# Milwaukee Police Department Retirees

## Cardiovascular Disease Risk and Morbidity Among Aging Law Enforcement Officers

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RESEARCH ABSTRACT

This study explored the self-reported prevalence of cardiovascular disease (CVD) and accompanying risk factors among 165 male retirees 43 years and older ($M$ = 56.2, $SD$ = 7.1) from the Milwaukee Police Department (MPD) compared to 671 individuals of similar age and income who responded to the 2005 Wisconsin Behavioral Risk Factor Surveillance System (BRFSS). CVD and other risk factors were more prevalent in the MPD retirees than the general population (CVD 15.2% vs. 9.5%, $p$ = .036; hypertension 51.5% vs. 36.2%, $p$ = .001; hypercholesterolemia 62.4% vs. 44.4%, $p$ = .001; overweight and obesity 85.1% vs. 74.7%, $p$ = .005). In addition, other factors associated with CVD prevalence included working in law enforcement (odds ratio = 1.70; 95% confidence interval = 1.03 to 2.79). Results suggest an association between employment in law enforcement and an increase in CVD morbidity.

The average age of workers in the United States is increasing (Bureau of Labor Statistics, 2008), indicating that individuals are choosing to remain employed until later in life. Health is an important factor in remaining employed later in life. Thus, occupational health nurses should identify risk factors specific to employment that may contribute to adverse health conditions. Previous studies have indicated that organizational factors in law enforcement may contribute to cardiovascular disease (CVD) in this population (Collins & Gibbs, 2003; Garcia, Nesbary, & Gu, 2004; Gershon, Lin, & Li, 2002; Ramey, 2003; Ramey, Downing, & Knoblauch, 2008).

CVD remains the leading cause of death among adults in the United States (American Heart Association, 2008a). Of the 71.3 million American adults with one or more types of CVD, an estimated 27.4 million are age 65 or older (Ford, Giles, & Mokdad, 2004). Several risk factors (e.g., older age per se) have traditionally been associated with an increased risk for CVD (American Heart Association, 2008b). More recently, however, other risk factors have been identified (e.g., elevated levels of inflammatory mediators) (Zebrack & Anderson, 2002). Another risk factor may be one's profession, as some unique occupational cohorts do appear to be at increased risk for developing CVD. To this end, a substantial number of published studies suggest a higher prevalence of CVD among law enforcement officers (LEOs); this is especially true for studies with large cohorts (Calvert, Merling, & Burnett, 1999; Franke, Collins, & Hinz, 1998; Guralnick, 1962; Milham, 1983; Violanti, Vena, & Petralia, 1998; Violanti et al., 2006; Williams et al., 1987).

One shortcoming of these studies is that the majority of researchers assessed CVD mortality rather than morbidity. In the United States, the former is declining faster than the latter (American Heart Association, 2008a), suggesting that assessing mortality alone may underestimate the CVD risk of LEOs. Moreover, assessing CVD morbid-

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ity and mortality in active-duty LEOs may underestimate CVD prevalence because the study cohorts are too young to have developed clinically significant CVD and officers may retire early specifically because of CVD and would be excluded from the study due to the healthy worker effect (Howe, Chiarelli, & Lindsay, 1988). In this regard, the two studies extant that assessed CVD morbidity in active-duty LEOs found similar prevalences of CVD in officers and comparison cohorts (Franke, Ramey, & Shelley, 2002; Sparrow, Thomas, & Weiss, 1983). Furthermore, the only published study that compared retired (older) officers with a comparison group in the general population found a 1.7-fold higher CVD prevalence in LEOs (Franke et al., 1998). Consequently, determining CVD prevalence in retired or older officers may more accurately assess law enforcement officers' CVD risk.

Although the findings of Franke et al. (1998) are striking, the generalizability of their results are limited. The LEO cohort included former members of the Iowa Department of Public Safety, with the majority being highway patrol officers. The 49 state police agencies in the United States employ collectively fewer than 60,000 of the more than 800,000 sworn LEOs in the United States (Reaves & Hickman, 2004). It is possible that the unique occupational demands of this LEO cohort may have influenced the observed CVD prevalence.

Consequently, given that this study has yet to be replicated, it is uncertain whether these findings reflect the LEO profession per se or are unique to a more specialized cohort of LEOs. Thus, the primary purpose of this study was to build on this previous research (Franke et al., 1998). The authors compared a group of retirees from a large metropolitan police department to a comparison group from the general population, measuring their prevalence of CVD risk factors and CVD morbidity. The occupational demands placed on this cohort were more consistent with those in a "traditional" police department than that of Franke et al. (1998). Consequently, this assessment of CVD morbidity and potential contributing risk factors among retired LEOs expands on the only other similar study by examining a markedly different LEO cohort. The researchers hypothesized that the law enforcement cohort would have a higher prevalence of CVD than the comparison group and this difference could not be fully explained by conventional risk factors.

## METHOD

### *Study Design*

This exploratory, cross-sectional study included written surveys from retired LEOs that evaluated their CVD morbidity and risk factors. A cover letter accompanied the survey and packets were mailed once to the retired LEOs. Postcard reminders were sent to the retirees approximately 10 days after the initial survey was mailed. Responses were compared to those from a demographically similar cohort in the 2005 Wisconsin Behavioral Risk Factor Surveillance System (BRFSS) survey (Centers for Disease Control and Prevention [CDC], 2006).

Briefly, the BRFSS is a telephone survey designed to determine health-risk behaviors of American adults.

### Applying Research to Practice

Health is an important factor in the ability to remain employed. Identifying risk factors specific to employment that may contribute to health conditions early in life is important not only to enable workers to remain employed but also to improve health when they retire. This is critical in an environment where workers are choosing to remain employed later in life. Health surveillance and intervention development during the working years may decrease the prevalence of chronic disease morbidity and risk during retirement.

The survey is administered annually by state departments of public health under the auspices of the CDC and the data are publicly available. The reliability and validity of the BRFSS is well documented (Bowlin et al., 1993; Stein, Lederman, & Shea, 1993). The survey completed by the LEOs either paralleled or very closely modeled questions in the BRFSS. During development of the LEO survey, three content experts reviewed the BRFSS questions chosen for the survey. One of these experts had been requested by the CDC to review the questions included in the current BRFSS.

### *Target Population and Sample*

Potential LEO participants were 305 former members of the Milwaukee Police Department (MPD) who had retired within the past 5 years (2000 to 2005). Respondents ($n$ = 192, 63%) were primarily Caucasian males (92.2%) and, because so few female retirees responded to the survey ($n$ = 13), only male respondents' data were analyzed. Participants provided informed consent as part of the written survey. The study was approved by the MPD, endorsed by the Police Chief, and conducted in accordance with the ethical standards for research involving human subjects of the Institutional Review Board at Marquette University.

After excluding cases with missing data ($n$ = 14) and data from female respondents, data from 165 male respondents were analyzed. The 165 male retirees were 43 to 83 years old ($M$ = 56.2, $SD$ = 7.1). Their incomes ranged from $35,000 to $88,000, estimated from pensions based on 25 years of service.

The potential comparison group members were the 1,375 respondents to the 2005 Wisconsin BRFSS questionnaire (CDC, 2006). Comparison group respondents were matched to the LEO group by gender, age, and income. The final comparison group consisted of 671 male respondents ($M$ = 54.3 years, $SD$ = 8.3 years) with an income of $35,000 or more.

### *Measures*

Consistent with the format of the BRFSS, the presence of CVD was scored when the retired officer self-reported

Table 1

**Percent Incidence (Number in Each Group) of Self-Reported Cardiovascular Disease and Risk Factors for Retired Law Enforcement Officers and the General Population in Wisconsin**

| | Response | | | | |
|---|---|---|---|---|---|
| | Retired LEOs (n = 165) | | 2005 BRFSS General Population (n = 671) | | |
| Risk Factor | No. (Total) | % | No. (Total) | % | Significance Level[a] |
| Cholesterol | 103 (165) | 62.4 | 274 (617) | 44.4 | .001* |
| Hypertension | 85 (165) | 51.5 | 243 (671) | 36.2 | .001* |
| BMI ⩾ 25.0 kg • $m^2$ | 37 (161) | 85.1 | 498 (667) | 74.7 | .005* |
| Cardiovascular disease | 25 (165) | 15.2 | 64 (671) | 9.5 | .036* |
| Diabetes | 21 (164) | 12.8 | 57 (671) | 8.5 | .089* |
| Physical inactivity | 16 (163) | 9.8 | 96 (670) | 14.3 | .130 |
| Tobacco use | 89 (165) | 54.0 | 382 (670) | 57.0 | .494 |

*LEOs = law enforcement officers; BRFSS = Behavioral Risk Factor Surveillance System; BMI = body mass index. [a]From t tests for equal group means. *p = .05.*

that a physician had informed him he had experienced a cardiac event (i.e., heart attack or myocardial infarction, angina or coronary heart disease, or stroke). Likewise, officers were asked whether a physician or other health professional had ever informed them they had diabetes, elevated cholesterol, or high blood pressure. Body mass index (BMI), a surrogate measure of body composition, was calculated from self-reported height and weight. Tobacco use was assessed by a lifetime history of having smoked at least 100 cigarettes. Physical inactivity was defined as reporting no exercise in the past 30 days.

### *Statistical Analysis*

Initially, data were screened for missing values and outliers. For all variables on the LEO survey, the responses "don't know" or "refused" were recoded as missing data. Outliers were defined as unusual or extreme values found within the distribution. Officers who retired early because of medical disability were included in the sample.

The retired LEO group and the general population were compared for CVD prevalence and CVD risk factors by the following procedures. Respondents were categorized as having CVD if they reported a physician had informed them they had coronary heart disease, angina, myocardial infarction, or stroke. Self-reported categorical independent variables included hypertension, cholesterol, diabetes, physical inactivity, tobacco use, and BMI greater than or equal to 25 kg/$m^2$.

Simple percentages were cross-tabulated to compare the prevalence of risk factors in the LEO cohort with that of those found in the general population. Logistic regression was used to generate the best subset model to predict membership in the group with CVD and the group without CVD. Initially, forward selection logistic regression was used to predict group membership for classification with the aforementioned independent variables. Subsequently, stepwise selection and backward elimination methodology were employed to select the model that best predicted CVD group membership. The threshold for inclusion in the model was $p = .05$. For both continuous (time in the profession) and categorical (LEO profession, physical inactivity, hypertension, diabetes, cholesterol, and BMI) variables, the odds ratio (OR) reflects the increase or decrease of multiplicative risk.

As with the combined LEO and general population analysis, logistic regression was used to generate the best subset regression model within the LEO cohort, to predict membership in the group with CVD and the group without CVD. Initially, forward selection logistic regression was used to predict group membership for classification with the aforementioned independent variables. Because it was not certain which subset of variables would constitute an acceptable model, stepwise selection and backward elimination were used to select the best model for predicting CVD group membership. The stepwise selection method tests which variables should be removed from the model.

## FINDINGS

The researchers collected and compared descriptive data from 165 retired LEOs and 671 comparison individuals from the 2005 Wisconsin BRFSS. The data, from a written questionnaire, consisted of self-reported CVD (i.e., angina, coronary heart disease, myocardial infarction, and stroke) as well as CVD risk factors (i.e., diabetes, hypercholesterolemia, hypertension, BMI ⩾ 25.0 kg/$m^2$, physical inactivity, and tobacco use). These data appear in Table 1. CVD was significantly more prevalent among

the LEO retirees than the general population (15.2% vs. 9.5% $p$ = .036). The association of the risk factors with CVD, for the combined cohort of the general population and LEOs, is reported in Table 2. The cross-tabulated OR for CVD morbidity associated with the LEO profession was 1.70 (95% confidence interval [CI] = 1.03 to 2.79), indicating that retirees are 70% more likely to develop CVD than counterparts in the general population. Results show that after controlling for the effects of these conventional risk factors, the LEO profession remained a significant risk factor for developing CVD.

In the LEO group, the presence of CVD was associated with the risk factors of hypercholesterolemia, hypertension, and diabetes (Table 3). Diabetes was not associated with CVD in the combined group of LEOs and non-LEOs, but was the most critical risk factor in the LEO cohort. Conversely, an elevated BMI was not associated with CVD in the LEOs, but was in the combined group.

Table 2

**Odds Ratios and 95% Confidence Intervals for MPD Retirees and the Wisconsin General Population**

| *Risk Factor* | *OR* | *95% CI* |
|---|---|---|
| Hypertension | 1.87 | 1.33 to 2.64* |
| Cholesterol | 2.08 | 1.46 to 2.96* |
| BMI ⩾ 25.0 kg • $m^2$ | 1.94 | 1.21 to 3.10* |
| LEO profession (CVD) | 1.70 | 1.03 to 2.79* |
| Diabetes | 1.58 | 0.93 to 2.69 |
| Tobacco use | 0.89 | 0.63 to 1.25 |
| Physical inactivity | 1.54 | 0.88 to 2.69 |

*MPD = Milwaukee Police Department; LEO = law enforcement officer; OR = odds ratio; CI = confidence interval; BMI = body mass index; CVD = cardiovascular disease. *p = .05.*

## DISCUSSION

The researchers compared the prevalence of CVD morbidity and risk factors between a comparison group of non-LEOs and retirees of a large metropolitan police department. They consider the study results worthwhile for several reasons: few studies have assessed CVD morbidity in the LEO profession or examined older individuals, not active-duty LEOs; and the cohort better represents the population of LEOs in the United States than related research.

The main findings were that retired LEOs have a higher prevalence of CVD compared to the comparison cohort, and that diabetes is more strongly associated with CVD in LEOs but an elevated BMI is not. Although self-reported diabetes was not significantly more prevalent in LEOs than the general population, LEOs with diabetes were more than four times more likely to develop CVD.

CVD was approximately 70% more prevalent among retired LEOs than the comparison group. This difference agrees with the 71% higher prevalence found by Franke et al. (1998), suggesting that their findings may, indeed, be generalizable to the broader LEO population. The current study, however, detected lower absolute prevalences—Franke et al. found prevalences of 31.5% and 18.4% in the LEO and comparison groups, respectively. This difference may be due to the ages of the studied groups. The LEO and comparison groups the researchers assessed were, on average, 9.3 and 14.7 years younger than the respective groups studied by Franke et al. (1998); thus, in their cohort, CVD would have had more time to develop and be diagnosed. This age difference may also underlie the different ORs in these two studies: in the prior study, the OR associating the LEO profession with CVD was calculated to be 2.34 (95% CI = 1.5 to 3.6); in contrast, this study arrived at an OR of 1.70. Regardless, the higher prevalence detected in this study is particularly striking because this LEO group included retirees as young as 43 years. Consequently, this study not only reinforces the earlier findings of Franke et al. (1998) but extends them by suggesting that relatively young LEO retirees also experience an above-average prevalence of CVD. Thus, it appears that officers do not differ from peers of similar age in their prevalence of CVD up to the fifth decade of life (Franke et al., 2002; Sparrow et al., 1983), but the OR for developing CVD becomes significantly higher in the sixth decade (1.70 in the current study) and higher still in the seventh decade (2.34; Franke et al., 1998). Collectively, this research suggests that LEOs are at increased

Table 3

**Stepwise Selection Logistic Regression Coefficients for Risk Factors Among the Retired Law Enforcement Officers ($n$ = 165)**

| *Risk Factor* | *ß* | *Wald* | df | p | *OR* | *95% CI* |
|---|---|---|---|---|---|---|
| Cholesterol | 1.24 | 19.04 | 1 | .001 | 3.45 | 1.98 to 6.02* |
| Hypertension | 1.18 | 19.28 | 1 | .001 | 3.26 | 1.93 to 5.54* |
| Diabetes | 1.53 | 26.62 | 1 | .001 | 4.61 | 2.58 to 8.23* |
| Constant | 4.44 | 249.02 | 1 | .000 | .012 | |

*OR = odds ratio; CI = confidence interval. *p = .05.*

risk for CVD compared to their non-LEO peers and this risk becomes more pronounced as they age.

For the LEOs, the ORs for the presence of several risk factors contributing to CVD were high: greater than 3.2 for cholesterol and hypertension and greater than 4.6 for diabetes (Table 3). Of course, the contribution of these risk factors to the development of CVD is not a new finding; what is novel is that these risk factors appear to be more strongly associated with CVD in LEOs than in the general population. Moreover, two of these three risk factors were more prevalent in the LEO cohort, suggesting that risk reduction interventions targeted specifically at these risk factors could markedly improve the health of LEOs.

The LEOs, indeed, reported a higher frequency of significant CVD risk factors. Yet, it is interesting that even when these risk factors were statistically controlled, LEOs were at greater risk for developing CVD. Thus, some unique aspect(s) of the law enforcement profession likely increases an individual's chances of developing CVD. Although the current study did not measure perceived stress, law enforcement is recognized as a stressful occupation and the direct effects of job-related stress on CVD in LEOs are well appreciated (Franke et al., 2002; Ramey, 2003). Moreover, chronic exposure to job-related stress may be related to serious mental and physical conditions in aging LEOs (Gershon et al., 2002). Thus, the researchers postulate that job-related stress may have also contributed to the development of CVD in LEOs.

Strengths and limitations of this study must be taken into account. One strength of this study is that approximately 63% of the targeted LEOs responded to the survey. This relatively high response rate increases the generalizability of the results. Second, this cohort of retired LEOs is likely representative of most metropolitan LEOs because of the similar nature of their job responsibilities and the community within which they work. A limitation of this study, however, is the cross-sectional methodology. The findings reported are necessarily associative; causality cannot be inferred. Some members of the study population may have died in the retirement period studied or chose not to participate in the study. Thus, the differences in CVD prevalence and risk between the two cohorts may be underestimated. In addition, all of the data are self-reported and collected at one point in time. Moreover, some of the BRFSS questions are imprecise (e.g., assessing tobacco use with a lifetime history of having smoked 100 cigarettes). Finally, because the study sample was predominately Caucasian males, generalizing findings to other groups of LEOs should be done cautiously.

This study provides strong evidence that law enforcement officers experience an increased prevalence of CVD. Diabetes, hypercholesterolemia, and hypertension appear to be significant contributors to this risk, although other characteristics of law enforcement work likely also play a role.

## IMPLICATIONS FOR PRACTICE

It is projected that by 2016, 70,000 additional officers will be needed to replace workers who retire or leave law enforcement (Bureau of Labor Statistics, 2007). Therefore, it is imperative that health care professionals, especially occupational health nurses, identify and address prevalent health issues within this profession to not only avoid a shortage of officers but also improve the longevity and quality of life of those who retire. Future research should include efforts to identify additional risk factors and develop and evaluate interventions to reduce risk factors for CVD among law enforcement officers and workers in similar high-stress occupations.

Interventions might eventually include health coaching, specific lifestyle and behavior change, and structured programming focusing on health issues for LEOs before they reach retirement. However, before scarce resources can be used to develop specific interventions, occupational health nurses must identify the most prevalent mediators of risk in this and other high-stress occupations by highlighting specific work-related sources of stress and associated biology (e.g., weight changes over time and C-reactive protein and other inflammatory markers). It is possible that work-related stress (experienced in this and other high-stress occupations) may contribute to the development of obesity and obesity-related diseases, including hypertension, hypercholesterolemia, and CVD.

Exploring the biological patterns of risk that develop over time as opposed to self-reported cross-sectional data will likely predict who is at most risk for the development of disease. Specific targeted and tailored interventions based on evidence can then be further developed and implemented.

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## CE Answers
## Knowledge, Perceptions, and Attitudes of Managers, Coworkers, and Employed Breastfeeding Mothers
## October 2008

| | |
|---|---|
| 1. C | 6. A |
| 2. B | 7. A |
| 3. C | 8. D |
| 4. D | 9. B |
| 5. C | 10. D |

## CE Answers
## When a Coworker Completes Suicide
## November 2008

| | |
|---|---|
| 1. D | 6. D |
| 2. B | 7. C |
| 3. C | 8. A |
| 4. A | 9. D |
| 5. B | 10. B |