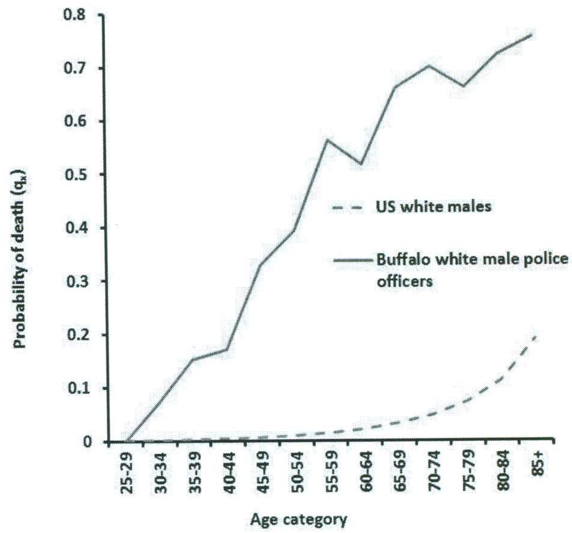


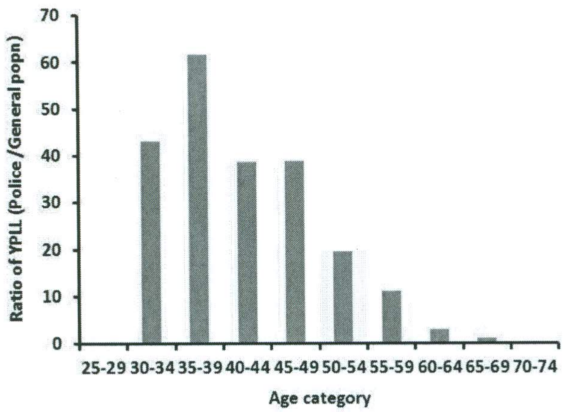
Table 2.
Age of Death and Years of Potential Life Lost (YPLL). Comparison of White Male Police Officers from Buffalo and the U.S. Male Population.

Age	Mid point of the age range	*Number of Deaths-US white males	*Number of Deaths-US white male police officers	Total YPLL white males	Total YPLL white male officers	**YPLL Ratio
25-29	27	151.33	0	7264.00	0	0
30-34	32	169.82	7317.00	7302.51	314631.00	43.08
35-39	37	228.67	14087.81	8689.83	535337.00	61.60
40-44	42	347.74	13473.57	11475.55	444627.88	38.74
45-49	47	549.60	21339.04	15388.94	597493.39	38.84
50-54	52	875.23	17200.41	20130.31	395609.59	19.65
55-59	57	1357.63	14987.81	24437.46	269780.59	11.03
60-64	62	2071.52	6000.29	26929.77	78003.89	2.89
65-69	67	3058.75	3692.39	24470.03	29539.18	1.20
70-74	72	4425.89	1333.82	13277.67	4001.47	0.30
75-79	77	6332.81	375.81	0	0	0
80-84	82	8974.28	139.12	0	0	0
85+		13561.88	40.12	0	0	0
Total				159366.11	2669024.03	21.73

*Number of deaths were computed using actual mortality rates applied to a theoretical starting population of 100,000
** Values in this column indicate the ratio between U.S. white males and male police officers in terms of potential years of life lost (YPLL).

The years of potential life lost (Table 2 and Figure 3) was higher than the general population in all police age categories and clustered primarily in younger age groups. For example, the YPLL was over 38 times larger for police in the 40-44 year age group. Overall, the years of potential life lost for police officers was 21 times larger than that of the general population (ratio of YPLL for male officers vs. U.S. males = 21.7, 95% CI: 5.8-37.7).

Figure 3.
Ratio of years of potential life lost (YPLL) for white male police officers from Buffalo NY vs. general US white males by age classes.



DISCUSSION

Our results suggest that white male police officers have an increased risk of dying at an earlier age across various age categories than does the white male general population. On average, the life expectancy of police officers in our sample was significantly lower than that of the U.S. population (mean difference in life expectancy = 21.9 years; 95% CI: 14.5-29.3; $p<0.0001$). Overall, male police officers had a significantly higher average probability of death than did males in the general population (mean difference = 0.40; 95% CI: 0.26,-0.54; $p<0.0001$).

The years of potential life lost (YPLL) measure emphasizes specific causes of death in proportion to their burden on society (Gardner & Sanborn, 1990). Romeder and McWhinnie (1977) state that potential years of life lost calculations have the objective of comparing the relative importance of different causes of death for a particular population. Our results suggest that the YPLL was significantly higher for police than it was for the general population. YPLL (Table 2) was higher is all police age categories compared to the general population and clustered primarily in younger age groups. For example, the YPLL was over 38 times larger for police in the 40-44 year age group. This result indicates that a greater number of potential years of police service are lost to death among younger officers than similar working times among the same age groups in the general population.

In present conditions of restrictive police budgets and scarce human resources, the premature loss of personnel can put an additional strain on police departments. For example, Table 3 displays the ages and potential years of life lost prior to the average retirement age of the cohort (57.1 years). During the 55-year period of this Buffalo, NY police mortality cohort (1950-2005), there were 1,538 deaths leading to 2,234 years of potential life lost due to death. This equates to 41 years of potential years of life lost annually during the period from 1950-2005. Stated differently, the department lost 41 years of service every year for 55 years due to deaths prior to the average age of retirement is this department.

Police Work Exposure and Health Outcomes

In this section we discuss some of possible exposures based on previous research, both psychosocial and physical, that may lead to disease and possible earlier death rates among police officers. Psychosocial hazards result from a complex interplay of job demands, decision-making latitude, work organization, and social interactions. Stress, post-traumatic stress disorder and suicide are examples of outcomes (Violanti & Paton, 1999). Additionally, officers are often exposed to environmental factors which may be harmful to health such as chemical hazards. Prevalent diseases associated with chemical exposure include cancer, lung disease, cardiovascular abnormalities, skin rashes, and blood related diseases. Physiological health outcomes include increased risk for CVD, cancer, and other stress related diseases. All of these can result in loss of work time and possible premature death (Violanti et al., 2006).

Stress

Seyle (1950) proposed that disease states occur when the body can no longer adapt to external stressors and remains in a state of chemical imbalance. Stress is believed to produce a neuroendocrine response which, through nervous and endocrine systems, affects all body organs. Russ et al. (2012) in a study of over 68,000 persons from the general population, found a dose-response association with risk of mortality increasing with degree of psychological stress. Psychological stress was associated with increased risk of mortality from several major causes of death, CVD being a prominent cause. Risk of mortality was higher even at lower levels of stress and remained after adjustment for somatic comorbidity, behavioral and socioeconomic factors. Black and Garbutt (2002) reported that stress-associated inflamma-

Table 3.
Years of potential life lost (YPLL) prior to the average retirement age. Buffalo, NY Police Department.

Age of death	Mid-point of age of death	Number of officers who died	Average age of retirement	YPLL due to death prior to retirement	Total YPLL
30-34	32	4	57.1	25.1	100.4
35-39	37	21	57.1	20.1	422.1
40-44	42	34	57.1	15.1	513.4
45-49	47	60	57.1	10.1	606.0
50-54	52	113	57.1	5.1	576.3
55-59	57	160	57.1	0.1	16.0
60-64	62	192	57.1	0	0
65-69	67	235	57.1	0	0
70-74	72	251	57.1	0	0
75-79	77	189	57.1	0	0
80-84	82	152	57.1	0	0
85+	85	127	57.1	0	0
Totals		1538			2234.2*

*This averages to 41 years of potential police service lost every year for 55 years.

tion may well be responsible for CVD seen in the 40% of cardiac patients who do not have pronounced conventional risk factors.

Police work has been characterized as an occupation replete with stress. Several sources of stress in police work have been identified: (1) the inherent aspect, which involves danger and job risk; (2) the police administrative organization; and (3) the stressors involved in police work such as shift work or work load (Bonner, 2000; Patterson, 2002; Spielberger, Grier, & Greenfield, 1982). Hartley et al. (2011) found that police stress, particularly organizational pressure and lack of support, was significantly and positively associated with the metabolic syndrome among female but not male police officers. Of the five metabolic syndrome components, abdominal obesity and reduced high density lipoprotein cholesterol were consistently associated with police stress in women.

Posttraumatic Stress Disorder

The Diagnostic and Statistical Manual IV-TR (DSV-IV-TR) (American Psychiatric Association, 2003) describes posttraumatic stress disorder (PTSD). The diagnostic categories include the traumatic stressor, re-experiencing the trauma, hyperarousal, numbing of affect, and avoidance of trauma related stimuli. PTSD may promote poor health through a complex interaction between biological and psychological mechanisms. PTSD also has been found to be associated with greater medical service utilization for physical health problems (Friedman & Schnurr, 1995). PTSD has been associated with high levels of co-morbidity, social and occupational impairment, and increased health care costs when compared to other mental disorders (Connor & Butterfield, 2003).

PTSD may result in police officers from exposure to traumatic events and increase the risk of health problems. Examples of such events are homicides, dead bodies, accident and assault victims, and abused children (Violanti & Paton, 1999). It is estimated that 7-19% of police officers have PTSD (Carlier, Lamberts, & Gersons, 1997; Robinson, Sigman & Wilson, 1997). Violanti et al. (2006) found that officers with severe PTSD symptoms had a nearly two-fold greater impairment in brachial artery flow-mediated dilation, an indication of subclinical CVD. A second study by Violanti et al. (2006) suggested that officers who reported higher PTSD symptoms had a three-fold higher prevalence of the metabolic syndrome than those reporting the fewest PTSD symptoms.

Shift Work

Some studies suggest that shift work may affect metabolic factors such as triglycerides, cholesterol, BMI, abdominal fat distribution and coagulation (Knutsson & Boggild, 2000). A study by Knutsson and Nilsson (1998) found that shift workers had a cluster of obesity, high triglycerides, and lower concentrations of HDL cholesterol than day workers. Ayas et al. (2003) examined self-reported irregular sleep durations in the Nurses Health Study cohort and found the relative risk for diabetes was increased (RR=1.57 for short sleepers, and RR=1.47 for long sleepers). Sleep deprivation is a common denominator in most forms of shift work in police work and has serious metabolic and cardiovascular consequences. Officers who worked nights and either had less than six hours of sleep or worked more overtime had a four-fold greater number of metabolic syndrome components than officers working the day shift (Violanti et al., 2009).

Obesity

Obesity may be a predictor of early mortality. The Prospective Studies Collaboration (2012) in a study of 900,000 adults found that at a BMI range of 30–35, median survival living time is reduced by 2–4 years; and at a BMI range of 40–45 it is reduced by 8–10 years, which is comparable with the effects of smoking. Obesity may add to health problems among police officers. A recent study suggested that overweight and obesity were more prevalent among law enforcement personnel than the general population (Ramey, Downing, & Franke, 2009) and lack of regular physical exercise is one of the occupational risk factors contributing to the higher prevalence of elevated blood pressure, metabolic syndrome, and CVD among emergency responders such as police officers (Kales, Tsismenakis, Zhang, & Soteriades, 2009).

Police officers tend to report increased food consumption, a high fat diet, and decreased physical activity in response to high levels of occupational stress (Grencik, 1973). The average BMI among male and female police officers in a recent police study was 29.2 ± 3.9 and 26.1 ± 4.6, respectively (Charles et al., 2007). These values are higher than those of adult men over the age of 20 in the general U.S. population (28.4 ± 0.14), but lower than the average for women (28.4 ± 0.19) (McDowell, Fryar, Ogden, & Flegal, 2008). Among nine Midwestern states in the U.S., nearly 83% of police officers were overweight (BMI > 25) , and similar findings were reported among retired police officers from Milwaukee (85% with a BMI > 25) (Ramey et al., 2009), which is much greater than the percentage of U.S. adults who are overweight or obese (66%).

One study found that 25% of police officers had reduced leisure-time physical activity in 1996 compared to their physical activity level in 1981 (Sorensen, Smolander, Louhevaara, Korhonen, & Oja, 2000). Similarly, 38% of officers self-reported regular exercise in 1981, whereas only 23% reported regular exercise in 1993 (Franke, Cox, Schultz, & Anderson, 1997). In another study, 9% of officers claimed they rarely exercised, 38% exercised 1-2 days a week, 32% exercised 3-4 days a week, and only 21% exercised 5 or more days a week (Richmond, Wodak, Kehoe, & Heather, 1998). These proportions are lower than the prevalence of regular physical activity (i.e. at least 30 minutes of moderate intensity physical activity most days of the week) among women (47%) and men (50%) in the general U.S. population (Kruger & Kohl, 2008).

Working night shift may precipitate poor dietary behaviors and obesity among police officers. Sleep restriction and shift work also interfere with normal dietary patterns and promote excessive consumption of calories from snacks (Nedeltcheva et al., 2009).

Environmental Work Exposures

Law enforcement officers are often exposed to chemical hazards on duty. Harmful health effects depend on the nature of substances, the magnitude of exposure, and the duration of exposure. Prevalent diseases associated with chemical exposure include cancer, lung disease, cardiovascular abnormalities, skin rashes, and blood related diseases. Clandestine drug laboratories are one example. Such labs are equipped with dangerous chemicals some of which are carcinogenic. Police officers exposed to shutting down active labs have a 7-15-fold greater risk of becoming ill during response activities (Burgess, Barnhart, & Checkoway, 1996). Lead exposure from firearms may be another health hazard. Hakan (1999) found a positive correlation of lead exposure with the number of bullets annually fired both on and off duty. Valaway (1989) found that fragmentation when the bullet strikes the target or backstop during firearm practice may also contribute to the airborne lead concentration. Fingerprint powders used by police vary in their constituents and some have been known to contain toxic components. Lead and mercury appear to be common ingredients currently used in fingerprint powders (VanNetten, Souter, & Teschke, 1990). Benzene, an organic air pollutant and human carcinogen, is often emitted into urban air supplies from motorized vehicles. Policemen working outdoors are highly exposed to traffic pollutants, and this exposure could result in a higher cancer rate amongst policemen (Forastiere et al., 1994).

Study Limitations

The results of this study should be interpreted with caution. The present research, while suggestive, requires additional prospective research and further inquiry. The Buffalo police sample was limited ($n = 2,800$) compared to the total police population in the U.S. and there were a limited number of deaths in the younger age categories. Secondly, the mortality rates for police were derived using death information for the interval period 1950-2005 while the mortality rates for the general population were averaged over consecutive five year intervals to obtain an estimate for that same time period. Life expectancy estimates in the present study may be limited in generalizability. Estimates for police officer mortality data were only from one geographic region and not from the entire U.S. Additionally, mortality data for police officers ranged over a long time span and some ecological conditions (psychosocial, technological, etc.) may have changed over time. The same is true for life expectancy in the U.S. general population. A recent report from the Institute of Medicine of the National Academies found that life expectancy in the U.S. ranked 17th for males and 16th for females among 17 countries (Institute of Medicine, 2013). Despite these limitations, this is one of the first epidemiological examinations of police life expectancy.

Suggestions for Future Research

There is a need to develop a wider database of police officer mortality that includes date and age at death of each deceased officer. For every calendar year the database should also show the number of officers alive at a given age and the number deceased in the same age. The mortality data and the number alive at the beginning of each age interval may be obtained from death registers and surveillance databases that identify occupation. This would offer a larger sample and a more complete picture to estimate life expectancy of police officers and enable full comparison with other demographic or occupational groups. If it were possible to acquire single year mortality data for police officers for the entire U.S., such data could then be compared with the general U.S. population. Additionally, a national sample would better be able to provide data on ethnic and gender mortality among police officers which is presently scarce.

Further research in the area of police mortality is only part of the solution. Police health and wellness programs are essential intervention strategies. Training in good health practices, diet, exercise and stress management are particularly important primary prevention strategies at the police training academy level when officers first enter police work. Unfortunately, law enforcement wellness programs are lacking due to budgetary constraints and emphasis on operational police training (Church & Robertson, 1999). Zimmerman (2012) points out that physicians should take special note of occupation in their evaluation of patients. If patients are police officers, specific attention should be given to the potential for medical complications which may occur while on police duty.

Lastly, the police organizational culture can play an important part in police wellness by encouraging a healthy lifestyle (Zimmerman, 2012). This notion is in line with the U.S. Attorney General's recent proclamation that police wellness and safety are organizational priorities in today's law enforcement environment (Attorney General's Law Enforcement Summit, June, 2012). Both officers and the society they serve will certainly benefit following the recommendations of this priority.

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