Occupational Health and Safety Issues of Police Officers in Canada, the United States and Europe: A Review Essay

June, 2004

Introduction

Police officers play a pivotal role in North American and European societies. They are involved in many aspects of North American and European life. Officers' involvement ranges from general, daily, proactive patrol activities to specific criminal activities such as narcotic investigations. Because there is such a wide range of activities involved in police work, there are many health and safety issues surrounding policing as an occupation. Police officers may be exposed to different health and safety risks in their occupation. For example, police officers are at risk of assault and homicide; the dynamics of policing as an occupation creates opportunities for them to experience many psychosocial hazards such as stress, suicide, sexual harassment, and discrimination.

It is important that research be completed on the health and safety issues of police officers in order to identify hazards and identify ways to reduce risk. The failure to identify and solve health and safety concerns of officers has potentially serious consequences for the health and well being of officers and their families. These consequences can include depression, divorce, suicide, and disease. Not addressing the health and safety issues associated with policing may also impact the general public. For example, if an officer is stressed or fatigued he/she may not perform his/her duties to the best of his/her ability reducing the contribution of policing to the community. Police officer fatigue might also increase the potential for a car accident, thus putting the public at risk.

This essay provides a review of some of the existing research on the occupational health and safety risks that police officers may encounter on a daily basis or at some point during their career. The essay opens with a description of the research methods used to assemble the research reviewed here. This is followed by a summary of the documented health and safety risks associated with policing. The latter are divided into five categories: physical, chemical, biological, ergonomic, and psychosocial. Documented physical hazards associated with policing include homicide, assault, cardiovascular disease and fatigue; chemical hazards include cancer and air pollution; biological hazards include communicable disease; and, ergonomic hazards include back problems. Stress, sexual harassment, discrimination and suicide, are some of the psychosocial risks associated with policing.

The research reviewed for this study included Canadian, American and European research. The discussion of each category of hazard is broken down by the country where the research was completed. Each hazard section ends with a discussion of the weaknesses evident in the literature related to that hazard. The essay concludes with a comparison of Canada and the United States as well as North America and Europe in terms of the research completed and the results yielded in the literature. Also included in the conclusion is a discussion of the general gaps in the research on occupational health and safety issues of police officers indicating areas where future research needs to be completed.

Methods

The literature search that informed this review essay of existing research on the health and safety of police officers began with a general search on the World Wide Web for general information on workplace health and safety issues. My intention was to attain

a general knowledge of the research that has been completed on workplace health and safety and apply it to the occupation of policing.

After the search for workplace health and safety information I did a computerized search of published literature in the article indexes at the Queen Elizabeth II library for any research that has been completed on health and safety issues of police officers in Canada, the United States and Europe dating back to the mid 1980's. The article indexes that were most effective in this search were the Criminal Justice Abstracts, the Sociological Abstracts and PubMed.

The searches in the article indexes were organized by various key words pertaining to workplace health and safety issues of police officers in Canada, the United States and Europe. The key words used in these searches included, but were not limited to, police, policing, Canada, RCMP, United States, Europe, health, safety, risk, hazards, stress, fatigue, sleep disorders, assault, homicide, disease, suicide, harassment, discrimination.

From the research materials that were generated using the key words I was able to use the bibliographies associated with each source to find more sources pertaining to my topic. I also used the author's names to generate more searches for relevant information. Many authors had completed several pieces of research concerning the same topic.

A final method I used to locate the literature reviewed here was to use the Internet link that was provided on the PubMed web site. All of the research that was displayed in the PubMed search had a link directly to other research that was completed on a similar topic. The PubMed Internet link proved to be effective in locating research on occupational health and safety issues of police officers.

The focus of my research for this literature review was police officers in Canada, the United States and Europe. This research could have been expanded to include security guards, as the two groups are relatively similar and would likely have similar health and safety issues. Although these two groups are similar, particularly in their organization, they have some key differences. The training that is required for policing, the socialization process that officers go through, the type of work that they do, and the expectations that society places on them, differ for police officers and security guards. The differences between the two occupations suggest that the health and safety risks they confront may differ as well so it was decided not to review the literature on security officers at this time. This would be an interesting area for future research, as would a comparison of the risks associated with these different occupations.

The general research on the different types of workplace health and safety hazards that exist often groups these hazards into five categories: physical hazards, chemical hazards, biological hazards, ergonomic hazards, and psychosocial hazards (Messing, 1991). Physical hazards arise from the physical environment. Physical hazards may be visible, as, for example a person with a weapon, or completely invisible to the naked eye, like radiation. Chemical hazards may originate from several sources including, for example, furnace fumes or car exhaust. Biological hazards may involve micro-organisms which may come from experimental material used in laboratories or from contact with humans or human cells carrying communicable diseases like HIV/AIDS, and hepatitis A, B, or C. Ergonomic hazards involve risk of injury to the muscloskeletal system of the worker. Ergonomic hazards arise from uncomfortable working positions or heavy physical tasks. An example of an ergonomic hazard is sitting in a police patrol car for

long hours. The final category of workplace hazards is psychosocial hazards, which can involve difficulties with supervisors or fellow workers, such as sexual harassment, but may also result from the perception of other types of risks such as, for example, the fear of acquiring HIV/AIDS (Messing, 1991).

A review of the literature on occupational health and safety issues of police officers indicates that police face physical, chemical, biological, ergonomic, and psychosocial hazards. Research that has been completed on workplace health and safety issues of police officers has concentrated on such problems as homicide, assault, cardiovascular disease, fatigue, cancer, air pollution, communicable disease, back problems, stress, sexual harassment, discrimination, and suicide.

Physical Risks

Homicide

Although there has been some research completed in Canada on homicide risk for police officers, this review essay found no research on this topic in European countries. A majority of the research on this issue has been completed in the United States.

Canada

There is minimal research completed on the topic of police officer homicide in Canada. My literature search found only one Canadian study on this problem. Unfortunately, the article was not available at Memorial so the following summary is based on the abstract. Michael Whittingham (1984) concentrates on the rates of homicide for police officers compared to other occupations, the general public and other countries. He used cross-cultural data from the United Nations and Statistics Canada on the murder rate of police officers.

Whittingham (1984) compared the homicide risk of Canadian police officers with the general public. He reports that the rate of homicide victimization in Canada between 1975-1979 per 100,000 was lower among police than the general public. Police officers were murdered at a rate of .01 per 100,000 people while the general public was murdered at a rate of 2.91 per 100,000 people during that time period

This study also found that Canada has a comparatively low homicide rate for police officers as compared to other countries. The data on the murder of police officers show that Canada ranked fourth among 14 nations in the rate of officers murdered in the line of duty in the 1970s, a homicide rate that was several times lower than the United States. Statistics showed that the Canadian police homicide rate was .155 per 1 million population compared with the United States with .408 per 1 million population (Whittingham, 1984).

United States

The American research on police officer homicide focuses on the felonious killings of police officers as opposed to the accidental killing of officers. One reason for this may be that officers are more frequently killed intentionally than accidentally (Boylen and Little, 1990). The research concentrates primarily on the risk of homicide of officers compared to other occupations and the general public. Other issues discussed in

this literature are situations that create the greatest homicide risk for officers, the weapon of choice of the offender, characteristics of the victim officer and the assailants, and solutions for reducing police homicide.

The American literature on police homicide indicates that police officers are among high-risk occupations for homicide (Brown and Langan, 2001; Castillo and Jenkins, 1994; Hales et al., 1988; Kraus, 1987). One study considered Federal Bureau of Investigation (FBI) statistics during 1976 and 1998 and noted that since 1976, an average of 79 police officers have been murdered each year in the line of duty in the United States (Brown and Langan, 2001). Another study used data aggregated over a 10-year period, which was acquired from the National Traumatic Occupational Fatalities (NTOF) surveillance system. The NTOF system compiles death certificates from the 50 states, New York City and the District of Columbia. This data indicates that sheriffs, police officers and their supervisors are among the top five of the 12 high-risk occupations (Castillo and Jenkins, 1994).

Some researchers found that police officers were at a higher risk of homicide than the general public, however, their risk of homicide is decreasing (Boylen and Little, 1990; Hill and Clawson, 1988; Kraus, 1987; Quinet, 1997; Southwick, 1998). Quinet et al. (1997) used statistics derived from the U.S Department of Justice for the period from 1960 to 1993. The researchers included only data of felonious line-of-duty deaths of municipal, county and state officers for 50 states. They found that the number of felonious police officer deaths has ranged from 38 per 100,000 in 1971 to 10 per 100,000 in 1990. The same study showed that the U.S homicide rate was 9 per 100,000 in 1971 and 10 per 100,000 in 1990. A second study noted the number of police officers murdered in 1976, 1988, and 1998 and found the number dropped from 28 per 100,000 to 16 per 100,000 to 11 per 100,000 respectively (Brown and Langan, 2001).

One explanation that is offered for the decline in police officer homicides in the United States over this period is the increasing police use of bulletproof vests and body armor. Other factors that may have contributed to the drop in homicides among police officers include better training, better communications and better police practices (Brown and Langan, 2001; Quinet et al., 1997). Boylen and Little (1990) also noted that of the law enforcement officers feloniously killed between 1977 and 1986 in the United States an overwhelmingly majority were male (98%), with only 2 percent being female.

According to Brown and Langan (2001), the work related situations that pose the greatest threat of homicide for police officers include responding to disturbance calls and arrest situations, accounting for 16 percent and 39 percent of homicides respectively between 1976 and 1998.

A second study evaluated the number of police officers feloniously killed between 1977 and 1986 based on FBI statistics. The study indicated that the circumstances that are threatening to officers and are associated with homicides were as follows: robberies/pursuing robbery suspects (16%), traffic pursuits/stops (15%), attempting other arrests (14%), investigating suspicious persons (12%), bar fights, man with gun (11%), drug related matters (7%), entrapment/premeditation (6%), burglaries in progress (5%), family quarrels (5%), handling/transporting/custody of prisoners (4%), unprovoked attack (3%), mentally deranged persons (2%), and civil disorders (.1%) (Boylen and Little, 1990).

There is consistency in the literature regarding the weapon that is most commonly used in homicides of police officers. In the literature, the researchers indicate that in most cases of officer homicide, firearms were the favorite weapons of the assailants (Boylen and Little, 1990; Brown and Langan, 2001). Brown and Langan (2001) indicate that between the years 1976 to 1998, the officers' own gun was used in 12 percent of officer homicides.

Research has been completed concerning the characteristics of the victim officers. The results of the studies conclude that officers who have been murdered are typically over 30 years of age and overwhelmingly male. The officers were usually white and had five or more years of service. The majority of murdered police officers were wearing their uniform (Boylen and Little, 1990; Brown and Langan, 2001).

The literature on police homicide also considered the characteristics of assailants. Felons who murdered police officers were generally 18 to 30 years of age and an overwhelming majority was male. The majority of felons were white. A final characteristic of felons who murdered police officers in the periods studied was that the majority of them had a prior criminal arrest and prior criminal conviction (Boylen and Little, 1990; Brown and Langan, 2001).

Existing research has identified some solutions for reducing police homicide. These operate on two levels. There are recommendations that may lead to a reduction in citizen-inflicted deaths of police officers and recommendations that address the underlying causes of violence against police. The first recommendation is that police recruit and in-service training should include regular sessions in officer survival, basic patrol procedures, firearms, self-defense and defensive driving. The training should be presented in such a way that the error factor of police officers is trained out. It is suggested that training and retraining officers on that level decreases the risk of homicide (Boylen and Little, 1990). Another suggestion to decrease police officer homicide is for police officers to wear ballistic resistant body armor protecting their upper torso. Boylen and Little (1990) found that approximately half of the American law enforcement officers fatally shot from 1977 through 1986 suffered fatal wounds to the upper torso. Most of these police homicides could have been avoided if the victim officers had been wearing body armor protecting their vital areas (Boylen and Little, 1990).

Although these recommendations may lead to a reduction in citizen inflicted injuries and deaths of police officers, they do not address the underlying causes of violence against police. Another category of recommendations takes a theoretical approach. American society is characterized by oppression of an entire class of people who suffer individual deprivation, degradation, exploitation, frustration, and alienation, which is at least a partial cause of violence against police. Recommendations based on this theory would include radical social change focusing on the reduction of economic deprivation and inequality (Boylen and Little, 1990).

Assault

Canada

The Canadian research on police and assault focuses primarily on the risk of assault for police officers compared to other occupations, and some discussion regarding

solutions for and prevention of assault of police officers. This research also identifies characteristics of the perpetrators responsible for the violence towards police officers.

One Canadian study indicated that police officers are at greatest risk of time loss due to violence (Boyd, 1995). Boyd (1995) examined the problem of workplace violence in British Columbia between 1982 and 1992. The data were collected from Workers' Compensation Board Records. He maintains that police officers have more than double the risk of violence than workers in all other occupations included in the study and that the risk of violence is borne disproportionately by men as only 10 percent of police officers are female.

Unfortunately Boyd does not control for differences between occupations in the relative number of workers at risk, or for potential differences in overall hours of exposure among occupations. There is also a difference in rates of risk within the occupation. An officer is far more likely to be assaulted when responding to a robbery, and when arresting and transporting suspects and prisoners than when responding to other problems such as domestic disturbances (Ellis, 1993). An officer who walks the beat in an underprivileged neighborhood has a higher risk of assault than does an officer who is doing a patrol in an upscale neighborhood (Boyd, 1995).

Ellis (1993) studied a random sample of 379 patrol officers in three adjacent urban Canadian police forces. The data were collected from questionnaires and official police statistics. Ellis (1993) found that police officers were at the greatest risk of assault when arresting and transporting suspects and prisoners. He reported that officers were injured in 68.8 percent of arrest and transport situations. Other situations where officers are at an increased risk of assault and the percentage of incidents that result in assault are as follows: investigating suspicious situations (11.7%), disturbances (7.7%), robbery (2.8%) and domestic disturbance (2.5%) (Ellis, 1993).

The Canadian research indicates that the perpetrators responsible for violent acts on police officers are overwhelmingly young, male, and economically and socially disadvantaged (Boyd, 1995; Ellis, 1993).

Solutions suggested for the prevention of violence towards police officers include primarily two suggestions. The first involves staffing levels of police officers. Low staffing levels can increase the risk of assault on police officers. By increasing the number of police officers that respond to high-risk situations, police officers would be better prepared to handle the situation (Boyd, 1995). A second suggestion for prevention of assault on police officers is for increased training of the officers. Research indicates that when an officer is prepared for the possibility of assault, the probability of the officer being injured decreases by 8.8 percent (Ellis, 1993: 162).

United States

The American research on assault of police officers focuses primarily on the risk of being assaulted in relation to job related activities of law enforcement personnel and the most common injuries that result from the assaults. As well, the literature identifies the motivation to engage in violence against the police.

Consistent with the Canadian research, two American studies suggest that the policing task that resulted in the highest injury rates was controlling/arresting a suspect (Brandl, 1996, Chamlin and Cochran, 1994). One study, completed in Oklahoma City in the United States, considered longitudinal data on the reciprocal relationship between

measures of arrest and non-lethal assaults. This research indicates that from 1975 to 1989 arrest transactions accounted for a low of 21.7 percent to a high of 26.4 percent of all non-fatal assaults on police (Chamlin and Cochran, 1994). Other tasks that have an increased risk of assault are conducting investigations, apprehending fleeing suspects and motor vehicle accidents (Brandl, 1996; Chamlin and Cochran, 1994).

One study indicated that the most common injury was a puncture/abrasion/laceration. In a sample of 464 police officers, 22.4 percent reported this type of injury most often (Brandl, 1996). Other injuries included infectious disease contact, other muscle pain, strain, contusion, eye injury, broken bones, burns, gun shot wound, and knife wound (Brandl, 1996).

Chamlin and Cochran (1994) indicate that civilian attitudes toward the police are consistent with the speculation that certain groups are more willing to use violence in their encounters with police officials than other members of the community. Both race and age appear to be associated with attitudes toward the police. Specifically, nonwhite (particularly blacks) and the young are more likely than their counterparts to hold negative opinions concerning the demeanor and behavior of the police. The researchers explain that for many members of minority groups and less powerful segments of society, for example, the young, police officials are often viewed as symbols of oppression by the legal system. Hence, they become the tangible target for the problems that these people have with the shortcomings of the system.

Europe

There is very limited research completed in European countries on the topic of assault on police officers. One study done in South Wales was based on police records and interviews with assailants. The sample consisted of 619 individuals who were predominantly male (Noaks and Christopher, 1990).

This European research focused primarily on the assailants' viewpoint of the assault on police officers. The research includes the characteristics of the offender and the officers who were assaulted. It also includes the method of attack and the degree of injury and some recommendations aimed at reducing the problem of assaults against the police.

Characteristics of the assailants are addressed in terms of five categories: criminal records, peer support, employment status, alcohol and attributing blame. The researchers indicate that the majority of assailants in their study had a previous criminal record (80%) and 60 percent were recidivist, having over five previous convictions. The researchers suggest that there was a high level of support of the offenders' actions against the police from their friends. Noaks and Christopher (1990) suggest that the majority of the offenders were unemployed and those in employment held low-status jobs. The use of alcohol was a pervasive feature of assault incidents and the majority of assailants who were interviewed (70%) considered the police were to blame for the incident (Noaks and Christopher, 1990).

Characteristics of the assaulted police officers were categorized in terms of their sex, rank, and tenure. The European study on police officer assault indicates that 8 percent of the assaults were made against female officers, a figure which is in direct proportion to their representation in the force. Assaults on male and female officers are proportionate with their representation in the force, and the latter would now appear to be as much at risk as their male colleagues. This study suggests that gender equality in risk

of assault likely has to do with the more equal role of the female officer, which involves a greater involvement in front line police activity and thus exposures to risk (Noaks and Christopher, 1990).

This study also found that the group that is most commonly assaulted is constables. Constables comprise 82 percent of the total officers assaulted in this European study. Constables primarily, and sergeants to a lesser extent, are the foremost victims; once the officer moves above the rank of sergeant the threat of assault becomes significantly less (Noaks and Christopher, 1990). The researchers maintain that the largest percentage of officers assaulted is drawn from those officers with between five and ten years' service. Officers with less than two years' service only account for 10 percent of those assaulted (Noaks and Christopher, 1990). Punching proved to be the most common form of attack, followed by kicking, wrestling and head butting. In several cases the officer was bitten. Weapons were used in 9 percent of the incidents and included a broad range of implements including metal bars, screwdrivers, stakes, hammers, bottles, glasses, bricks, and rocks (Noaks and Christopher, 1990).

Nearly 90 percent of the officers who were assaulted reported experiencing some injury as a result of their attack, although the majority of these were minor injuries. Only 3 percent of the assaulted officers rated their injury as severe (Noaks and Christopher, 1990).

This article offered several suggestions on how to respond to and eliminate assault on police officers. The first suggestion is to maximize efficient and effective deployment of available manpower. A second suggestion is to alter officer training to include human awareness training and effective communication skills. There also needs to be an emphasis on tactics and strategies for defusing trouble. A third suggestion for responding to assault on police officers is to alter the design in the police uniform. The researchers found that head butting of officers is one of the more common forms of attack and question whether the traditional helmet affords adequate protection. A fourth solution for the assault of police officers is for senior officers to communicate more effectively what officers should be trying to achieve on the streets. There was evidence in the study of variation across divisions in the threshold at which officers and their supervisors saw it as appropriate to intervene in situations. A lack of direction from senior personnel can cause confusion and uncertainty in the minds of officers as to how they should approach and deal with a matter. Presently, the priorities and objectives of the police are not necessarily those of the public and until that becomes the case the potential always exists for confrontation in police/public interactions (Noaks and Christopher, 1990).

Cardiovascular Disease

A limited amount of research, completed in the United States and Europe, has examined the issue of cardiovascular disease amongst police officers (Franke et al, 1997; 2002; Ramey, 2003; Reviere and Young, 1994; Quire, 1990; Tuchsen et al., 1996).

United States

The American literature on police officers and cardiovascular disease focuses primarily on officers' risk of developing cardiovascular disease compared to the general public. A second topic in this research is the general risk factors that increase an officer's risk of heart disease.

Frank et al. (2002) defines cardiovascular disease as coronary heart disease, myocardial infarction, angina, or stroke.

Much of the research on cardiovascular disease has found increased risk of heart disease among police officers (Reviere and Young, 1994). The research completed in the United States on this topic indicates that in comparison to the general population in the same age bracket, male police officers do not have a higher risk of developing cardiovascular disease (Frank et al, 1997; 2002; Ramey, 2003). However, several studies indicate that the risk of developing a cardiovascular disease increases with age; this comparison is similar for the general population as well (Frank et al., 1997; Quire, 1990).

Several factors increase the risk of cardiovascular disease (Franke et al., 1997; 2002; Ramey, 2003). Franke et al., (1997) found that factors such as obesity, stress, and physical inactivity increase the risk of heart disease. For example, obesity can elevate cardiovascular disease risk indirectly by causing hypertension, hypercholesterolemia and diabetes (Franke et al., 1997; Ramey, 2003). Another factor that can increase an officer's risk of cardiovascular disease is tobacco use. Ramey (2003) found that tobacco use was a good predictor variable for cardiovascular disease.

Europe

This review essay yielded only one source dealing with police officers and cardiovascular disease in European countries. The researchers used longitudinal studies of mortality and morbidity by occupation in order to identify occupations at high risk of ischemic heart disease. The study concentrated on the risk of heart disease among various occupations in European countries, including policing. A second topic addressed in that research is the possible causes of cardiovascular disease.

The results of the European study suggest that senior police officers, in more than one country, have an increased risk of ischemic heart disease compared to other occupations (Tuchsen et al, 1996). Possible causes of cardiovascular disease include the nature of the shift work, the psychologically demanding nature of the job and unsatisfactory decision authority (Tuchsen et al, 1996).

Fatigue

Another problem faced by police officers that relates to the characteristics of their job is fatigue. Researchers interested in the relationship between policing and fatigue have collected data from reports of interviews with police officers and using telephone surveys with police officers. The samples used in this research are relatively small and have consisted of police officers who are members of various police forces. Results are not broken down by gender or race in this research.

Canada

The Canadian research on police officer fatigue focuses on the cause of fatigue. DeCarufel and Schaan (1990) note in their study that fatigue is a product of the 12-hour shift. Fatigue and stress are often associated with longer hours of work so a twelve-hour shift schedule might be prone to such effects (Cunningham, 1990).

In their study on the impact of compressed workweeks on police job involvement, DeCarufel and Schaan (1990) examined 3 Canadian police forces, 2 located in eastern Ontario and the third in western Quebec. The sample consisted of 25 officers in each

force. Data were collected from on site interviews and questionnaires. The Quebec force was on a 9-hour shift, using a 4-on and 3-off schedule rotated over a 35-day period. One of the Ontario forces had a 12-hour shift over an 8-day cycle. The other Ontario force had a 12-hour shift over a 4-week cycle. The researcher noted that twelve-hour shifts were associated with self-reported fatigue. This study was primarily concerned with police officer job involvement in relation to twelve-hour shifts therefore it did not discuss the issue of fatigue related to shift work in any greater depth (DeCarufel and Schaan 1990).

United States

The American research completed on fatigue among police officers focuses primarily on the prevalence of fatigue in police departments, causes of fatigue, the effects that fatigue can have on an officer, and suggestions of ways to minimize fatigue in police officers. Vila et al. (2002) define fatigue as a mental and/or physical state resulting from insufficient quality sleep or from prolonged or intense physical, emotional, or mental effort that tends to decrease alertness, impair performance potential, worsen mood, and interfere with decision making. From this definition we can expect excess fatigue to adversely affect police officers' performance, health, and safety; their relations with the public; and the quality of their discretionary decisions (Vila et al., 2002).

Vila et al. (1996) studied physical indicators of fatigue in police officers from 12 of the largest urban police departments that, together, employed more than 2,000 sworn officers. The researchers did not indicate where in the United States the departments were located. They measured a person's current fatigue-related impairment by comparing eye-performance measures with their usual performance. They also evaluated subjective information about the impact of fatigue on officers such as information gathered through interviews about officers' sleep quality, their attitudes about their own fatigue levels and those of their peers. Taken together, the data from these sources provided solid information about the effect of fatigue on police officers' work performance, physical and emotional well-being and personal lives. Results indicated that, on average, police officers experienced poor sleep quality twice as frequently as the general public. Vila et al. (2002) note in a review essay on police officer fatigue, that "evidence from many different sources points to high levels of fatigue among patrol officers in the United States-and there is no contrary evidence." (Vila et al., 2002: 20).

The literature on police officer fatigue reveals that there are several causes of fatigue for officers including the nature of patrol work, which is sometimes challenging physically and emotionally, and other times is excruciatingly boring (Vila, 1996). Other potential causes of officer fatigue are shift rotation schemes, excessive mandatory or elective overtime assignments, and frequent off duty court appearances (Vila et al., 2002). Another study examined the effects of variable shifts and stable day shifts on fatigue. These researchers found that there was an increase in fatigue ratings associated with variable-shift work compared with day-shift work (Neylan et al., 2002).

The effects that fatigue can have on officers include increased stress levels, diminished ability to cope with the sorts of complex and threatening situations that police officers are often called to handle, decreased alertness, impaired performance (Vila, 2002; 1996). Chronic fatigue can also interfere with the familial and social relations that connect us to our communities (Vila, 2002). Research has also shown that fatigue tends to undermine a person's ability to make sound decisions, control his or her emotions and

perform complex motor tasks such as driving a vehicle. During periods of low activity, fatigue tends to increase accident proneness. Researchers argue that tired people have more accidents because they tend to be less attentive, slower to react to impending hazards and more likely to respond inappropriately (Vila, 1996).

The problem of police officer fatigue can be minimized through administrative changes in police departments as well as through more research on the issue. Vila et al. (2002) suggest that management should do all it can to ensure that officers are fit for duty when they report to work and throughout their work shifts because overly fatigued officers are more likely to put themselves, their fellow officers, and their communities at risk. Further policy recommendations include the use of an expert panel to assess the need for immediate policy changes; the use of community policing, which would moderate the hours worked by patrol officers; and the use of personnel reliability programs to ensure that officers are emotionally and physically fit for duty each time they start a shift (Vila, 1996). Other suggestions include the improved use of technology. Thus, for example, the increased use of laptop computers could reduce report writing time. Another change that might reduce fatigue involves the modification of work schedules to, for example, four 12-hour work days followed by four days off or four 10-hour work days followed by three days off. A final suggestion includes limiting exposure to intense patrol environments (Vila, 1996).

Overall, existing research on physical hazards among police officers suffers from several weaknesses. In general, there is relatively little research in this area, particularly in Canada and Europe. Secondly, the research that exists needs to be expanded to include analysis of such things as victim/offender profiles, the weapons used in the homicides, and possible solutions to help the issue of police homicide. Another weakness in the literature concerns the comparison of homicide rates of police officers to those experienced by other groups. Finally, more research is needed providing a comparison of the homicide rates for police officers in one country to the homicide rates for police officers in another country.

Weaknesses in the research on police and assault include the absence of a comparison of the rate and risk of assault for female officers compared to males as well as the rate and risk of assault of non-white officers compared with white officers. Research should include a discussion of the most frequently used methods of assault by perpetrators; the Canadian and American research does not indicate methods of assault. As well, much of the literature fails to suggest solutions to help solve the problem of assaults on police.

Overall, more research is needed on the risk of cardiovascular disease among police officers, work-related factors that may influence that risk and similarities and differences in cardiovascular disease and risks across different groups of police officers.

As well, there is little Canadian research on police officer fatigue. More generally, research needs to explore the risk of fatigue for different groups of officers, its potential consequences for officers and ways to reduce exposures and risks associated with fatigue, particularly in Canada.

Chemical Risks

Cancer

Canada

The areas of focus for Canadian researchers interested in cancer amongst police officers has been the causes of cancer in police officers, the incidence of cancer in police officers and the different types of cancer. The majority of research completed in Canada on cancer has been in relation to radar devices.

Studies show that an increased risk for various types of cancer was found in exposed study participants, although in different organs. The evidence is inconclusive about whether or not the increased risk is due to traffic radar (Breckenkamp et al., 2003; Finkelstein, 1998).

Breckenkamp et al. (2003) considered nine cohort studies dealing with the biological effects of radio frequencies/microwaves on human health, published between 1980 and 2002. The size of the cohorts ranged between 304 persons and nearly 200,000 persons. Included in the exposures studied were radar devices of Canadian police. The study population consisted of 1,596 females and 20,601 male police officers. Due to the small number of females in the department, the study was limited to the male participants only. Unfortunately, a measurement or estimation of officers' exposure to radio frequencies was not indicated in the research. Breckenkamp et al. (2003) found that police officers have an increased risk of various cancers such as brain tumors and leukemia, however, the overall results were inconsistent and the researchers could not conclude that the radar frequency emissions cause cancer.

Finkelstein (1998) carried out a retrospective cohort cancer incidence study among 22,197 officers in 83 Ontario police departments. The study does not differentiate between rural and urban departments involved in the study. Finkelstein found an increased incidence of testicular cancer and melanoma skin cancer, however, concluded it is not possible to draw etiologic conclusions due to the fact that he did not have information about individual exposures to radar emissions.

Van Netten et al. (2003) also completed research in Canada regarding cancer and police officers. Van Netten et al. (2003) studied police personnel associated with a police detachment from 1960 to 2003, in a small British Columbia community. The sample consisted of 20 current and 154 previous employees. All of the current and previous employees of the detachment or their next of kin were contacted. Van Netten et al. (2003) found that there were 16 cases of cancer from their sample of 174 employees. The researchers discovered there were increased rates of testicular, cervical, colon, skin (including melanoma), and leukemia in the police detachment in British Columbia relative to the general public. These researchers suggest an association between the cancers of the officers in that police department and the use of police traffic radar or other occupational exposures (Van Netten et al., 2003).

These studies do not provide systematic comparisons of cancer rates among police officers to those among other groups. Data are also not broken down based on gender, ethnicity, rank or other factors.

United States

Studies of cancer incidences among occupational cohorts are rarely performed in the United States because of incomplete registration and a limited time period available for follow-up (Demers et al., 1992). One study completed in two cities in the United States of 340 police officers found six cases of testicular cancer between 1979 and 1991. The researchers found that the occupational use of a radar gun was the only shared risk factor among all six officers and all held the radar gun in close proximity to their testicles. The researchers note that the health effects of the occupational use of radar have not been widely studied therefore further research into a possible association with testicular cancer is needed (Davis and Mostofi, 1993).

Unfortunately, this was the only research on the issue of police officers and cancer suggesting there has been little research on this potential hazard and on potential work-related cancers among American police officers.

Europe

Only one source was identified concerning police officers and cancer in Europe. The study focuses primarily on the potential carcinogenicity of engine exhaust for 3,868 urban policemen in Rome. It evaluated mortality risk by job category. Two groups of subjects were compared; subjects employed in jobs entailing a higher exposure to engine exhausts such as traffic guards, car drivers, and motorcyclists, and officers employed in jobs where clerical work was prevalent and engine exhaust exposure less likely (Forastiere et al., 1994). The researchers did not consider differences between male and female officers but did consider differences between those officers who smoked and those who did not.

Forastiere et al. (1994) found that there was no association between lung cancer and various jobs, and the odds ratios for developing lung cancer did not increase with duration of employment in a particular job. As well, the smoking habit was not an important confounder in this analysis. Further results of the study indicate that overall cancer mortality was not increased among urban policemen in Rome. However, excess risk was found for some cancer sites, particularly the colon, male breast, and endocrine glands. As well, police car drivers and police motorcyclists seem to be at increased risk of bladder cancer, kidney cancer and non-Hodgkin's lymphoma.

Exposure to Air Pollution

Air pollution has been generally recognized as a health hazard (Burgaz et al., 2001). Outdoor workers such as police officers (particularly traffic police workers) experience the highest exposure to airborne pollutants (Tomei et al, 2001; Carere et al., 2002). There has been an abundance of research completed in European countries on air pollution and police officers (Atimtay et al., 2000; Burgaz et al., 2002; Carere et al., 2002; Fustinoni et al., 1995).

Europe

The literature on air pollution indicates two main sources of air pollution: motor traffic exhaust and domestic heating (Tomei et al., 2003; Forastiere et al., 1994). Air pollution consists of chemicals such as carbon monoxide, benzene, and lead (Tomao et al., 2002; Tomei et al., 2001; 2004). The literature on police officers and air pollutants

concentrates on the officers' risk of exposure to air pollutants in creating health problems for police officers in European cities, and compares the risk of negative health outcomes of traffic police officers to other occupations.

European research has found that officers are at a high risk of exposure to air pollution (Atimtay et al., 2000; Burgaz et al., 2002; Carere et al., 2002; Forastiere et al., 1994). The research is divided, however, on the potential for air pollution to have damaging effects on officers. Although some studies found health related problems due to exposure to air pollution such as liver damage, cancer, hormonal damage and problems with serotonin levels (Tomei and Rosati et al., 2003; Forastiere et al., 1994; Tomao et al., 2002; Burgaz, 2002), not all of the studies found health problems in their participants (Tomei and Ghittori et al., 2003; Carere et al., 2002; Merlo et al., 1997; Karahalil et al., 1999; Pala et al., 2002).

Tomao et al. (2002) assessed whether employees of the Municipal Police Force in a large city in Rome, exposed to urban pollution are at risk of hepatotoxicity (liver damage). The study covered 118 male municipal police employees performing traffic duties and 118 male blood donors engaged in office work. Tomao et al. (2002) administered tests of the participant's blood and urine accompanied by a questionnaire survey designed to identify possible risk factors and the non-professional confounding factors for hepatotoxicity. The results of their study indicated that there is a possibility of liver damage in members of the Municipal Police Force (Tomei et al., 2002).

A second study that revealed health problems due to exposure to air pollution considered alterations in serotonin levels of urban police officers in Rome. Serotonin is involved in a variety of physiological processes, psychiatric disorders, and cardiovascular functioning. Physiological processes include blood pressure regulation, body temperature regulation, pain sensitivity, and mood control. Psychiatric disorders include schizophrenia, obesity, bulimia, anorexia nervosa, alcoholism, depression and impulsive violence and suicidal behavior. The effects of serotonin are felt most prominently in the cardiovascular system (Tomei et al. 2004). Tomei et al. (2004) studied serotonin excretion in 140 employees of a municipal police force in a large Italian city. The sample included 70 traffic police responsible for outdoor activity that exposed them to urban pollutants and 70 administrative workers with indoor activity. In the sample, there were 29 male officers and 41 female officers in the traffic police group and 29 males and 41 females in the administrative group of officers. Subjects were matched based on age, working life, duties performed and other non-occupational confounding factors. The researchers found that the mean serotonin levels were significantly lower in male and female traffic policemen than in control groups. This alteration in serotonin level could result in physiological disruption such as body temperature regulation or mood regulation; psychiatric disorders such as schizophrenia or alcoholism; or problems with the cardiovascular system (Tomei et al., 2004).

Not all studies that considered air pollution and health problems of police officers found health problems in the participants. Merlo et al. (1997) tested 94 traffic police officers and 52 age-matched urban residents who worked in confined spaces from the city of Genova, Italy. Air samples and blood samples were collected for occurrence of DNA adducts in white blood cells due to exposure to airborne polycyclic aromatic hydrocarbons (PAH). Despite finding that traffic police officers experienced an exposure to airborne PAH up to 30 times higher than the referent subjects working in confined

spaces, the researchers failed to detect a significant difference in occurrence of DNA adducts in white blood cells (Merlo et al., 1997).

There are several existing weaknesses in the literature concerning chemical risks for police officers. One weakness in the Canadian and European literature regarding cancer and police officers focuses on radiation and the lack of consideration of other causes of cancer for police officers such as, for example, air pollution, and sun exposures, where applicable. Much of the literature is also lacking comparisons of cancer rates and sites between different groups of officers and across countries and regions.

There are several weaknesses in the literature regarding air pollution and police officers. Firstly, longer time frames need to be considered in the research that concluded there were no health problems due to air pollution. The short time frames used in the research may affect the results of the research, as health problems may not be evident in short time periods. As well, more research needs to consider differences in exposure rate and risk of health problems amongst officers within police departments for example among male and female officers or officers of different ranks. Another weakness in the literature involves international comparison of the results. The research on the exposure to air pollution and health problems related to air pollution in European countries is very thorough, however some international comparisons of the results would be beneficial. Researchers in the United States and Canada should consider pollutants as a health risk to the police officers working outdoors in those countries and generate research on that issue.

Biological Risks

Communicable Disease

The literature about communicable disease concentrates on the risk of exposure to a communicable disease such as AIDS or hepatitis (Pretty et al., 1999; Averhoff et al, 2002; Flavin, 1998; Muraskin, 1995; Pagne et al. 1996). The literature also compares an officers' risk of being exposed to a communicable disease with other occupations that are at risk of being exposed to a communicable disease.

Police officers are at increased risk of coming into contact with communicable disease relative to many other groups of people (Pretty et al., 1999). This issue has been primarily studied in the United States (Pretty et al., 1999; Averhoff et al., 2002; Flavin, 1998; Muraskin, 1995; Pagne et al., 1996; Rischitelli et al., 2001). No Canadian or European research on this topic was identified. The small amount of research on this topic may relate to the fact that HIV/AIDS exposures have only emerged relatively recently as a potential hazards for police officers. Relatively little attention has been given to the complex issues it presents to police officers (Flavin, 1998).

United States

The research on communicable disease focuses on the HIV/AIDS virus and hepatitis B and C. The studies completed in this area concentrate on the risk of exposure to a communicable disease primarily in comparison with other occupations and between various groups of police officers. Other issues addressed in the literature include type of exposure and solutions for improving the problem of officer contact with the diseases.

American research on police officers and communicable diseases indicates that police officers are among high-risk occupations for coming into contact with infectious diseases (Averhoff et al., 2002; Flavin, 1998; Pretty et al., 1999; Rischitelli et al., 2001; Thompson and Marquart, 1998). Averhoff et al. (2002) studied the frequency and risk of hepatitis B virus infection experienced by public safety workers in various police departments in the United States. The researchers did not indicate if the research was conducted in rural or urban police departments. The sample consisted of 2,910 public safety workers. Questionnaires were administered to gather information regarding the contact the workers may have had with the hepatitis B virus and laboratory tests were conducted to test for hepatitis B virus. Averhoff et al. (2002) found that of their sample, 6.8 percent reported at least one occupational exposure to hepatitis B virus in the previous 6 months. When considering the rate of occupational exposure between occupations, they found that 2.7 percent of firefighters, 3.2 percent of sheriff officers, 6.6 percent of corrections officers and 7.4 percent of police officers reported one or more occupational exposures to hepatitis B virus. The researchers also found that the risk of occupational exposure to hepatitis B virus increased with older age, being non-white, and having a previous history of a sexually transmitted disease (Averhoff et al., 2002). Differences between male and female officers were not considered.

Pagne et al. (1996) also discovered that workers in urban areas are likely to experience a higher incidence of exposure to hepatitis B or C virus. They analyzed transcutaneous exposures among police officers in the New York City Police Department during 1992. The department had 31,258 police officers, 26,725 male officers and 4,543 female officers. The police chief of personnel's office provided limited demographic information for all officers with reported transcutaneous exposures during the year 1992. The researchers found that the transcutaneous exposure rate of the New York City Police Department was 38.7 per 10,000. There was no difference in the exposure rates of male and female officers. However those officers with 4 to 10 years in the police department had the highest rate of exposure with an exposure rate of 59.3 per 10,000. As well, those officers who were on patrol (25,006 officers on the force) and those on narcotics (1, 375 officers on the force) had the highest exposure rat at 43.6 per 10,000 (Pagne et al., 1996).

There are several different types of occupational exposures to communicable diseases. Exposure methods include needle stick exposures, which are needle punctures, mucous membrane exposure, blood, and being bitten (Averhoff et al., 2002; Flavin, 1998; Pretty et al., 1999).

Jeanne Flavin (1998) suggests that needle stick injuries present a small but significant risk of HIV infection. She indicates that the average risk of HIV transmission associated with needle punctures or other percutaneous injuries is .32 percent (21 infections following 6,498 exposures). Behind that method of exposure is the risk of infection through mucous membranes. This method does not pose a great risk of exposure. Exposure to saliva contaminated by blood is also considered a very rare mode of HIV transmission, therefore transmission of a communicable disease via spitting is considered extremely low. A final method of disease transmission is biting. However, the biter is at greater risk of becoming infected than the person who is bitten because the former comes into contact with the victim's blood while the reverse may not be the case (Flavin, 1998). Flavin (1998) does not indicate the rate of exposure for these possible routes of occupational exposure to HIV.

Possible solutions for handling the issue of police officer exposure to communicable disease are primarily precautionary. Even though the risk of acquiring a disease from a civilian or offender is relatively low, the fear and stress associated with being infected are high so that it is important to take precautions (Flavin, 1998). One suggestion to reduce the stress caused by the fear of acquiring hepatitis B or C is a vaccination for the virus provided by all police departments (Pagane et al., 1996). A second solution for police officers dealing with the risk of acquiring an infectious disease is education and training regarding these diseases and how to handle civilians and offenders who have these diseases (Flavin, 1998; Pagane et al., 1996).

The weaknesses in the research involving contact with communicable diseases among police officers include a lack of research on this issue in Canada and in European countries. Another weakness is the lack of gender-based analysis and analysis of officers of different ethnicities. Gender based analysis is analysis considering the differences between females and males. This type of comparison would make the literature on this issue much more thorough.

Ergonomic Risks

Back Problems

Another issue that is a concern for police officers is their susceptibility to back problems. Although the information is scarce, low back pain seems to be a common ailment influencing the lives of police officers (Kuorinka, 1994).

Canada

The research on back problems amongst Canadian police officers has concentrated on the risk of back problems compared with the general population. One group of researchers in Canada conducted a survey of a random sample of 1,002 members of the Royal Canadian Mounted Police (RCMP) to determine if back problems were more common in their group than the general public (Brown et al., 1998). These researchers sent questionnaires to the officers regarding their experience with lower back pain. The responses were compared with the rates of lower back pain in the general public. Researchers found that the general public reported a 1-year prevalence rate between 25 percent and 62 percent and the RCMP had a 1-year prevalence rate between 44 percent and 62 percent (Brown et al., 1998). The researchers concluded that the prevalence of back problems in that sample of RCMP officers was similar to that of the general public and that police officers do not have a higher risk of back problems due to certain aspects of their job such as wearing a seatbelt or riding in a patrol car all day (Brown et al., 1998).

Europe

The research in Europe on back problems used two methods of data collection; in the first, data on low back trouble were collected from a representative random sample of exposed and control forces along with variables describing exposure to occupational physical stressors (Burton et al., 1996). The second method used to gather data involved

conducting an interview survey comparing two groups of police officers with differing levels of exposure to driving (Gyi et al., 1998).

The first study considered continued exposure to wearing body armor and prolonged work in a vehicle in relation to low back trouble. Burton et al. (1996) studied two urban police forces. One force was in Northern Ireland with 2000 participants, and the other police force was in Manchester contributing 600 officers to the sample. The participants were a random sample that was representative of the two forces. The researchers considered two possible causes of back problems: exposure to vehicle vibrations for over 2 hours per day and wearing body armor. They administered a survey regarding the experience of back pain and duties and activities the officers took part in. Burton et al. (1996) found that exposure to wearing heavy body armor did increase the risk of low back trouble. For those participants who were not exposed to vehicle vibrations or body amour, 4.3 percent experienced back problems. For those subjects who were not subject to vehicle vibrations but were subject to body armour, 8.2 percent succumbed to back pain. For those participants who were subject to vehicle vibrations but not body armour, 6.3 percent succumbed to back trouble. Finally, for those participants who were exposed to vehicle vibrations and body armour, 7.8 percent succumbed to back problems (Burton et al., 1996).

A second study that concentrated on the rate of back problems included a comparison linking differing levels of time spent driving and musculoskeletal troubles of police officers. The research in the United Kingdom found that European police officers whose job mainly involves driving, experienced more lower back trouble than those officers whose job involved things other than driving including, for example, sitting or standing tasks (Gyi and Porter, 1998). Gyi and Porter (1998) considered a rural police force in the United Kingdom. The sample consisted of 80 police officers whose work included driving or sitting in the same car all day and 91 general duty officers whose daily tasks were varied and who did not carry out one particular activity all day. Gyi and Porter (1998) found that 38 percent of traffic car drivers compared with 29 percent of general duty ‘standers’ and 22 percent of general duty ‘lifters’ experienced low back trouble for more than 8 days in 1997. The same study found that police motorcyclists had higher rates of reported shoulder trouble than the officers whose work included sitting in the same car all day (Gyi and Porter, 1998). This study compared police motorcyclists to the police car drivers with regard to reported musculoskeletal troubles. Gyi and Porter (1998) found that the severity of reported shoulder trouble and the recorded period of shoulder trouble of 12 months were significantly higher for police motorcyclists.

Several weaknesses are evident in the literature concerning ergonomic occupational hazards of police officers. The findings in the European research suggest that the Canadian researchers need to change their approach to studying police officers and their risk of back problems to incorporate measurements of exposures. The Canadian research needs to be more exhaustive; for example, the research should include a comparison of police officers doing different types of police tasks such as office work or motorcycle patrol. By comparing different groups of officers within the same force, a researcher is better able to compare rates of back injuries in an effort to determine if an officer who is assigned to one task is more susceptible to back problems (or other types of problems) than other officers performing a different task.

Psychosocial Risks

Stress

Canada

Canadian research regarding police officers and stress indicates that policing is a high stress job (Anderson et al., 2002; Golembiewski and Kim, 1990; Loo, 1986). The research concentrates on the sources of police officer stress and the effects it has on the officers. Some of the research offers solutions for police officer stress.

The physical, psychological, and emotional stressors in police work can be divided into three categories: extra-organizational sources, intra-organizational sources and individual sources. Extra-organizational sources of police stress are things that that may cause officer stress outside of the police organization. Intra-organizational stress results from sources of stress within the police organization, and individual sources of stress are personal characteristics of police officers that make them susceptible to stress (Golembiewski and Kim, 1990).

One Canadian study considered all three of these potential police stressors. Golembiewski and Kim (1990) interviewed a number of recruits in the Canadian Urban Police Academy; the number of participants was not given. The researchers identified two extra-organizational sources of police stress, including the criminal justice system and police-community relations (Golembiewski and Kim, 1990; Stearns and Moore, 1993). Court-specific stressors are an effective illustration of how the criminal justice system has a stressful impact on police officers. There are several court-specific stressors including problems in scheduling appearances, being cross-examined, and the impression that courts are lenient toward criminals (Golembiewski and Kim, 1990).

The police-community relationship is characterized by tensions between what the community wants and what police work entails. The public wants a deterrent approach from its police officers; however, police activities are largely service oriented, for example handling family fights. These tensions can potentially worsen the police-community relationship as well as increase police alienation from the community and create role conflict for them (Golembiewski and Kim, 1990).

Intra-organizational sources of police stress can include the physical danger of the job, shift work and organization structure (Golembiewski and Kim, 1990). The physical danger of police work implies major stressors for police as their work involves them in potentially dangerous situations (Golembiewski and Kim, 1990). The Canadian literature on police stress reveals that several researchers in Canada have studied physically dangerous situations as a police stressor (Golembiewski and Kim, 1990; Parent and Verdun-Jones, 2000; Yarmey, 1988). One physically dangerous situation that has a stressing effect on police officers is the use of deadly force. The use of deadly force can have substantial psychological impacts on police officers (Loo, 1986; Parent and Verdun-Jones, 2000; Yarmey, 1988). Loo (1986) found that the stressful impact of a shooting incident was so severe that the average time it took for officers to feel that they were back to normal working, social, and family life was 20 weeks.

The third category of stressors for police officers is individual characteristics of the officer. Although most research finds no unique police personality, there is an emerging consensus that the stressors of police work often generate general attitudinal

behavioral characteristics. For example, an officer may become suspicious, rigid, cynical, and authoritarian (Golembiewski and Kim, 1990; Stearns and Moore, 1993). As well, after dealing with lying cheating, and hostile people on the streets, officers can start mistrusting friends and even family or develop a negative attitude toward their work (Golembiewski and Kim, 1990; Kohan and O'Connor, 2002).

Stress can have many negative effects on police officers (Golembiewski and Kim, 1990). One negative consequence suggested in the Canadian literature on police officer stress is marital problems (Golembiewski and Kim, 1990). Other effects of police officer stress are suicide and drug/alcohol use. Alcoholism and drug use are often considered major stress-related outcomes for officers (Golembiewski and Kim, 1990; Kohan and O'Connor, 2002). Much of the research completed on alcohol and drug use of officers indicates that there is an alcohol and non-medical drug use problem among police personnel (Dietrich and Smith, 1986).

A fourth stress-related outcome for police officers is physical symptoms. Researchers suggest that officers can suffer from a range of discomforts for example headaches, being fidgety or tense, backaches, stomach aches, poor appetite, problem with falling or staying asleep and nightmares (Golembiewski and Kim, 1990; Parent and Verdun-Jones, 2000). The incidence and severity of physical symptoms among police is not firmly established (Golembiewski and Kim, 1990). A final effect of police officer stress that is identified in the Canadian literature is job burnout. Evident in the literature on police officer stress is the notion that police officers sometimes suffer moderate to high levels of job burnout (Golembiewski and Kim, 1990; Stearns and Moore, 1993) Burnout is characterized by several dimensions including depersonalization, reversed personal accomplishment, emotional exhaustion, and lack of satisfaction or happiness (Golembiewski and Kim, 1990; Stearns and Moore, 1993).

In each of these studies, the researchers based their results on the subjective interpretation of the stress suffered by the participants and do not indicate the frequency of the problems relative to other occupational groups or the general population.

In response to much of the literature on police officer stress involving the use of deadly force, one solution suggested in the Canadian literature on police officer stress is psychological debriefing as soon as is practical following a lethal incident (Loo, 1986). A second solution to the stress is counseling or therapy for the officer or the officers' family (Loo, 1996; Parent and Verdun-Jones, 2000; Yarmey, 1988). A third solution to officer stress is a period of leave from duty (Loo, 1986). A final solution revealed in the literature on police officer stress is police training; especially recruit training that addresses stress management (Loo, 1986; Parent and Verdun-Jones, 2000).

United States

The American literature on police officer stress concentrates on the sources of stress including which stressors are most dominant amongst various groups of police officers. There is some discussion of the effects of stress on officers as well as solutions to reducing stress and treatment for the stress.

The American studies on the sources of police officer stress indicate two categories of stressors: the nature of police work and organizational factors within police forces (Violanti and Aron, 1995; Van Hasselt et al., 2003; Zhao et al., 2002). Stressors that are reported as inherent in police work are danger, shift work, role conflict, public

apathy, boredom, a sense of uselessness, and dealing with misery and death (Klaus et al., 2002, Laufersweiler-Dwyer and Dwyer, 2000; Robinson et al., 1997; Violanti and Aron, 1995; Van Hasselt et al., 2003; Zhao et al., 2002). Organizational factors that are a source of police officers' stress are authoritarian structure, lack of participation in decisions affecting daily work tasks, lack of administrative support, unfair discipline, the promotion process (Klaus et al., 2002; Laufersweiler-Dwyer and Dwyer, 2000; Toch, 2002; Violanti and Aron, 1995; Zhao et al., 2002).

The literature indicates the death of a partner or taking a life in the line of duty as among the top stressors identified by officers (Robinson et al., 1997; Violanti and Aron, 1995; Zhao et al., 2002).

Some of the literature considered perceptions of stressors by officers at different levels of job experience, rank, age, race, and gender. Violanti and Aron (1995) considered variations in perceptions of stress among police officers. The study included a sample of 103 full time sworn officers employed by a large police department in New York State. The participants completed the Police Stress Survey administered by the researchers, which was designed to assess incidents within the macro, intermediate and micro levels of the organization. Violanti and Aron (1995) found that there was little difference in reporting on level of stress caused by organizational and job related stressors between rank, age, years of service, race or gender. One difference in the mean scores for race suggests that Caucasians report a slightly higher mean score for organizational stressors than do African Americans and Hispanics. As well, African Americans have the greatest disparity between organizational and job related stressors, ranking inadequate support by the department as the highest stressor. Violanti and Aron (1995) did not indicate the rate of stressors for officers of various years of experience, ranks, age, race and gender relative to the general population.

Another study in the American literature on police officer stress that analyzed the differences among the various groups within the demographic population considered possible differences in the demographic characteristics in officers recorded. Of particular interest to the researchers were the differences between genders and educational levels. Laufersweiler- Dwyer and Dwyer (2000) administered the Police Stress Survey to 402 officers, deputy sheriffs and others employed in several United States municipal police and sheriff agencies. The sample included 336 males and 72 females. The sample included 50 officers with high school diplomas, 181 officers with some college educations, 147 officers with a bachelor degree and 30 officers who had completed graduate work. In the group mean comparisons the researchers found only a small degree of difference existed for those with higher education levels. However, as education increased the mean stress level decreased. This discovery provides support for the concept that coping strategies are significantly better in those with a college education (Laufersweiler-Dwyer and Dwyer, 2000).

In considering female and male officers the researchers found no difference in stress levels. The researchers offer no explanation for why there was no difference between the two genders (Laufersweiler-Dwyer and Dwyer, 2000).

Laufersweiler-Dwyer and Dwyer (2000) also considered officers' age and rank in their study. The sample was comprised of 119 officers in the 20 and 30 age bracket, 152 officers in the 31 to 40-age bracket, 95 officers in the 41 to 50-age bracket and 42 officers who were 51 or older. There were no differences between group means when considering

the age of the respondents. The study refers not only to the effect of age but the combined effect of age and experience. The researchers note that because people of different ages have different priorities, needs, fears and hopes there is little significance found in using a person's age to determine their perceived stress levels (Laufersweiler-Dwyer and Dwyer, 2000).

Anderson et al. (2000) determined several physical and psychosocial stress reactions of officers from data collected from 121 ride-alongs over a 12-month period. The effects of stress on police officers include many physical and psychosocial stress reactions including but not limited to increased blood pressure and heart rate, increased tension resulting in a stiff neck, grinding teeth and headaches, nausea, and dry mouth (Anderson et al., 2002).

Another study used a sample of 100 suburban police officers that completed an anonymous questionnaire including a measure of duty related stressors. The researchers cited anxiety, depression, somatization, burnout and alcohol abuse as common reactions of police officers that are under stress (Robinson et al., 1997).

The research reviewed here did not include information on the frequency with which the various types of stress or various stress-related problems occurred.

Solutions for police officer stress suggested in the American literature include the practice of debriefing at the end of shifts or immediately after critical incidents. A second solution to police stress is the inclusion of a discussion of stress and stress related illness in police training. There is a recommendation that training programs should also look towards the officers social support network and offer seminars on how to best offer a supportive environment at home and recognize the signs of stress (Anderson et al., 2002). Another suggestion to improve the problem of stress among police personnel is for supervisors/administrators to address the concern that officer stress is sometimes due to the lack of officers' coping skills. One way to address this problem is by providing additional support from the organization level (Klaus et al., 2002).

Europe

The majority of research completed in European countries on police officer stress concerns the rate of stress for police officers compared to other occupations and between among different groups of officers, the source of the stress, the various effects, and solutions for police officer stress.

European literature on police officer stress reveals that policing is a stressful occupation (Collins and Gibbs, 2003). Compared to other occupations policing is amongst the top three occupations most commonly reported by both occupational physicians and psychiatrists in the Occupational Disease Intelligence Network (ODIN) system for Surveillance of Occupational Stress and Mental Illness (Collins and Gibbs, 2003).

One study that considered male and female officers and officers of various races found that officers with more than 15 years service had a high stress level. Sergeants, office and administrative employee rank, officers who were divorced and were over 30 years of age also had a high stress level. Also in the high stress group were officers who did not have leisure time activities or hobbies (Deschamps et al., 2003). Another study that considered gender differences offered conflicting results indicating that females have higher levels of stress and suggesting that a proportionately higher number of female

officers are retiring on the grounds of psychological illness than male officers (Collins and Gibbs, 2003).

European studies on police officer stress indicate two categories of police stress: internal and external stressors. Internal stressors include organizational stressors such as poor management, reorganization, bureaucratic interference, administration, shift work, and 'macho' or unmotivated colleagues (Kop et al., 1999). External stressors include various aspects of the nature of police work such as physical threat, violence, and exposure to danger (Carlier et al., 1997; Kop et al., 1999).

A review of this literature reveals that some of the research completed on police officer stress in European countries relates to posttraumatic stress disorder (Carlier et al., 1997; Green, 2004). This research indicates that officers have high rates of posttraumatic stress disorder (Carlier et al., 1997; Green, 2004). The results of one study indicate that 7 percent of the sample used (262 officers) had posttraumatic stress disorder and 34 percent had posttraumatic stress symptoms such as introversion, emotional exhaustion, lack of hobbies, job dissatisfaction, and brooding over work (Carlier et al., 1997). Another study completed in the United Kingdom involving 31 police officers and 72 civilians found that the prevalence rates for posttraumatic stress disorder in police officers may be 6 or more times the prevalence rates for the wider community (Green, 2004).

The effects of stress on police officers were considered in most studies (Carlier et al, 1997; Green, 2003; Kop et al., 2001; 1999). One study indicated introversion; difficulty in expressing feelings; emotional exhaustion; insufficient time to recover from trauma; and dissatisfaction with organizational support as common effects of police officer stress (Carlier et al., 1997). Another study indicated use of alcohol as a common effect for an officer who has just experienced a traumatic event (Green, 2004). Two other studies found that burnout including emotional exhaustion and depersonalization was common for officers dealing with occupational stress (Kop et al., 2001; 1999).

Evidence of solutions for officer stress in this literature is minimal. Kop et al., (1999) suggest that police personnel management should pay closer attention to burnout and depersonalization among police officers, and departments should place greater emphasis on improving their organizational health in order to improve officers stress caused by organizational stressors (Kop et al., 1999). There were no suggestions made in this research for coping with or improving the stressful situations caused by the inherent nature of police work.

Sexual Harassment

Another problem that some police officers encounter is sexual harassment. Key factors in acts of sexual harassment include behavior that is unwanted and unrequested, humiliating, intimidating and offensive. Sexual harassment can be indirect or unintentional and can involve continuous behavior or a single event. It may take the form of propositions, suggestive comments, requests, offensive jokes, unnecessary touching, leering or offensive gestures (Anderson et al., 1993).

United States

The literature regarding sexual harassment of female police officers in the United States concentrates on the prevalence of sexual harassment in urban American police departments (Janus et al., 1988; Peters, 1999; Timmins and Hainsworth, 1989).

Research indicates that sexual harassment is prevalent in American police departments (Janus et al., 1988; Perez and Shtull, 2002; Peters, 1999, Timmins and Hainsworth, 1989).

Janus et al. (1988) conducted research on a sample of 135 officers employed between 1 and 28 years in New York City police departments and departments in small cities and towns in Connecticut, New Jersey and San Diego. The officers in the sample completed a questionnaire. Janus et al. (1988) discovered that when female officers were asked if they have ever experienced sexual harassment on the job, 68 percent said yes and 32 percent said they had not experienced sexual harassment. Janus et al. (1988) also noted that not all sexual harassment on the job is reported and the younger officers are at greater risk of experiencing harassment. One suggestion for eliminating sexual harassment is sexual harassment training for all employees to help ensure a zero-tolerance of harassing incidents (Peters, 1999).

Europe

The research on sexual harassment of female police officers in Europe focuses primarily on women's risk of being sexually harassed on the job. Only one European source on this topic was located in this search. I was unable to obtain a copy of the research therefore this review is based on a detailed abstract of the research.

Brown and Heidensohn (2000) used data derived from questionnaires completed by 804 female police officers from 35 countries. The researchers found that women from forces that were the earliest to admit women were almost twice as likely to experience sexual harassment than those women from forces that only recently started recruiting women.

Discrimination

Canada

Discrimination is another psychosocial hazard associated with workplaces. The Canadian research concerning discrimination within police forces concentrates on the hiring and promotion practices of departments, and the ranks and positions that women and minorities hold in those departments. A review of this research indicates that, in the absence of recruitment and promotional policies, direct active and aggressive attention to women, aboriginals, visible minorities and the disabled, the recruitment of these groups will continue to be erratic and sporadic (Nelson, 1992; Perrott, 1999).

Nelson (1992) used a survey investigating the hiring and recruitment practices in 22 urban police departments in western Canada. He found that there is a daunting record of police failure to hire and/or promote target groups. Nelson (1992) noted the absence of women, aboriginals and minorities. And, even within larger departments, a proportion of those from groups were typically marginalized in terms of the rank structure. The study revealed that of 326 females employed as sworn officers within departments surveyed, 290 (or almost 89%) were constables; the highest rank achieved by a female was that of inspector. Of 51 aboriginal officers, 2 held the rank of Superintendent; of the remainder, 40 held the rank of Constable. Of visible minority officers, 80 or 89 officers were constables. The highest rank held by visible minorities was that of detective/sergeant. In sum, the study indicated that women, aboriginals, and visible minorities are concentrated

in entry-level positions providing evidence that Canadian police departments are discriminatory in their hiring and promotion practices (Nelson, 1992).

Another study found supporting evidence for the lack of promotion for policewomen. Women had started making their way to the lower supervisory rungs, particularly in the major police forces. They still had not yet reached the senior management ranks, with a few exceptions (LeBeuf, 1996).

A third study considered among African-Canadian police applicants. Eighty African-Canadian police applicants were asked about their career aspirations and experience with obstacles to minority recruitment. The female and minority police officers indicate that racial prejudice by police officers and society were viewed as the most significant obstacles to minority recruitment (Perrott, 1999). This research indicates that discrimination based on gender, race or ethnicity may still be occurring in police departments in Canada.

United States

Susan Martin (1994) addresses the problem of discrimination against women and minority police officers in the United States. Martin (1994) focuses on the unique experiences of black female police officers. She interviewed 106 black and white officers and supervisors employed by 5 large municipal agencies in the United States. The population consisted of 31 black female officers, 35 white female officers, 21 white male officers and 17 black male officers. She found that the combination of race and gender statuses was associated with unique problems and experiences for black female police officers in the United States. Martin (1994) found that discrimination was widespread. However, officers differed in their experiences with it depending on their gender or race.

Martin's research indicated that black women officers identified three situations that impact them differently than the general population of police officers. The first situation that is unique to black female officers is uncertainties related to both co-worker backup and unpredictable responses of citizens to a black woman exercising authority. A second situation identified is that women are subjected to a hostile environment characterized by sexual propositions, pornography and cursing. A final situation where black female officers differ from the general population of police officers is the lack of unity among female officers (Martin, 1994). Martin (1994) discovered that 48 percent of black female officers indicated both race and sex as the forms of discrimination experienced most frequently compared to 17 percent of white females and 14 percent of white males. The black males included in this study did not indicate they had problems with discrimination based on both race and sex. Martin (1994) did not report her results based on the relative frequency of the problem among police officers compared with other groups of workers.

Europe

The European research on discrimination against women and minority police officers concentrates primarily on the hiring and promotion practices associated with women and minority police officers (Brown, 1998; 2000). Other research on this topic considers the experiences that are unique to female and non-white officers (Anderson et al., 1993; Holder et al., 2000).

Sexual and racial discrimination based on hiring and promotion is practiced within most police departments (Anderson et al., 1993; Brown, 2000; 1993; 1998). One study based on a questionnaire completed by 86 traffic wardens, 162 civilian support staff, 510 police women and 1,802 in urban police departments in the United Kingdom, found that one obstacle to women's promotion is discrimination related to the training opportunities available to women. Women have not had sufficient access to the training that would allow them to enter a particular profession or to gain promotion (Anderson et al., 1993). If discrimination exists in the training that is available to women then it follows that women's promotion prospects will be severely restricted.

Brown (1998) examined the discriminatory treatment of female police officers in England and found that women were underrepresented both laterally and horizontally in the police service. She surveyed 497 officers holding the rank of constable and engaged in uniform patrol or detective work from a large provincial English police force. Her research concluded that male police constables were twice as likely as women police constables to be deployed as solo community beat officers (24 percent compared to 12 percent); and five times more likely to be in the traffic department (17 percent compared to 3 percent). As well, female police constables were twice as likely to serve as foot patrol officers (18 percent compared to 9 percent). Women were also more likely to be section car drivers (55 percent compared to 29 percent). Results also indicated that one woman police constable drove the immediate response vehicle compared to 21, or 7 percent of the men.

The term 'triple jeopardy' illustrates the experiences that are unique to non-white female officers. Holder et al. (2000) interviewed 11 female police officers from England and Wales. The sample included 4 black female officers, 3 Asian female officers, and 4 white female officers. The research concluded that 4 white female officers experienced sexism only; 1 black female officer experienced racism only; and 3 black, and 3 Asian female officers experienced both racism and sexism. The evidence shows that black and Asian women officers are more likely to be affected by harassment and discrimination compared to their white women counterparts. They are also more likely to suffer sexual harassment, which is tied to experiences of racial discrimination; and suffer a greater range and severity of harassment and discrimination (Holder et al, 2000).

Suicide

Research on police officer suicide has been completed in Canada (Andrews, 1996; Loo, 2003; 1986), the United States (Janik and Kravitz, 1994; Violanti, 1997) and Europe (Lester, 1992; Schmidtke et al., 1999).

Canada

Research on suicide and police officers in Canada concentrates on suicide rates (Andrews, 1996; Loo, 2003; Loo, 1986). The researchers do not specify if the research was carried out in a rural or urban environment. Other issues also addressed in the literature include the role of rank, gender, race, method of suicide, time of year and possible causes of the suicides (Andrews, 1996; Loo, 2003). There is also discussion of preventative measures for suicide (Andrews, 1996).

The research on the rates of suicide of police officers in Canada indicates that, for most years, the RCMP suicide rate is lower than the general population rate (Andrews,

1996; Loo, 2003; Loo, 1986). Robert Loo's (1986) study examined a 23-year time period, in the RCMP. He found that suicide rate (14.1/100,000) to be less than half the comparable Canadian average for adult males (29.4/100,000). Lynn Andrews' (1996) study yielded similar results. Andrews (1996) found that between 1984 and 1995 the RCMP suicide rates were 16.02 per 100,000 as compared to 26.63 per 100,000 for the general population.

The literature on police suicide suggests that no particular rank within the force commit suicide at a disproportionate level with the exception of Sergeants who commit suicide at a lower rate than expected. The number of women who committed suicide was much smaller than the number of men (Andrews, 1996). Lynn Andrews (1996) suggests that of the officers committing suicide over an 11-year time span, 2 were women and 27 were men (Andrews, 1996). The same study discovered that most suicides happen between ages 25 and 39 and that the majority of officers who committed suicide were married (Andrews, 1996).

The primary method of suicide indicated in this literature was by gun (Andrews, 1996; Loo, 2003; Loo, 1986). Other methods include hanging and carbon monoxide exposure (Andrews, 1996). Also, there was no particular time of year during which a member was more likely to commit suicide (Andrews, 1996).

There are many suggestions regarding why police officers commit suicide (Andrews, 1996; Loo, 2003; Loo, 1986). The primary suggestion to explain police suicide is the stressful nature of police work in terms of work overload, shift work, and exposure to violent and life-threatening situations among other elements (Andrews, 1996; Loo, 2003). A second suggestion to explain police suicide is the organizational aspects of police departments including departmental politics, inadequate resources to do the job, lack of support and recognition from management to name just a few factors (Loo, 2003). Unfortunately, the research did not explain why police officers have lower rates of suicide than in the general public.

United States

The American research on suicide in police forces concentrates on the rates of suicide for police officers and compares the rates of officers with the general public (Janik and Kravitz, 1994; Violanti, 1997), and other occupations (Janik, 1994; Violanti, 1997; Violanti, 1995). The research on suicide in the United States also explores potential causes of suicide and suggestions for prevention (Violanti, 1997). The American literature on police officer suicide is primarily based on officers working in urban environments.

The American research on police suicide is quite different from the Canadian research. It indicates that police officers in the United States have a higher rate of suicide than the general population, and other occupations, such as municipal workers (Janik and Kravitz, 1994; Violanti, 1997; 1995). Violanti et al. (1997) suggest that male police officers had a 53 percent increased rate of suicide when compared to male municipal workers. One study, based on a survey of suicide rates among police officers for 26 countries for the period of 1980 to 1989 indicated that police officers in the United States rank second in suicide rates of police officers relative to the 26 countries studied. (Lester, 1992).

Potential causes for suicide are noted by one study as marital problems and suspension from duty (Janik and Kravitz, 1994). Another study suggests that exposures to stressors as part of their daily work increase the potential for police officer suicide. Stressors include organizational stressors such as authoritarian structure, lack of participation in decision-making, administrative support, punishment-centered philosophy and unfair discipline. Other stressors are danger, shift work, public apathy, boredom, a sense of uselessness, and dealing with misery and death, particularly in shootings. Exposure to distress without access to multiple resources for coping may increase the potential for suicide (Violanti, 1997).

The primary suggestion for handling the problem of police suicide in the United States is training on suicide prevention in stress management programs. A second suggestion is for organizational restructuring of the importance of the police role. In other words, new officers should be made aware that the role of police officer is important but that it is not the only role in their lives. These simple might help reduce suicide rates among police officers (Violanti, 1997).

Europe

The European literature on suicide among police officers concentrates on the rate of suicide for police officers compared to the general public, the most commonly used method of suicide, and explanations for why police officers have a higher suicide rate than the general public.

The European research on police officer suicide rates has yielded mixed results. Some research suggests that the suicide rate of police officers does not appear to be consistently higher or lower than that for men in the general population (Lester, 1992). However, other research suggests that police officers do have higher suicide rates in comparison to the rate within a comparable age group of males in the general public. One study based on a survey completed in 1997 in Germany within a random sample of Federal Republic of Germany police organizations, including Federal Customs, 16 state police and 2 federal police organizations, found that 25 per 100,000 police officers committed suicide in 1997 compared to 20 per 110,000 males in the general population. This study indicated that firearms were the most commonly used suicide method for officers, appearing in 66-71 percent of the suicide cases (Schmidtke et al., 1999).

Schmidtke et al. (1999) indicate that the higher suicide rates among police officers could be attributed to higher work stress than in other professions. A second suggestion is that officers have higher suicide rates than the general public due to individual variables such as psychiatric illnesses, alcoholism and marital problems.

This review of the literature on work-related psychosocial hazards of police officers points to several weaknesses in this literature. The first weakness relates to research on police officer stress. The Canadian literature on police officer stress did not indicate the frequency with which stress occurs in police officers. The literature also does not include the frequency with which the negative outcomes of stress occur including, for example, marital problems, alcohol and drug use, and problems sleeping. A weakness in the American research on officer stress is the lack of comparison of stress levels among non-officer citizens with those of the police officers (Klaus, 2002). The comparison of the officers with a control group such as another profession or similarly aged adults in the general population would make it easier to compare police officer stress with that in other

professions and might help separate work-related from other forms of stress. The research on police officer stress in European countries, like that done in Canada and the U.S. does not compare the risk and sources of stress to those associated with policing in other countries.

Existing research on sexual harassment in police forces indicates that female officers, particularly nonwhite female officers and those who entered forces when few women were working there, are at greater risk of sexual harassment. Much more research is needed to address the many issues surrounding sexual harassment of female officers including, for example, the effect harassment has on the women, the different forms that harassment can take and the severity of each method of harassment. The research on sexual harassment of female officers also needs to identify and examine the effectiveness of potential solutions to this problem.

More research needs to be completed in the area of discrimination against women and minority police officers. Research needs to address the effects that the discrimination has on minority officers and offer possible solutions for the problem. The Canadian literature on discrimination practices of Canadian police departments lacks discussion of solutions for the discriminatory problems that women and minorities face in their departments. As well, comparisons of rates of discrimination, types of discrimination and outcomes across groups and departments would be valuable both within and between different regions and countries.

All of the research on suicide in Canadian police forces focused primarily on the rates within the force and compared to the general public. Research on suicide does not compare suicide rates among police officers based on gender, ethnicity, rural versus urban or other factors. A second weakness in the research on police officer suicide is the absence of police records of officer suicides in the United States and Europe. The United States does not keep records on suicide among police officers (Lester, 1992). Reliable, long-term police suicide databases and reliable police records on police suicide are needed. Complete records on officer suicide would be very convenient for national comparisons of the problem. More research could also be completed on the methods of suicide. Very little research has objectively documented the effectiveness of particular kinds of innovations in reducing the suicide rate among police officers. Research into possible treatment options for officers at risk of suicide is also warranted. A final weakness in the research on police officer suicide is the lack of complete suicide statistics in European countries. European researchers need to develop suicide statistics including breakdowns by year, sex, and ethnic groups.

Conclusion

Policing is a complex occupation. Differences in job design and in the wider societal context within which police work occurs, adds to the complexity of policing. Due to the complexity of policing, risks and exposures may vary within forces, between forces and internationally. Although there are differences in the functioning of police departments and police work in Canada, the United States and Europe, much of the research reviewed here indicates important similarities between countries.

This review essay found strong similarities in the research on policing and occupational health carried out in Canada and the United States. With few exceptions, findings were also similar between the two countries. Areas of difference include

differences in the suicide and homicide rates of officers in Canada and the United States. Research in the United State indicates that police officers have a much higher rate of suicide than the general public. However, the Canadian research on police officer suicide indicates that the suicide rate of Canadian police officers is lower than that of the general population.

In comparing the North American research and the European research, considerable differences arise concerning the focus, methods and the results of the research. An example of the differences in the two sets of research relates to consideration of air pollution as a potential contributor to cancer among police officers. Instead of focusing solely on traffic radar as a primary cause of cancer, the European researchers also considered the potential role of exposure to air pollution in the development of police officer cancer and other health problems. Similarly, the focus of the research on back problems and police officers differed as well. The European research concerning back problems amongst police officers focused on body armor as a source of back problems for European officers whereas the North American research focused primarily on prolonged sitting in a vehicle as a potential cause of back problems for officers.

While considerable research has been completed in Canada, the United States and Europe on occupational health and safety issues of police officers, there is relatively little Canadian research overall and there are important general gaps in the research as a whole. The first general weakness in the literature is that most of the research has been concentrated in three areas: stress, homicide, and fatigue. Other health and safety issues of officers have been studied little and some potential issues have not been addressed at all. In Canada, there is no research on the risk of cardiovascular disease or air pollution exposures; the issues of air pollution and back problems have not been addressed in the United States; and the issues of homicide, communicable disease, and fatigue have received little attention in Europe. Finally, there is no research completed on the risk of motor vehicle accidents for police officers in Canada, the United States and Europe.

A second general gap in the literature is that the research is based primarily on studies conducted in urban police departments. I found no research focused particularly on rural policing and no studies comparing the occupational health risks associated with policing in rural versus urban areas.

A third gap in the literature relates to methodologies. The best research on occupational health and safety links risks to exposures and allows comparisons of health outcomes across different groups. Much of the literature included in this review essay does not indicate the results of the research in this manner making it difficult to compare the prevalence of particular health problems across different categories of police officers and between police officers and other groups. Self reported health problems are also very often used as the basis for identifying health problems and their severity where a combination of subjective and objective measures would be better.

A fourth gap in this research is that, with the exception of the research on discrimination and harassment, almost all of the research on the occupational health risks experienced by police officers has relied on male participants or has failed to incorporate a gender and race analysis of the results. By limiting the research to male officers or failing to carry out a gender-based analysis, the researchers are omitting a valuable part of the research on health and safety issues of police officers.

Finally, this review of the literature identified no research on police officer occupational health that was carried out in Atlantic Canada. Research on the Royal Canadian Mounted Police (RCMP) and the Royal Newfoundland Constabulary (RNC) would be valuable to the general research on health and safety issues of police officers and useful to local police forces. Of particular importance to research of this kind would be a comparison of the health and safety issues of rural and urban departments in Newfoundland and Labrador. Due to the vast difference in rural and urban Newfoundland and Labrador, research into the differing circumstances in both environments is warranted.

In summary, having considered the strengths and weaknesses of the literature on occupational health and safety issues of police officers, it is evident that the research that has hitherto been completed on this issue provides a solid foundation for further research but much remains to be done.

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