2006

Low Back Pain in Police Officers

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LOW BACK PAIN IN POLICE OFFICERS

By

Jennifer Gwyn Arts

THESIS

Submitted to the Physical Therapy Program at Grand Valley State University Allendale, Michigan
In partial fulfillment of the requirements for the Degree of

MASTER OF SCIENCE IN PHYSICAL THERAPY

2006

THESIS COMMITTEE/RESEARCH ADVISOR APPROVAL
ABSTRACT

Low back pain (LBP) is something that police officers deal with on a daily basis. The purpose of this research was to explore whether police officers have a higher incidence of LBP than the general population and to explore what factors officers believe contribute to the LBP they experience. Surveys were made available to all police departments in Kent County and all sworn officers were asked to participate. The difference between LBP experienced by police officers (60.2%) and that experienced by the general population (60-90%) was not found to be significant. The top two answers given by officers as to what contributed to their LBP were the duty belt (53.8%) and the vehicle they drive (54.8%). Further research is warranted to look at interventions to modify the vehicle or the duty belt.
DEDICATION

I would like to dedicate this thesis to my husband, Josh Arts, for the inspiration to study police officers as well as his support and encouragement throughout the research and writing process. I would also like to dedicate this thesis to all police officers who suffer from low back pain. May this research provide a stepping stone for changes to be made.
ACKNOWLEDGEMENTS

I would like to thank Roger Gren of the Cedar Springs Police Department for his assistance in presenting my research and distributing the surveys. I would also like to thank my committee for their assistance throughout the research process.
PREFACE

Definitions

Low Back Pain (LBP): Pain experienced between the vertebral level of T10 and the sacrum.

Chronic LBP: Pain experienced for six months or more over the course of a year.
<table>
<thead>
<tr>
<th>TABLE OF CONTENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstract</td>
</tr>
<tr>
<td>Dedication</td>
</tr>
<tr>
<td>Acknowledgements</td>
</tr>
<tr>
<td>Preface – Definition of Terms</td>
</tr>
<tr>
<td>List of Tables</td>
</tr>
<tr>
<td>Chapter</td>
</tr>
<tr>
<td>1. Introduction</td>
</tr>
<tr>
<td>a. Background</td>
</tr>
<tr>
<td>b. Statement of the Problem</td>
</tr>
<tr>
<td>c. Purpose of the Study</td>
</tr>
<tr>
<td>d. Rationale for the study</td>
</tr>
<tr>
<td>e. Research Questions</td>
</tr>
<tr>
<td>2. Literature Review</td>
</tr>
<tr>
<td>a. Prevalence of Low Back Pain (LBP)</td>
</tr>
<tr>
<td>b. Cost of LBP</td>
</tr>
<tr>
<td>c. Factors Contributing to LBP</td>
</tr>
<tr>
<td>i. Vibration</td>
</tr>
<tr>
<td>ii. Lifting</td>
</tr>
<tr>
<td>iii. Posture</td>
</tr>
<tr>
<td>1. Sitting Posture</td>
</tr>
<tr>
<td>2. Standing Posture</td>
</tr>
<tr>
<td>iv. Psychosocial Issues</td>
</tr>
<tr>
<td>d. Treatment Options for LBP</td>
</tr>
<tr>
<td>i. Counseling</td>
</tr>
<tr>
<td>ii. Back Belts</td>
</tr>
<tr>
<td>iii. Exercise</td>
</tr>
<tr>
<td>iv. Medication</td>
</tr>
<tr>
<td>v. Treatment Specific to Police Officers</td>
</tr>
<tr>
<td>1. First Breath of Action</td>
</tr>
<tr>
<td>2. Suspenders</td>
</tr>
<tr>
<td>e. Summary</td>
</tr>
<tr>
<td>3. Methodology</td>
</tr>
<tr>
<td>a. Study Design</td>
</tr>
<tr>
<td>b. Study Site and Subjects</td>
</tr>
<tr>
<td>c. Instrument</td>
</tr>
<tr>
<td>d. Validity</td>
</tr>
<tr>
<td>e. Procedure</td>
</tr>
<tr>
<td>f. Data Analysis</td>
</tr>
<tr>
<td>g. Limitations</td>
</tr>
</tbody>
</table>
4. Results
   a. Data Analysis 21
   b. Characteristics of Subjects 21
   c. Incidence of LBP 24
   d. Influences on LBP 24
   e. Qualitative Data Analysis 25

5. Discussion
   a. Applications 32
   b. Limitations of the Study 33
   c. Suggestions for Further Research 34

Resources 35

Appendix A – Survey 37
Appendix B – Survey Cover Page 42
Appendix C – Comments from Surveys 43
LIST OF TABLES

Table 1-Participant Demographics.....................................................................................................22
Table 2-Non work factors influencing LBP......................................................................................23
Table 3-Officer reported factors influencing LBP...........................................................................25
CHAPTER 1

INTRODUCTION

Background

Low back pain (LBP) is a common ailment in the United States. From 1999-2000, according to the National Health and Nutrition Examination Survey (NHANES), approximately 37% of the population was suffering from LBP.\(^1\) The working population under the age of 45 is most affected by LBP with annual cost for treatment and disability estimated as high as $56 billion\(^2\) or as low as $16 billion\(^3\). LBP is often related to occupation. Occupations that require heavy or repetitive lifting have a greater risk for the development of LBP.\(^2,3\) Other risk factors include exposure to vibration from vehicles, smoking and extensive driving.\(^3\) Medical conditions such as obesity and osteoporosis can also predispose a person to LBP.\(^2,3\) In addition, persons with LBP have a higher incidence of depression, anxiety, alcoholism and divorce.\(^3\)

Police officers are exposed to a number of these risk factors on a daily basis. A study by Kumar and Narayan\(^4\) described 96 different tasks a police officer must complete during the course of their workday. Forty-six of those tasks required heavy physical work (e.g., apprehending suspects and defusing problems) and other tasks that were not technically classified as heavy work would be made easier if the officer was in good physical condition. There is a high incidence of disability in police officers due to back, knee or ankle injuries.\(^5\) In addition, if a person makes a career out of police work, he/she will be more than likely to retire with a back, knee or ankle injury and may have to retire because of the injury.\(^5\)
Many interventions, including counseling, back braces and patient education in body mechanics, exercise, cessation of smoking and decreasing obesity, have been used successfully in corporate and factory settings. These interventions have been shown to be ineffective in decreasing LBP when applied to police officers. There are several reasons that traditional interventions for LBP are not effective for police officers, including the fact that work conditions are constantly changing in police work. In addition, traditional instructions are often not appropriate for situations officers find themselves in and may actually cause further injuries instead of preventing them.

Statement of the Problem

Traditional treatment for LBP is often not appropriate for police officers. Therefore, whereas in the general population LBP is treatable and generally does not develop into chronic pain, the situation is different for police officers. It follows logically that police officers may have a higher incidence of chronic LBP than the general population. This, in turn, may affect their quality of life, job performance, and ability to work.

Purpose of the Study

The purpose of this study was to examine whether or not police officers have a higher incidence of chronic LBP than the general population. A second comparison was made between the incidence of LBP found among the Kent County police officers and the incidence reported by Brown, Wells, Trottier, Bonneau and Ferris in 1997. Additionally, the research investigated the various factors that police officers believe contribute to the LBP that they experience.
Rationale for the Study

Medical professionals must be better prepared to treat the unique LBP presentations of police officers. Furthermore, police departments can institute changes designed to decrease the incidence of LBP experienced by their officers if pertinent risk factors can be identified. Exploring the truth behind the perceptions that police officers have about their back pain was not within the scope of this study. However, if officers think that something is a problem, the medical professional should incorporate treatment of that issue into the plan of care.

Research Questions

This study addressed the following research questions:

1. Is chronic low back pain more common in police officers than in the general population?

2. What work and non-work related factors do police officers feel contribute to their LBP?
CHAPTER 2
LITERATURE REVIEW

Prevalence of Low Back Pain

Sources estimate the yearly incidence of LBP to be as high as 50% or as low as 5%.\textsuperscript{2,3} At some point in their lives 60-90% of the population will experience LBP.\textsuperscript{2,3} LBP is the top cause of restriction of activity, including taking time off work, in the population under the age of 45.\textsuperscript{2,3,8} Furthermore, LBP is second only to arthritis as the leading cause of disability in the population between the ages of 45 and 65 years.\textsuperscript{8} Of the people who take time off work to treat their LBP, a reported 1 million people\textsuperscript{8} in 1999, 90% will return to work within 6 months of the initial injury.\textsuperscript{8} Among the 90% who return to work, 20-44% will experience a recurrence of symptoms requiring further time off work and an additional 15-20% will continue to have LBP but will not take time off again for at least a year after the initial onset of pain.\textsuperscript{8} Although most LBP comes on acutely and is self limiting, approximately 5-10% of all LBP experienced will become chronic.\textsuperscript{2}

Cost of Low Back Pain

Back pain is one of the top ten reasons patients give for visiting emergency rooms, hospital outpatient departments and doctors’ offices.\textsuperscript{2} Given that so many people are limited by LBP and are consequently visiting their doctors, the costs for medical management of LBP are extremely high. In 1990, the reported direct medical costs for treatment of LBP were over $24 billion and when lost wages and other disability expenses were included the cost rose to between $35 and $56 billion.\textsuperscript{2} In 1999, the total cost for treatment of LBP including the disability costs was estimated at $45 to $54 billion.\textsuperscript{9}
Factors Contributing to Low Back Pain

There are many factors that have been identified as contributors to LBP. Among those are vibration from a vehicle, heavy or awkward lifting, sitting posture, and various psychosocial issues.

Vibration

In Britain, it has been estimated that 8.5 million men and women are exposed to whole body vibration (WBV) on a weekly basis. There is evidence to suggest that exposure to vibration and jolting, such as that experienced while driving a car, increases the risk for LBP to develop. In fact, driving a car for more than four hours a day increases the risk for development of LBP by a factor greater than two and those who spend a moderate or high (moderate is defined as one hour and high is defined as more than one hour) amount of time in a car each day have a much higher incidence of LBP than do those who spend less than one hour in a car each day. In addition, men who worked for more than six years at a job involving lifting or driving were at an increased risk for recurrent LBP. Mansfield and Marshall, in their examination of rally drivers, found that the most common area for pain to develop was the low back. This held true whether the drivers were professional, recreational, primary driver or co-driver.

Conversely, Palmer, Griffin, Syddall and Pannett found that the correlation between time spent in a car (including leisure time) and LBP was much lower than the correlation between lifting and LBP. In fact, the risk associated with driving was not significantly different than the risk associated with simply sitting, suggesting that vibration from a vehicle is not an important risk factor in the development of LBP. Researchers have reached different conclusions as to the amount of time spent in a vehicle that is significantly
correlated with an increased risk of LBP. In spite of this, however, there is a growing consensus that driving does increase the risk of LBP.\textsuperscript{13}

**Lifting**

Palmer, Griffin, Syddall and Pannett found that lifting was a greater risk factor for LBP than driving.\textsuperscript{11} Harkness, Macfarlane, Nahit, Silman and McBeth found that lifting more than 23 lbs at or above shoulder level and pulling more than 56 lbs were both among the top six predictors of new episodes of LBP.\textsuperscript{15} However, lifting and pulling correlated with only modest and non-significant increases in the risk of developing LBP.\textsuperscript{15}

On the job lifting was a good predictor of whether or not a person would require a long absence from work at some point in the future. However, it was not a predictor of whether or not they would take a short period of time off.\textsuperscript{16} Increasing the frequency of lifting throughout the day or increasing the weight lifted did not increase the incidence or duration of time taken off work.\textsuperscript{16} In addition, the relation between lifting and time off work was higher than the relation between lifting and self reported LBP.\textsuperscript{16} Levangie also found that there was no relation between magnitude of lifting and LBP.\textsuperscript{13} In addition, lifting was not identified as an important risk factor for the development of LBP in this study.\textsuperscript{13} However, there was a slight increase in risk for women compared to men.\textsuperscript{13}

Although there is not agreement as to whether or not LBP is influenced by lifting, most studies tend to find at least a weak correlation. This suggests that lifting may not be the initiating factor in the development of LBP but that it can contribute to already existing LBP.
Posture

A study by Harkness, Macfarlane, Nahit, Silman, and McBeth indicates that standing, sitting, squatting, kneeling, bending and stretching below knee level are all correlated with incidence of LBP to some degree.\textsuperscript{15}

Sitting Posture

Levangie found that, although he could not show statistical significance, there was still a correlation between sitting and LBP.\textsuperscript{13} Additionally Devereux, Buckle and Vlachonikolis state that, although the literature is split on whether or not there is a correlation between sitting and LBP, there is definitely a correlation between sitting with vibration and LBP, as occurs in a vehicle.\textsuperscript{12}

Sitting posture in a car is greatly influenced by the seat. As car seats age they deteriorate and do not provide the same sitting surface compared to when they were new.\textsuperscript{6} As the driver repeatedly gets in and out of the car, the edge of the seat nearest the door gets worn down more quickly than the other edge.\textsuperscript{6} This results in the seat leaning towards the door at an angle of 4.67\degree, as measured in a study of Quebec police cars.\textsuperscript{6} The sideways tilt of the seats caused an asymmetry in the sitting position of the driver. This asymmetry increased after 10 minutes of sitting in the vehicle.\textsuperscript{6} Given the constant use of police cars, this deterioration can occur in the matter of a few months. This quick deterioration may be due to the number of people who use police cars. When a car is shared among many people, nobody feels personally responsible for the care of the vehicle. As a result, everyone who uses the car tends to abuse it.\textsuperscript{6} Also, most police cars are in use close to 24 hours a day. The worn seats also caused the driver to lean backwards more than new seats. This resulted in a forward flexion of the spine in order for the driver to keep his head in a horizontal position.\textsuperscript{6}
Another consideration with sitting posture is the number of forms that police officers are required to fill out while sitting in their cars. The front seat of a police car does not have much space in which to lay out a form. Thus the officers must prop the form against the steering wheel to fill it out.

Persons with LBP secondary to improper static sitting posture are instructed in proper sitting posture in order to alleviate the pain. As the car seats age and begin to sag, they provide less support for the driver. This decrease in the amount of support causes an increase in the compensatory measures taken by officers (i.e., sitting on their radios or angling themselves in the seat). Thus, even though officers may be instructed in proper sitting posture, the seats they use do not always provide a proper sitting surface.

Standing Posture

The standing posture of police officers is influenced by the equipment attached to their duty belts. Required equipment includes a baton, hand gun, two sets of bullet magazines, radio, handcuffs, and pepper spray. Officers may choose to add additional equipment (e.g. cell phone, medical gloves). According to Cote, different officers arranged the equipment on their belts in different ways. The most common arrangement found in this study was to place the hand gun on one side of the belt and the remainder of the equipment on the other side of the belt. A few officers chose to place some or all of their equipment on the front of the belt so that they didn’t have to rearrange the equipment to sit in the car. Arranging the equipment anteriorly on the belt was associated with the largest increase in LBP. This is due to the fact that the lumbar lordosis increased significantly when the equipment was on the front of the belt as a form of compensation for the weight distribution. In addition, those who wore their equipment on the front of their belts also had a higher
incidence of diagnosed disc problems in their backs. Officers who chose to place their equipment on either side of their belts often arranged the equipment so that it was off balance. This caused compensation by leaning to the side with less weight. Back pain was also increased with this arrangement. Only 3 officers in this study arranged the equipment on their belts so that the weight was distributed equally on both sides. None of these officers experienced any back pain. Compensation by lumbar lordosis, as seen when the equipment was placed on the front of the belt, was associated with more LBP than was compensation by side bending, as seen when equipment was not distributed equally between both sides of the belt. Regardless of whether the officers compensated by increased lordosis or by side bending there seemed to be a correlation between the degree of compensation and the severity of LBP.

Persons with LBP as a result of poor standing posture are also instructed in proper standing position. However, police officers frequently have poor standing posture as a result of the pull from their duty belt. The duty belt weighs between 12 and 14 lbs and the equipment on the belt can be arranged in a variety of different ways. The most common way is to split the equipment between the two sides of the belt. However, some officers choose to place some, or all, of their equipment on the front of the belt in order to increase accessibility. This tends to pull the officer into a lordotic posture. A study conducted by the Royal Canadian Mounted Police (RCMP) experimented with the use of suspenders to take the weight of the duty belt off of the waist and move it to the shoulders. The results indicated that only 4 out of 28 officers would not wear the suspenders if given the choice. Although the suspenders cannot change the amount of weight the officers have to carry around, they can change where the weight is carried. This will help to decrease pressure of the stomach.
and hips, as well as increase the officer’s ability to maintain a neutral spine and to run and maneuver with ease.

Psychosocial Issues

Devereux, Buckle and Vlachonikolis reported that the greatest risk factor for LBP is a job that has high levels of physical and psychosocial factors. Either of these factors acting independently produced an increased risk for LBP compared to a population with low physical and psychosocial demands.

Harkness, Macfarlane, Nahit, Silman and McBeth found the highest predictor of new onset LBP to be monotonous work. Stressful work and lack of support from colleagues were lesser predictors of new onset LBP. Hoogendoorn, Bongers, DeVet, and Ariens added low support from supervisors and low job satisfaction to the list of predictors for an increase in LBP.

Predictors for LBP found by Thorbjornsson, Alfredsson, Fredriksson, and Koste include dissatisfaction with leisure time outside of work and previous occurrence of LBP. Subjects reporting either of these conditions in 1969 were 1.5 times more likely to report LBP between 1970 and 1992. These two conditions were the highest predictors of LBP for both women and men. Other predictors for men included high physical load, severe vibrations and monotonous work. For women, shift work, and high mental and physical load were additional predictors of LBP. Interestingly, these additional predictors for both men and women only accounted for LBP as much as they interacted with conditions outside of work such as dissatisfaction with leisure time.

Power, Frank, Hertzman, Schierhout and Li found that factors from early life played a role in onset of LBP. These include social class at birth, emotional state between the ages...
of 7 and 16, and body mass index (BMI) at age 23. They also found characteristics of the work environment that predisposed people to LBP including negative psychosocial work characteristics, job dissatisfaction, psychological distress at age 23, and moderate to low life control.  

In Quebec, Canada, a police department referred 36 of its officers to take part in a study regarding their experience with low back pain. Prior to the study the department reported to the researchers that 3 of the 36 officers were experiencing back pain. After the study was conducted, 28 of the 36 officers were found to be experiencing some form of back pain. The researchers in this study differentiated between two types of LBP. The first was acute, as in that related to an accident or illness. The second was chronic. Most officers considered chronic LBP to be a normal part of their job.

Police officers are exposed to some unique psychosocial factors at work. Among them is the fact that officers, in general, complain very little about pain that they are experiencing. This may be due to the fact that they do not want to be labeled as a whiner or because they fear consequences and reprisals. This in no way means that police officers do not experience pain. Rather it means that they are hesitant to talk about the pain that they experience.

**Treatment Options for LBP**

**Counseling**

One of the first treatments tried, in the occupational setting, for back pain is counseling. Counseling can be done in a doctor’s office, in an on-the-job seminar, or in a “back school” setting. The variety of settings in which counseling takes place can make it the most common treatment and prevention strategy available. However, studies evaluating the effectiveness of counseling have found no difference between the intervention and
control groups in regards to incidence or duration of injuries, pain and absenteeism. In addition, the traditional instruction in body mechanics to correct improper movement patterns are not effective for a police officer, and may actually hinder him from performing his job efficiently. For example, police officers are required to be able to go from sitting in a car to chasing a suspect in a matter of seconds. If the officer were to attempt to follow the usual back care instructions he would not be able to exit the vehicle quickly enough to apprehend the suspect.

**Back Belts**

Perhaps the second most common treatment for LBP is the use of a back belt or brace. The proposed benefits of a back belt are a decrease in LBP and decreased time lost from work due to LBP. Potential disadvantages of back belts include rubbing, pinching or bruising, decreased ability to sit and to drive, sweating under the belt, and a false sense of security from injury. In addition, studies have shown that back braces increase blood pressure, intra-abdominal pressure, muscle weakness and the incidence of abdominal hernias. Most of the potential disadvantages develop over time. Long term use of a back belt is cautioned against. However, short term use is still being debated. Those with a history of LBP have been shown to benefit from the use of a back belt. Another study actually found an increase in back pain and injury with the use of back belts. Additionally, the injuries sustained while using a back belt tended to cost more to treat than injuries sustained while not using a back belt. However, studies have shown poor rates of compliance with proper use of a back belt thus suggesting that, even if there is a benefit to wearing them, people are hesitant to use them and will miss out on the benefit.
Exercise

Another intervention for LBP is exercise to strengthen the back musculature. Studies evaluating the efficacy of exercise found significantly fewer reported “painful days” as well as decreased absenteeism. Although these studies showed benefit from exercise, the effects of the exercise were of uncertain duration.\(^2\)

Medication

Drugs such as non-steroidal anti-inflammatory drugs and muscle relaxers have been found to relieve LBP.\(^9\) In addition to drugs, topical heat sources such as the Therma-Care heat wrap, have also been shown to help decrease incidence of LBP.\(^9\) In some cases the heat therapy was able to replace the drugs as the pain relieving source.\(^9\)

Treatment Specific to Police Officers

Police officers are required to respond to varying situations, many of which present less than ideal situations for back care. Consequently, many of the above treatments are impractical for a police officer to implement.

First Breath of Action

One proposed way to teach police officers to avoid back pain is to teach them to always begin any activity by taking the “first breath of action” from their diaphragm.\(^5\) The theory behind this is that the diaphragm controls the effort put forth by the body and helps bring the center of gravity lower.\(^5\) This allows the person to use the hips and legs for work as opposed to the shoulders and upper body. Since the diaphragm is located in the center of the body, putting it under control will allow the rest of the body to work more efficiently.\(^5\) In addition to learning how to breathe from the diaphragm, police officers are also taught how to focus their energy, how to use this focus to maintain stability and leverage, how to use
their body as one unit, and how to identify situations in which leverage and stability are not optimal. Research on the “first breath of action” method has shown that physical occupations such as police work have benefited greatly from implementing this technique. One law enforcement agency, the Alameda Police Department, showed a 90% reduction in back injuries during the first year after their officers went through a half-day training session in this technique.

Suspenders

As described previously in the discussion on posture, wearing the duty belt can increase the LBP experienced by police officers. Thus, a treatment aimed directly at the duty belt was attempted. A pair of suspenders was developed that took the weight of the duty belt off the hips and transferred it to the shoulders. A total of 30 officers from a variety of Canadian police departments agreed to test the suspenders. The majority of the officers found that the suspenders increased comfort while wearing the duty belt and only 4 out of 28 responded that if the suspenders were issued equipment they would not wear them (2 people did not answer this question). In addition to comfort, physical performance with and without the suspenders was also measured to see if there was a difference in performance. Three physical performance tests were performed: floor to waist lifting with a weighted crate, increasing the weight with each lift; balance testing, 6 patterns of gait on a 2x4 beam; and climbing up and down ten flights of stairs ten times. On each test the officers performed poorly without the suspenders while performance improved when the suspenders were worn. All but one officer reported increased ease of performance of these tests while wearing the suspenders. Although almost all officers reported increased comfort and increased
performance while wearing the suspenders, not all officers reported the same degree of comfort or demonstrated the same degree of improvement in performance.\footnote{7}

**Summary**

LBP is among the most common musculoskeletal complaints treated by doctors. The cost annually to treat LBP, including costs for lost wages, reaches into the billions of dollars. There are multiple risk factors established for LBP, many of which are experienced on a daily basis by police officers. There are also risk factors for LBP that are unique to police officers such as wearing the duty belt. A number of treatments have been attempted to decrease LBP. Some are appropriate for use in police departments and some are not. With all of the risk factors experienced by police officers and the limited number of treatment options available, it follows that police officers would experience a higher incidence of LBP, specifically chronic LBP, than the general population.
CHAPTER 3
METHODOLOGY

Study Design

This research was modeled after an investigation conducted in Canada using the Royal Canadian Mounted Police (RCMP). A survey research design was used to determine the incidence of LBP in police officers in Kent County and compare it to the incidence reported in the general population of the United States as well as the results found with the RCMP. Data were collected on characteristics of the officers, the job description they must fill, and their experience with LBP.

Study Site and Subjects

The survey was made available to all police chiefs in Kent County at their monthly meeting. Each chief was asked to take enough surveys for all of the sworn officers in his/her entire department if he/she wished to participate. Sworn officers include those doing road patrol, special teams officers such as Special Weapons and Tactics (SWAT), and administrators such as captains and lieutenants. Enough surveys were provided to allow every officer in every department a chance to fill out the surveys if the chief okayed it and if they chose to. Subjects were asked to complete the survey independently and return it anonymously.

Instruments

A copy of the original survey used with the RCMP was obtained and edited to make it appropriate for an American police force (Appendix A). All references to “RCMP” in the survey were changed to say “police department”. The French portion of the survey was
removed, and the instructions at the beginning of the survey were changed. The survey consisted of 34 questions which addressed patient demographics, risk factors for LBP and personal experience with LBP. The questionnaire required approximately 10 minutes to complete.

A brief statement (Appendix B) accompanied each survey explaining the purpose of the study, voluntary participation, and the right to withdraw at any time. The statement also explained that informed consent is implied by returning the survey. Officer Joshua Arts, of the Walker, Michigan, Police Department, and officer Roger Gren of the Cedar Springs, Michigan, Police Department reviewed the survey before it was sent out to ensure that the questions were clear and applicable to American police departments. Any questions that applied specifically to the RCMP were removed.

Validity

The survey used for this study was the same survey used by the RCMP. Before it was used in the RCMP study, the researchers conducted a pilot test to ensure validity. The same survey was used in the current study in order to increase the ability to make comparisons between police officers working in Kent County and officers working for the RCMP. Additionally, having two police officers review the survey before it was sent out helped to ensure clarity. This contributed to the number of usable surveys returned.

Procedure

Roger Gren, the Chief of Police for the city of Cedar Springs, arranged for this researcher to attend a monthly meeting of all chiefs of police in Kent County. Enough surveys were brought to the meeting so that each chief could take a survey for every sworn officer in his/her department if he/she chose to do so. The chiefs who chose to participate in
the study took surveys back to their respective departments and distributed them among the officers. When each department felt that everyone who wanted to fill out a survey had done so someone from the department, usually the chief or the head of human resources, contacted this researcher by phone and arranged a time for the surveys to be picked up.

Data Analysis

The first section of the survey requested demographic information about the participants and consisted of five fill-in-the-blank and multiple choice questions. Data were analyzed based on gender, age, height, weight, years of service, and type of job to examine whether or not any of these variables have an impact on experience with LBP.

The second section of the survey requested information about workplace circumstances and consisted of eight fill in the blank and yes/no questions. Data from this section was analyzed based on whether participants like their work, are engaged in special duties, wear a duty belt, carry heavy objects, perform frequent twisting as a part of their work, and have a good relationship with their supervisor. In addition, participants were asked where they spend most of their day and whether they have been exposed to any traumatic events at work. Again, data were examined to determine whether any of these variables have an impact on experience with LBP.

The third section of the survey was only completed by those officers who answered “yes” to experiencing chronic LBP. This section requested information about what work and non-work factors the officers felt contributed to their LBP and consisted of thirteen yes/no questions. These data were analyzed for frequencies to determine if there was a trend in what areas officers felt had an impact on their LBP.
The fourth section of the survey requested information about non-work circumstances that have been shown in previous research to contribute to LBP. This section consisted of eight multiple choice and yes/no questions. Data were analyzed based on amount of physical activity in a week, personal trauma in the past year, pregnancy, smoking, living status (alone vs. with others), and presence of children under age ten at home. A chi-square test was used to compare those experiencing LBP versus those not experiencing LBP in relation to each of the variables from sections one, two and four.

The final section of the survey provided a space for participants to add their own comments. These comments were used for suggestions as to further research ideas and to help explain the results as well as to support the data from the previous four sections of the survey.

Limitations

Generalizability of the study was decreased due to the small geographical area being tested. Although there is a wide range of police departments in Kent County, from the 300-plus officer Grand Rapids Police Department to the 7 officer Cedar Springs Police Department, Kent County is still a small area and results may not be generalizable to other states or even to other counties in Michigan.

Since participation in the survey was voluntary, there may have been a response bias. That is, people with high levels of LBP might have been more likely to fill out the surveys than those who haven't experienced LBP. Additionally, the involvement of the chiefs of police in distribution of the surveys and the fact that the researcher's husband works at the Walker Police Department may have caused employees to fill out the survey due to perceived peer pressure. Although neither the chiefs nor the researcher's husband attempted to put any
pressure on others in the department, it may still have been perceived that they “had to” fill out the survey.

Confidentiality concerns may also have been an issue. If the officers thought that their responses would get back to the city’s administration, they may have been hesitant to report the full extent of the LBP they experience for fear of the consequences. This was addressed in the instructions on the front page of the survey indicating that the responses would not be used for anything other than this research project and that they would not be shared with anyone else.
CHAPTER 4

RESULTS

Data Analysis

Each survey item was precoded numerically to assist with data analysis. Data were entered using Microsoft Word and then transferred to SPSS 12.0 for Windows. Statistical analysis was performed using the SPSS 12.0 for Windows program. Comments from participants were open coded for all pieces of information contained within them. Each piece of information was then axial coded into groups of similar content. Each group was finally selectively coded into broad categories.

Descriptive statistics were run on all quantitative data to obtain frequencies for demographic items and incidence of LBP. Chi square analysis and Fisher’s Exact Probability Test were used to test for independence between demographic characteristics and incidence of LBP. The chi square test is a nonparametric statistical technique used to determine if a distribution of observed frequencies differs from theoretical expected frequencies. Fisher’s Exact Probability Test was used when the assumptions for chi square were not met. The assumptions are that no cell will have a count of zero and not more than 20% of the cells will have a count less than 5. A p-value <.05 was declared statistically significant. Qualitative data analysis will be discussed later in the chapter.

Characteristics of Subjects

Of the 1,000 surveys made available to police departments, 550 were taken and 93 were returned for a return rate of 17%. Seven different departments participated in this
research by having at least one officer fill out a survey. Participant demographics are summarized in Table 1.

Table 1. – Participant demographics (n=93)

<table>
<thead>
<tr>
<th>GENDER</th>
<th>Number of respondents</th>
<th>Percentage of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>75</td>
<td>80.60%</td>
</tr>
<tr>
<td>Female</td>
<td>18</td>
<td>19.40%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AGE (in years)</th>
<th>Number of respondents</th>
<th>Percentage of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 30</td>
<td>21</td>
<td>22.60%</td>
</tr>
<tr>
<td>31-40</td>
<td>38</td>
<td>40.90%</td>
</tr>
<tr>
<td>41-50</td>
<td>20</td>
<td>21.50%</td>
</tr>
<tr>
<td>Over 50</td>
<td>14</td>
<td>15.10%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>YEARS OF SERVICE</th>
<th>Number of respondents</th>
<th>Percentage of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4</td>
<td>16</td>
<td>17.20%</td>
</tr>
<tr>
<td>5-9</td>
<td>25</td>
<td>26.90%</td>
</tr>
<tr>
<td>10-14</td>
<td>18</td>
<td>19.40%</td>
</tr>
<tr>
<td>15-19</td>
<td>15</td>
<td>16.10%</td>
</tr>
<tr>
<td>Over 20</td>
<td>19</td>
<td>20.40%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>JOB EMPHASIS</th>
<th>Number of respondents</th>
<th>Percentage of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patrol/Investigations</td>
<td>84</td>
<td>90.30%</td>
</tr>
<tr>
<td>Administration</td>
<td>9</td>
<td>9.70%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LIKE YOUR WORK</th>
<th>Number of respondents</th>
<th>Percentage of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>90</td>
<td>96.80%</td>
</tr>
<tr>
<td>No</td>
<td>3</td>
<td>3.20%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SPECIAL DUTIES</th>
<th>Number of respondents</th>
<th>Percentage of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>31</td>
<td>33.30%</td>
</tr>
<tr>
<td>No</td>
<td>61</td>
<td>65.60%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SPEND YOUR DAY</th>
<th>Number of respondents</th>
<th>Percentage of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>In A Vehicle</td>
<td>72</td>
<td>77.40%</td>
</tr>
<tr>
<td>At A Desk</td>
<td>26</td>
<td>28%</td>
</tr>
<tr>
<td>On Foot</td>
<td>7</td>
<td>7.50%</td>
</tr>
<tr>
<td>On A Bike</td>
<td>2</td>
<td>2.20%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WEAR A DUTY BELT</th>
<th>Number of respondents</th>
<th>Percentage of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>78</td>
<td>83.90%</td>
</tr>
<tr>
<td>No</td>
<td>15</td>
<td>16.10%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LIFT HEAVY OBJECTS</th>
<th>Number of respondents</th>
<th>Percentage of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1 time per shift</td>
<td>58</td>
<td>62.40%</td>
</tr>
<tr>
<td>2-4 times per shift</td>
<td>33</td>
<td>35.50%</td>
</tr>
<tr>
<td>FREQUENT TWISTING</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Yes</td>
<td>83</td>
<td>89.20%</td>
</tr>
<tr>
<td>No</td>
<td>8</td>
<td>8.60%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PAST YEAR:</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Involved in an accident</td>
<td>10</td>
<td>10.80%</td>
</tr>
<tr>
<td>Exposed to a disturbing crime</td>
<td>74</td>
<td>79.60%</td>
</tr>
<tr>
<td>Exposed to a shooting</td>
<td>14</td>
<td>15.10%</td>
</tr>
<tr>
<td>Exposed to a fight</td>
<td>60</td>
<td>64.50%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GOOD RELATIONSHIP WITH SUPERVISOR</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>87</td>
<td>93.50%</td>
</tr>
<tr>
<td>No</td>
<td>3</td>
<td>3.20%</td>
</tr>
</tbody>
</table>

There are also several non-work factors that have been associated with an increased incidence of LBP. These are summarized in Table 2.

Table 2. – Non work factors influencing LBP (n=93)

<table>
<thead>
<tr>
<th>KIDS UNDER 10 YEARS OF AGE</th>
<th>Number of Respondents</th>
<th>Percentage of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>39</td>
<td>41.90%</td>
</tr>
<tr>
<td>No</td>
<td>54</td>
<td>58.10%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LIVE ALONE</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>14</td>
<td>15.10%</td>
</tr>
<tr>
<td>No</td>
<td>79</td>
<td>84.90%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SMOKE</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>10</td>
<td>10.80%</td>
</tr>
<tr>
<td>No</td>
<td>83</td>
<td>89.20%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PERSONAL TRAUMA IN THE PAST YEAR</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>22</td>
<td>23.70%</td>
</tr>
<tr>
<td>No</td>
<td>71</td>
<td>76.30%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SPORTS</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1 time/week</td>
<td>20</td>
<td>21.50%</td>
</tr>
<tr>
<td>2-4 times/week</td>
<td>53</td>
<td>57%</td>
</tr>
<tr>
<td>5+ times/week</td>
<td>20</td>
<td>21.50%</td>
</tr>
<tr>
<td>PHYSICAL ACTIVITY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td>0-1 time/week</td>
<td>19</td>
<td>20.40%</td>
</tr>
<tr>
<td>2-4 times/week</td>
<td>58</td>
<td>62.40%</td>
</tr>
<tr>
<td>5+ times/week</td>
<td>16</td>
<td>17.20%</td>
</tr>
<tr>
<td>STRETCHING/STRENGTHENING</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-1 time/week</td>
<td>46</td>
<td>49.50%</td>
</tr>
<tr>
<td>2-4 times/week</td>
<td>39</td>
<td>41.90%</td>
</tr>
<tr>
<td>5+ times/week</td>
<td>8</td>
<td>8.60%</td>
</tr>
</tbody>
</table>

Incidence of LBP

60.2% of respondents reported experiencing LBP at some point in their lives. This is in comparison to the national average which is estimated at 60-90% throughout a lifetime. Although there is not a difference in reported incidence between police officers and the general population, there may be unique factors that police officers deal with that make the cause of their LBP different in some way. Chi-square analysis was run on all demographic data compared to whether or not the officer had experienced LBP at some point in his life. Wearing a duty belt resulted in a p-value of .304 and spending more than half of the day in a car resulted in a p-value of .161. Years of service resulted in a p-value of .262 with a trend towards an increasing amount of back pain as years of service increased.

Influences on LBP

Only those respondents who reported suffering from chronic LBP were asked to answer questions regarding what they thought contributed to the pain they experienced. The most common response was driving (90.9%) followed by the duty belt (87.3%). Other factors that closely relate to driving also scored fairly high. The car seat scored 80% and getting in and out of the car scored 54.5%. The results are summarized in Table 3.
Table 3. – Officer reported factors influencing LBP (n=56)

<table>
<thead>
<tr>
<th>FACTOR</th>
<th>Number of Respondents</th>
<th>Percentage of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAR SEAT</td>
<td>44</td>
<td>80%</td>
</tr>
<tr>
<td>IN/OUT OF CAR</td>
<td>30</td>
<td>54.5%</td>
</tr>
<tr>
<td>SITTING AT DESK</td>
<td>19</td>
<td>34.5%</td>
</tr>
<tr>
<td>STANDING</td>
<td>22</td>
<td>40%</td>
</tr>
<tr>
<td>WALKING</td>
<td>2</td>
<td>3.6%</td>
</tr>
<tr>
<td>DRIVING</td>
<td>50</td>
<td>90.9%</td>
</tr>
<tr>
<td>DUTY BELT</td>
<td>48</td>
<td>87.3%</td>
</tr>
<tr>
<td>SHOES</td>
<td>12</td>
<td>21.8%</td>
</tr>
<tr>
<td>TWISTING</td>
<td>30</td>
<td>55.6%</td>
</tr>
<tr>
<td>LIFTING</td>
<td>15</td>
<td>27.8%</td>
</tr>
<tr>
<td>ITEMS IN BACK POCKET</td>
<td>16</td>
<td>29.1%</td>
</tr>
<tr>
<td>TRAINING</td>
<td>14</td>
<td>25.5%</td>
</tr>
<tr>
<td>LEVEL OF FITNESS</td>
<td>17</td>
<td>30.4%</td>
</tr>
<tr>
<td>AMOUNT OF EXERCISE</td>
<td>15</td>
<td>26.8%</td>
</tr>
<tr>
<td>NO FACILITIES FOR EXERCISE</td>
<td>13</td>
<td>23.6%</td>
</tr>
<tr>
<td>FATIGUE</td>
<td>16</td>
<td>28.6%</td>
</tr>
<tr>
<td>STRESS</td>
<td>10</td>
<td>17.9%</td>
</tr>
<tr>
<td>FIGHT</td>
<td>10</td>
<td>17.9%</td>
</tr>
</tbody>
</table>

**Qualitative Data Analysis**

The process for analysis was described earlier in this chapter. The selective coding resulted in three broad categories into which all subjective comments were placed. These categories are: (1) sources of pain, including job related sources and non-job related sources; (2) duration and location of pain and (3) treatments/efforts to reduce pain, including medical advice and self-treatment.

Some of the perceived job related sources of pain identified through the qualitative analysis support the findings of the quantitative data from the survey. Other sources of pain were identified that were not options on the survey but warrant discussion none-the-less. The sources of pain described included multiple references to the duty belt and the vehicle. These were also the top two responses given on the survey. Some officers listed the duty belt...
separately. For example: "[My] doctor states [the cyst on my back is] probably caused by my gun belt in the same spot daily." "The duty belt is 'hard' on the lower back..." Other officers listed the car seat separately. For example: "[The] position of our car seats is not good-they 'pinch' our lower backs." However, most officers listed a combination of duty belt and car seat as the main cause of pain. For example: "Sitting in cruisers with duty belt in my opinion is the greatest problem." "In my opinion the main factors contributing to my back pain are the combination of sitting in the vehicle and wearing the duty belt." Officers also mentioned that the car seats tend to break down over time, increasing the pain they experience while sitting in them. This opinion was supported by the literature which stated that seats lean toward the door as they age causing postural asymmetry in the officers as they sit in the car. The officer's complaints about duty belt and vehicle were also weakly supported by the quantitative data from the surveys.

Another complaint expressed by the officers was that the irregular schedule of police work makes it difficult to maintain a good workout routine. A number of officers noted that their pain may be due, at least in part, to their lack of strengthening and stretching. For example: "[This is the] first year I have been having neck pain and thoracic and lumbar spine pain. [It] may also be more muscle pain that hasn't been able to heal. [I] need to build core muscles up." Other officers stated that the only time they are able to stay pain-free is when they keep up with their strengthening and stretching programs. For example: "I have been less sore as long as I maintain the stretching exercises given to me by my physical therapist." This was supported to a lesser extent by the survey as well. Only 16.1% of respondents noted that they felt their lack of regular exercise contributed to their LBP.
Of lesser note were the job related sources of pain that were not identified on the survey. These sources include the ballistic vest and moving on cold muscles. "[I have] back pain mostly upper to mid back while on duty (from vest)." Although these items were not options on the current survey, it would be worthwhile to investigate them further.

The second theme within the category of sources of pain were those sources of pain that are not job related. A number of officers shared that before joining the force they had been diagnosed with a medical problem that caused their back pain. For one it was a disc problem ("Back surgery for lower disc problem"), for another it was an un-fused vertebrae ("Per my doctor I was born with an unfused L5 vertebrae"), and for another a musculoskeletal deformity that the respondent did not identify ("I have muscular/skeletal deformity"). In all cases the officers stated that their health providers had told them that their duty belts were aggravating the pre-existing problem and making it worse. For example: "[My physical] therapists have stated our duty belts aggravate our backs." One officer also mentioned that his mattress was the cause of his back pain. "You should take into account a person’s mattress that they sleep on. I guarantee that is the reason for any back pain I have."

The second category identified was a description of the pain including where it was located and how long it lasted. These were commented on by several officers. Although all of the officers described a different duration for their pain, they all attributed it to the job. One stated that he only has pain when at work. "[I have] lower back pain only during work shift." Another stated that his pain begins at work, lasts a few days after his shift and then doesn’t come back again until he goes back to work. "[I have] back pain … while on duty. [The] pain continues several days after [work and] then decreases until next shift." A third officer stated that, after 20+ years on the job, back pain was inevitable. Although he had
moved from road patrol to an administrative job where he wasn’t exposed to a duty belt and vehicle his pain was still there. “[The] damage [to my back] so to speak already done after 20 plus years.” Several officers complained of neck and upper back pain in addition to low back pain. Even though the officers described pain throughout their backs and not specific to the lower back, the pain they described was always in the back, not in any other part of the body.

The third category identified the various treatment options that the officers had used to deal with or reduce their back pain. The treatment options fell into two categories: medical treatment and self treatment. The medical treatment included surgery, chiropractor, physical therapy and traction. A number of officers stated that they had had surgery to attempt to correct underlying problems that were causing back pain. “I have had back surgery on a removal of a cyst in my back.” “[I had] back surgery for lower disc problem.” The majority of officers who commented about treatment stated that they sought out or were still seeing a professional regarding their back pain. The most common professional mentioned was a chiropractor. “[I am] under care of a chiropractor for my back.” Only one officer mentioned physical therapy as his treatment option. “[I] sought physical therapy for a sore lower back about 3 years ago.”

Self treatment options included orthotics in all shoes, exercise, including strengthening and stretching, and changing jobs (i.e. moving from road patrol to administration). Exercise was by far the most mentioned self treatment option. The officers discussed it from both sides. Some officers stated that they exercised in order to keep from being in pain. “I have been less sore as long as I maintain the stretching exercises given to me by my physical therapist.” Other officers stated that they were in pain because they
didn’t exercise. “The dramatic decrease in my activity of the past year has greatly
ccontributed to any low back pain I experience.”

Based on the quantitative results of this study, certain conclusions can be drawn from
these data.

1. Police officers apparently do not experience more back pain than the general
   population despite the risk factors they are exposed to on a daily basis.
2. Police officers feel that the duty belt and the car seat are contributing factors in
   the back pain that they experience.

Based on the qualitative results of this study, certain conclusions can be drawn from
these data.

3. The job is probably the source of most back pain experienced by police officers.
4. The duty belt and poor seating in the vehicle appear to be the major problems.
5. The pain police officers experience appears to be treatable if the officers follow
   the advice of their health care providers.
CHAPTER 5

DISCUSSION

The objective in carrying out this study was to answer the research questions posed in Chapter 1. These questions were: (1) is chronic low back pain more common in police officers than in the general population, and (2) what work and non-work related factors do police officers feel contribute to their LBP?

The results of this study indicate a similar incidence of LBP among police officers (60.2%) compared to that reported for the U.S. population (60-90%). The results are similar to those obtained by Brown, Wells, Trottier, Bonneau and Ferris in Canada (60.2% vs. 54.9%). The incidence of LBP is somewhat surprising to this author given the large number of predisposing risk factors police officers are exposed to on a daily basis. There are a number of possible reasons for this reported incidence. The low response rate, including the fact that many departments did not participate at all, may have caused the percentage to be small. Additionally the tendency that police officers have to not complain about their problems may have decreased the number of officers who reported experiencing pain.

Based on the comments added by officers at the end of the survey (please see Appendix C for a complete list of comments) there were two themes that consistently came up as to what they felt was the cause of their back pain. In the comments at the end of the survey 15 people mentioned the duty belt in some fashion and 10 people mentioned the car seat. When viewed in conjunction with the results from the quantitative data which showed that 51 officers felt the car seat contributed to their LBP and 50 officers felt that the duty belt...
contributed to their LBP, it is fair to conclude that the duty belt and car seat are contributing factors to the back pain experienced by police officers.

Spending more than half the working day in a vehicle may contribute to LBP for many reasons. Vehicle vibration has been shown to correlate with LBP. Spending more than one hour in a car each day are more likely to develop LBP and driving for more than four hours a day increases the risk for development of LBP by a factor greater than two. Sitting posture is also affected when sitting in a vehicle. Seats deteriorate with age, providing a less than optimal sitting surface. This causes police officers to make adjustments in their posture, which may increase the LBP they experience. Vibration combined with poor sitting posture has an additive effect that correlates highly with LBP. Since most of the officers who filled out the survey reported working in patrol and spending most of the day in a vehicle, vibration and sitting posture likely contributed to the LBP that they reported.

Wearing a duty belt has a negative effect on standing posture. Most officers arrange the equipment on their belts along the front, which causes the belt to pull them into a position of increased lordosis. This form of compensation has been associated with the highest incidence of diagnosed disc problems as well as the highest reported incidence of LBP. Again, most of the officers who filled out the survey reported wearing a duty belt at work. This may contribute to the LBP that they reported.

Years of service could also contribute to LBP due to the additive effect of all of the predisposing factors to LBP experienced over the years. It would make sense that since vibration, sitting posture, and the duty belt all contribute to LBP then the officer who has been exposed to these things for 20 years is more likely to experience LBP than the officer who has only been exposed to them for 5 years.
Low job satisfaction has been shown to correlate with an increase in LBP. This research cannot show a correlation due to the fact that only two officers reported not liking their job. However, both officers that reported not liking their job also reported experiencing LBP. Whether or not this trend would continue if more officers had reported not liking their work is uncertain.

No factors were identified through this survey that correlated with the officers' opinions about what predisposes them to LBP. For example, a majority of the officers (50/56) stated that they feel the duty belt contributes to LBP and many included the duty belt in their comments at the end of the survey as well. When the Chi square test was performed to compare wearing a duty belt and reported LBP the p-value was only .304, indicating that these two factors are independent of each other.

Applications

This research can be applied to the physical therapy field as well as to police departments. Physical therapists can apply this information when treating a police officer for LBP. That is, there may be job specific factors to consider that are unique to the occupation. A treatment program for a police officer would not be complete without patient education regarding proper sitting posture in a vehicle, the correct technique for entering and exiting a vehicle, and strategies for wearing the duty belt. There are also factors outside of a physical therapist's control, such as years of service and whether or not the officer likes their job. Although a physical therapist cannot change those factors, he/she needs to be aware of them when establishing a treatment plan.

Based on the fact that only one police officer reported seeking physical therapy to treat his LBP, physical therapists may also need to use this research as a basis for marketing
themselves to police officers. If police officers are aware of the services provided by a
physical therapist, they might be more likely to seek physical therapy consultations.

Police departments can also apply this information by adapting equipment and
providing training to their officers in order to prevent injury or exacerbation of LBP. A
prevention program should be a part of all police departments’ training programs.
Additionally, when new equipment is purchased, the purchaser should discuss the options
with the officers and choose what will best meet their needs. A slightly more expensive seat
in the car, for instance, may save the department a lot of money if it can help to prevent LBP.

Limitations of the Study

The geographical area from which subjects were gathered limited this study. The
police officers were all employed within Kent County, Michigan. There may be some unique
things about working in Michigan that would not allow the results to be generalized to the
rest of the country. There may even be some unique things about working in Kent County
that would not allow the results to be generalized to the rest of Michigan police officers.

The low response rate (17%) also reduced the power of the study. Although every
effort was made to include all departments within Kent County, not all of them chose to
participate. Most departments did not give a reason for non-participation. However, one
Chief of Police stated that he did not wish his department to participate because if he handed
out a survey about LBP to everyone then there would be an increase in the number of
requests for time off due to back pain.

There were multiple surveys that were not completed correctly. The most common
errors were that respondents either left an answer blank, or provided two answers to the same
question. These surveys were still used, however, the questions that were answered
incorrectly were entered as missing data. There were two surveys where the respondent skipped an entire page of the survey. Since the surveys were divided into four sections, the data from the other three sections were still used.

Suggestions for Further Research

This study was performed on a very small scale within one county. The study could be reproduced on a larger scale, perhaps to include all departments within an entire state, to see if the results are the same or if a larger number of officers allows the researcher to show statistical significance. Changing the distribution method may also result in a larger return rate. For instance, if the officers' union were involved and provided a mailing list, then the return rate might be enhanced for two reasons. First, if the officers had the survey sent directly to them this might increase the likelihood that surveys would be returned at a greater rate. Second, knowing that the union was involved might also help to alleviate some of the fears that the officers have about admitting that they are experiencing pain.

This study suggests that police officers feel that spending more than half of their working day in a vehicle and wearing a duty belt contribute to their LBP, including spending the majority of the day in a vehicle and wearing a duty belt. A future study should analyze these specific factors in order to investigate whether or not they actually contribute to LBP.
RESOURCES


12. Devereux J, Buckle P, Vlachonikolis I. Interactions between physical and psychosocial risk factors at work increase the risk of back disorders: an


APPENDIX A

Instructions

* Please ensure this questionnaire is completed by the person to whom it was sent.
* Using a pencil, respond with an X or check mark directly on the survey questionnaire.
* If necessary, make clean erasures or use a white-out product.
* A prompt reply using the envelope provided is greatly appreciated.

A – Information About You

1. Sex
   ___ male  ___ female

2. Age in years
   ____ 30 or under  ____ 31-40  ____ 41-50  ____ 51 or over

3. Height
   ____ ft  ____ in  ____ lbs

4. Years of service completed with your department
   ____ 0-4  ____ 5-9  ____ 10-14  ____ 15-19  ____ 20 or more

5. What is your current job emphasis?
   ___ Patrol, Investigations
   ___ Administration
   ___ Operational/Technical Support

B – Your Workplace Circumstances

6. In general, do you like your work?
   ___ Yes  ___ No

7. Are you presently engaged in special duties (e.g. ES, SRT, Bomb Squad, etc.)?
   ___ Yes  ___ No

8. Do you spend more than half of your working day
   a) in a vehicle
      ___ Yes  ___ No
   b) at a desk
      ___ Yes  ___ No
   c) on foot
      ___ Yes  ___ No
9. Do you usually wear a duty belt when you are on duty?
   _____Yes  _____No

10. Do you frequently have to lift or carry objects that you consider heavy as a part of your work?
    _____Yes  _____No

If Yes, please place a mark on the line indicating the weight of the items you carry:

20 lbs ___________ 40 lbs ___________ 60 lbs ___________ 80 lbs ___________ 100 lbs

11. Does your daily work usually require frequent twisting movements of the back or legs (for example, getting into or out of a vehicle)?
    _____Yes  _____No

12. In the past year, have you been directly involved, as an officer, in any of the following:
    a. accident in a police car
       _____Yes  _____No
    b. exposure to disturbing crime or accident
       _____Yes  _____No
    c. a shooting
       _____Yes  _____No
    d. a physical confrontation/fight/altercation
       _____Yes  _____No

13. In general, do you have a good working relationship with your principal supervisor?
    _____Yes  _____No

C - Your Experience With Low Back Pain

14. Since joining the Force, have you ever had a chronic low back pain problem?
    _____Yes  _____No

If you answered “no” to question 14, skip to question number 27 (Part D), otherwise, please continue with the next questions.

15. Did you have a low back pain problem before joining your department?
    _____Yes  _____No

16. Did an ON-DUTY accident or incident involving a police vehicle contribute to your low back pain problem?
    _____Yes  _____No
17. Did an ON-DUTY accident or injury **not involving** a police vehicle contribute to your low back pain problem?
   _____ Yes     _____ No

18. Did an OFF-DUTY accident or incident **involving** a motor vehicle contribute to your low back pain problem?
   _____ Yes     _____ No

19. Did an OFF-DUTY accident or injury **not involving** a motor vehicle contribute to your low back pain problem?
   _____ Yes     _____ No

20. Which of the following duty-related factors has, in your opinion, contributed to your low back pain:
   a. the seat in the police car
      _____ Yes     _____ No
   b. getting into or out of the police car
      _____ Yes     _____ No
   c. sitting at a desk for long periods
      _____ Yes     _____ No
   d. standing for long periods
      _____ Yes     _____ No
   e. walking for long periods
      _____ Yes     _____ No
   f. driving or sitting in a vehicle for long periods
      _____ Yes     _____ No
   g. the duty belt
      _____ Yes     _____ No
   h. uniform shoes or footwear
      _____ Yes     _____ No
   i. twisting movements at work
      _____ Yes     _____ No
   j. work related to lifting or carrying
      _____ Yes     _____ No
   k. articles or equipment in back pockets while driving (notebooks, wallet, etc.)
      _____ Yes     _____ No
   l. departmental training
      _____ Yes     _____ No

21. Which of the following non-work factors has, in your opinion, contributed to your low back pain:
   a. my current level of general fitness
      _____ Yes     _____ No
   b. my limited participation in regular exercise
      _____ Yes     _____ No
c. lack of facilities at work where I can exercise to maintain general fitness
   ____ Yes  ____ No

d. general fatigue
   ____ Yes  ____ No

e. emotional stress
   ____ Yes  ____ No

f. physical confrontation/altercation
   ____ Yes  ____ No

22. **In the past year**, have you suffered from a chronic low back pain problem?
   ____ Yes  ____ No

23. **In the past year**, have you suffered from low back pain of sufficient severity that you took sick leave?
   ____ Yes  ____ No

24. If you answered **Yes** to question 23, did your sick leave total:
   ____ Less than 5 working days
   ____ 5 to 14 working days
   ____ More than 14 working days

25. **In the past year**, have you suffered from low back pain of sufficient severity that you should have taken sick leave, but went to work regardless?
   ____ Yes  ____ No

26. **In the past year**, have you suffered low back pain of sufficient severity that you sought medical, chiropractic or other professional help?
   ____ Yes  ____ No

**D – Your Non-Work Circumstances**
The following questions are based on research showing links with certain aspects of personal life and back problems.

27. In your average week, how many times do you participate in moderate or vigorous physical activity? This means continuous exercise lasting at least 20 minutes per occasion and which is hard enough to make you breathe heavier and your heart beat faster.
   ____ 0-1 times  ____ 2-4 times  ____ 5 or more times

28. In your average week, how many times do you participate in stretching and muscular strengthening activities lasting at least 40 minutes per occasion and which are demanding enough to maintain good overall flexibility and strength?
   ____ 0-1 times  ____ 2-4 times  ____ 5 or more times
29. In your average week, how many hours do you accumulate in one or more forms of exercise, sport or other leisure time, physical activity that enhances your health and/or physical fitness?
   ____ 0-1 hours  ____ 2-4 hours  ____ 5 or more hours

30. In the past year, have you experienced a significant personal trauma (such as divorce, financial crisis, death of a loved one, major medical condition)?
   ____ Yes  ____ No

31. Are you pregnant and in the last 3 months of your pregnancy?
   ____ Yes  ____ No  ____ Not Applicable

32. In the past year, have you smoked cigarettes on a daily basis?
   ____ Yes  ____ No

33. Do you live alone?
   ____ Yes  ____ No

34. Do you have one or more children less than 10 years of age at home?
   ____ Yes  ____ No

Other Comments:

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

Thank you for participating in this survey.
APPENDIX B

Dear Participant:

I am a graduate student at Grand Valley State University conducting a survey as part of my research requirement for my Master’s of Science degree in Physical Therapy. I would greatly appreciate your participation in completing the attached survey, requiring approximately 10 minutes of your time.

The purpose of the survey is to determine the incidence of low back pain in police officers in Kent County. Additionally the survey will investigate your perceptions of how much your duty belt and the car you drive influences the low back pain you experience. I hope that this information will help future medical professionals and police departments make the best choices regarding treatment and prevention of low back pain.

By completing the attached survey you will be giving your consent to participate in my research study. Your participation in this study will be anonymous and will not affect your job status. The results of my study will be presented at Student Scholarship Day held at Grand Valley State University. The results will not be displayed in any fashion that would single out any participant.

If you choose to complete the survey please return it to the directed location. To ensure confidentiality, do not include your name on the survey. Please make sure all questions have been answered completely and honestly.

Thank you for your support and contribution. If you have any questions regarding this research study, please contact Jennifer Arts at 616-866-4655 or Daniel Vaughn at 331-2678.

Sincerely,

Jennifer Arts, S.P.T.
616-866-4655

Daniel Vaughn, M.O.M.T., P.T.
616-331-2678
APPENDIX C

The duty belt is "hard" on the lower back +/- 20 lbs. Stress tends to be more in the neck pain-stress.

I have had back surgery on a removal of a cyst in my back that was where my gun belt sits. Dr. states probably caused by my gun belt in the same spot daily. The cyst was benign but had to be removed none the less.

Back surgery for lower disc problem. Therapists have stated our duty belts aggravate our backs-position of our car seats are not good-they "pinch" our lower backs. Seats should be arranged such that they have the driver sit at more than 90°.

The physical exercise question is difficult to give accurate numbers. The job interferes with a regular exercise program a lot during the month so it is a struggle to work out regular two times a week. When work is slow I can do 3 times a week worth of exercise.

You should take into account a person's mattress that they sleep on. I guarantee that is the reason for any back pain I have, not work or stress or injury. It's a proven fact that a person's mattress does affect back pain. For 27 years my back was perfectly fine. After I got married we got a new bed and ever since my back has had problems.

I enjoy biking and racing MT bikes. On the bike 3-4 times a week. First year I have been having neck pain and thoracic and lumbar spine pain. May also be more muscle pain that hasn't been able to heal. Need to build core muscles up. Also job change back in a patrol car, work 4 days a week 40-70 miles of driving a day. Need to work on posture also. Gun belt and gun weighs 10-12 lbs. Vest weighs 3 lbs.

Need lighter duty belts and fitness facilities.

Over the past year (since July '04) I have had severe problems with my right (I am right handed) rotator cuff. The problems required three surgeries to fix them. The pain and healing time have greatly diminished my physical activity. I am normally quite active. The dramatic decrease in my activity of the past year has greatly contributed to any low back pain I experience.

Under care of a chiropractor for my back. I have been told there is too much weight on belt, it puts strain on lower back and hips.

I am a member of our emergency support team. As such I am required to perform and maintain certain physical standards. One of the things I do to prepare and maintain for these standards is bicycle. During one of my training rides I had a bicycle accident which caused a back problem. Consequently I was off work as listed in question #24.
Main problem is the duty belt due to total weight. 8-10 hours a day.

The lower back problem is not that significant. However, seems to be progressively getting worse. When I wake from sleeping in bed is when I find I have the most pain.

*I fractured a “wing” of a lower vertebrae as a young person
*Discomfort lessens by exercise and strengthening
*No back pain during high school and college
*Could barely put my socks on in recruit school due to amount of physical activity and time spent standing
*Occasional back pain on-duty due to 25lb gun belt and poor patrol car seat support
*I have orthotics in all of my shoes and work boots

My duties have changed from patrol to desk to sometimes patrol. From years of duty related patrol car crashes, physical confrontations, changing flat tires for motorists, lifting dead deer, my neck and lower back have paid the price. I have a duty belt with a handcuff case. This case is on one side of my lower back. When seated the case certainly pushes the back out of alignment. The twisting and effort used to enter/exit a patrol car is not good either. Now that most of my duties are at a desk without a belt I have less problems. I have not had to see the chiropractor in a long time

Duty Belt! Ballistic Vest! Seating, Rapid movements on cold muscles

I have muscular/skeletal deformity that is severely exacerbated by my duty belt and shoulder holster and especially by sitting in a car. I am currently in treatment and may soon start using some new type of traction device. I have been recently referred to U of M hospital. I have also had 3 surgeries due to training accidents or repetitive motion injuries.

I would recommend that the ____________ police department allow us to wear suspenders that attach to our duty belts. This would distribute the weight of our duty belt.

Sought physical therapy for a sore lower back about 3 years ago. Since that treatment I have been less sore as long as I maintain the stretching exercises given to me by my physical therapist.

Sitting in cruisers with duty belt in my opinion is the greatest problem. Once went inside adm there was a big improvement, but damage so to speak already done after 20 plus years.

😊

From time to time my lower back feels a little funny and I go to the bone doctor for an adjustment but lately things have been great.

While your looking into this another point of concern would be officers shoulder injuries. I been in law enforcement for almost 10 years and have seen 6 people in our department with shoulder injuries. The lower back issue it should be taken into consideration our smaller
officer way have almost 1/3 of their body weight around their waist-from belt and vest pushing down as well as the inner belt we wear. I’d think low back, hips out of line, sway back, car seats broke down when getting old, our other things to take into consideration. Good Luck.

Back pain mostly upper to mid back while on duty (from vest). Pain continues several days after then decreases until next shift. Lower back pain only during work shift and worse with extended time in vehicle.

In my opinion the main factors contributing to my back pain are the combination of sitting in the vehicle and wearing the duty belt.

I have upper back, neck discomfort but never lower back.

Per my doctor I was born with an unfused L5 vertebrae. The duty belt is a direct contributing factor in my low back pain. Eventually this will require a spinal fusion.

(in response to “thank you for participating in this survey”) No, thank you!