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## RESEARCH ARTICLE

# POLICE OFFICER BACK HEALTH

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**ABSTRACT**

The purpose of this study was to examine the extent of, and factors related to, lower back pain (LBP) in municipal police officers. Officers (n=30) completed a multi-categorical questionnaire investigating factors associated with LBP, and the Oswestry Disability Questionnaire. Of the 21 officers returning complete data, 86% reported having back pain, with 6% having moderate disability. Fifty-five percent reported occasional back pain, and 10% reported daily pain. Pain was most often associated with muscular strain and ligament sprain (33%), while treatment sought ranged considerably. Officers reported pain to limit prolonged standing (37%), sitting (27%), and sleep quality (53%). Data suggests that police officers are at a high risk of lower back pain, while its frequency and intensity may be related to the physical requirements of the job.

***Keywords:*** Lower back pain, occupation, disability, prevalence, policing

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## INTRODUCTION

Lower back pain is a major cause of morbidity in the industrialized world impacting both work and leisure time pursuits. Back pain was found to be the most frequent cause of activity limitation in the adult population (Carpenter and Nelson 1999). In industrialized countries de Girolamo estimates that 5% of the population will be experiencing lower back pain at any given time (deGirolamoa 1991), with an annual prevalence of 15-45% (Bonneau et al. 2001, Waxman et al. 2000). It is suggested that 60 - 80% of the population will experience lower back pain at some point in their lifetime with LBP being the second leading cause of medical visits (next to cardiovascular problems), while being ranked third for hospital visits and fifth for surgical procedures (Carpenter and Nelson 1999). The most frequently documented cause of LBP is muscle strain, with overexertion and irregular (fast, wrong) movements such as lifting, twisting, turning, bending, pushing and pulling being typical underlying factors (Bonneau et al. 2001, Ying et al. 1997).

Acute onset of LBP usually lasts from 2 – 6 weeks while chronic lower back pain is reoccurring and lasts a lifetime unless fully rehabilitated and the lower back strengthened. Of those suffering from lower back pain, 5 - 10% will develop chronic symptoms, pain and disability (deGirolamoa 1991). For this reason, lower back pain has a large economic and psychosocial cost. In 1991 the direct and indirect costs associated with lower back pain were thought to be in the 25 billion dollar range in the United States (deGirolamoa 1991).

The first onset of lower back pain is most common between the ages of 25 and 55 (deGirolamoa 1991, deZwart 1997). Nohejl et al. found the highest reported initial incidence of lower back pain in 20 - 30 year olds who were employed in jobs requiring minimal training, such as general labor (deZwart 1997). de Zwart et al. found the incidence of back pain to be higher in individuals over the age of 44 who were blue collar workers exposed to heavy lifting (deZwart 1997), although several others report high incidence of back pain in those who drive for a significant portion of the day (Boshuizen et al. 1992, Gyi and Porter 1998, Robb and Mansfield 2007, Okunribido et al. 2007, Lis et al. 2006). Many sources attribute lower back pain to occupation (deZwart 1997, Nohejl et al. 1987, Riihimaki et al. 1988, Yu et al. 1984, Robb and Mansfield 2007).

Understanding the physical requirements of police work and the literature linking driving and heavy lifting (Anderson et al. 2001, Gyi and Porter 1998), twisting and turning (Anderson et al. 2001, deGirolamoa 1991, Nohejl et al. 1987, Yu et al. 1984), one could

predict a high incidence of lower back problems in the police force. While Brown et al. found the one-year prevalence rates of lower back pain in RCMP members to be within those reported for the general population (25-62%) (Brown et al. 1998), police officers fall within the upper end of normal with prevalence rates of 44-62%. The purpose of this study was to develop a method to explore the prevalence of LBP in general duty police officers, while examining the level of disability associated with the LBP and factors that the officers attribute to LBP occurrence.

## METHODS

Research ethics were obtained for the study through the institutional Research Ethics Advisory Committee. The research involved a two part questionnaire that was distributed to a convenience sample (n= 30) of general duty police officers during their shift briefing. Respondents were asked to fill out the questionnaire investigating factors associated with LBP and return it, anonymously, in a sealed envelope to the researchers following their shift.

The back health questionnaire was a multi-categorical questionnaire collecting individual demographical data, workplace circumstances, and self-reported lifestyle behaviors, physical activity and fitness, low back pain and back pain with daily living. In addition to the questionnaire the Oswestry Disability Questionnaire was included to assess the level of disability attributed to back pain (Fairbank et al. 1980). The approximate time required to fill out the questionnaire was 20 minutes.

The Oswestry Scale provides reliable, subjective results that evaluate the individual disability or level of function (Fairbank et al. 1980, Riihimaki et al. 1988, Gronblad et al. 1994). The questionnaire consists of 10 sections each containing 6 statements that are related to progressive dysfunction, allowing for the categorization of disability level. Each section is scored from 0 (no disability) to 5 (significant dysfunction). An accumulative score is calculated to determine the level of disability the individual is thought to have.

Descriptive statistics and Pearson two-tailed bivariate correlations were calculated using SPSS v.12 software. Data were typically expressed as a percent of the total sample, and where applicable, percent of those reporting LBP. Graphs were generated using Microsoft Excel for Windows.

## RESULTS

Subject's age ranged from 31-50 years, with 2 female respondents and 19 male respondents. With a response rate of 71 percent, the data received indicates that most officers have or had experienced LBP. However, due to a limited sample size and convenience nature of the sample, statistical analysis were not appropriate. Instead, a descriptive analysis was performed to identifying factors associated with lower back pain and help guide further research efforts.

**Job Descriptions**

Job descriptions of the respondents varied. The majority of police officers were currently working in either general duty (33%) or investigation (38%). Ninety percent (90%) of the police officers indicated that they were satisfied with their work and had a good working relationship with other staff and employer. Forty five percent of the officers currently worked in a vehicle 4 or more hours of their working day, while 25 percent spent 4 or more hours of the working day standing or walking; 60% of the officers reported that their job required this twisting at the trunk on a daily basis.

**Reported Lower Back Pain**

Eighty six percent of the officers in the present study report having had trouble with their lower back and associated lower back pain. Of those with back pain 55 percent reported occasional back pain and 25 percent reported experiencing back pain often. Only 10 percent of the officers reported that the lower back pain bothered them on a daily basis. The type of back trouble experienced ranged from sciatic pain, acute pain to muscular strain and ligament sprain in the lower back. The most prevalent problems reported were muscular strain and ligament sprain (33%). Of those reporting LBP, 76 percent of the officers did not have back pain prior to entering the police force, although the majority of officers now report having between 1-7 days (31%) and 8-30 days (27%) of LBP in the past 12 months. When asked about specifics, 37 percent reported that their pain limits them from standing for prolonged periods of time, while 27 percent report that it limits them from prolonged sitting. In addition, 53 percent of the officers claim that their sleep is affected due to LBP. The length of time they experienced back pain was positively related to years of service ($r=0.53$; $p < 0.05$) but not age ($r=0.38$; $p>0.05$). The relationship between LBP and years of service is reported in Figure 1.

**Time off work**

The majority of the officers (90%) report that they have used 0-4 days of their sick leave in the last 12 months to cover days when LBP limited their function. When asked specifically about sick time due to lower back pain 77 percent reported that their sick leave total was no greater than 5 working days. However, when asked it they went to work regardless when they should have taken time off work 63 percent reported that sick leave was warranted, and in retrospect, think they should have used more sick time to expedite their recovery.

**Treatment and Response to Treatment**

Of those officers afflicted with back pain, most responded well to various treatments. Sixty nine percent (69%) of the officers who suffered lower back pain in the last year had sought help from a health professional. Many treatment options were sought by the officers including treatment by a physician (22%), physiotherapy (17%), chiropractic care (50%) and massage therapy (33%). Along with therapeutic treatment options, medications were also taken for relief of pain and discomfort. Fifty eight percent (58%) of the officers answered yes when asked if they had taken medication. As with treatments, various medications were taken including analgesic medication (26%), anti-inflammatories (37%) and muscle relaxants (27%). A total of 65% of the officers reported a good response to medication and previous treatment.

### Physical Activity and Fitness

Eighty five percent of the officers reported participating in 3 or more days of moderate to vigorous physical activity. In addition, most officers (76%) also participated in stretching and muscular strengthening activities 2 or more days of the week. Ninety percent of the officers stated they participated in physical activity for associated health benefits, although many reported themselves as below average for muscular (57%) and cardio respiratory (38%) fitness. Neither general aerobic or muscular fitness were found to be correlated to disability (r=0.24 in both cases). The relationship between perceived fitness and level of disability from LBP is presented in Figure 2.

### Duty Belt and Police Car

Sixty one percent (61%) of the police officers within this study attributed their low back pain to the police belt/vest and the seat in the police car, while 39% attributed sitting or driving for long periods of time to lower back pain.

### Oswestry Questionnaire

Of the 21 officers who participated in the current study, three indicated they have not experienced back pain, while 1 questionnaire offered incomplete data. Of those seventeen officers reporting LBP most (94%) fell into the Minimal Disability Category while 6% reported a Moderate Disability. At the level of *Minimal Disability* (Fairbank et al. 1980) it is expected that this group can cope with most living activities. Usually no treatment is indicated, apart from advice on lifting, sitting posture, physical fitness and diet. In this group some patients have particular difficulty with sitting, and this may be important if their occupation is sedentary. At the level of *Moderate Disability* (Fairbank et al. 1980) it is expected that this group experienced more pain and problems with sitting, lifting and standing. Travel and social life are more difficult and they may well be off work. Personal care, sexual activity and sleeping are not grossly affected, and the back conditions can usually be managed by conservative means. The Oswestry Disability Score was significantly related to years of back pain ($r=0.62$; $p<0.05$).

## DISCUSSION

In the United States back pain is found to be the most common reason for filing a workers' compensation claim (Guo et al. 1999). Through the National Health Interview Survey the prevalence of lost-workdays was estimated to be 4.6%, with 101,800,000 workdays lost to lower back pain in 1998. Guo et al. reported the prevalence of back pain cases to be 17.6% with 149,100,000 workdays lost to lower back pain in 1988 (Guo et al. 1999). The prevalence was highest in general laborers (construction) in males (22.6%), and nursing/nursing aides in females (18.8%). The duration of absence appears to be related to the physical nature of the work, the occupation (e.g. amount of driving, work posture, whole body vibration), social and economic opportunities of the employees (Butterfield et al. 1998). Deyo and Tsui-Wu stressed the importance of socioeconomic factors in disability related to lower back pain (Deyo and Tsui-Wu 1999). These authors found a direct correlation between level of education and absenteeism attributable to lower back pain in men, with individuals with higher education having significantly fewer sick days attributed to lower back pain. Laslett et al. (1991) could not

duplicate these results, however, finding no differences in back pain characteristics across different social groups and occupational postures.

Studies routinely report 60-85% of the general adult population to have a lifetime prevalence of LBP. In comparison, the present study found a high incidence of LBP in the general duty police officers, with 86% of the officers reporting having LBP at some point in their life. While 76% of the officers did not experience LBP prior to entering the police force, it would be easy to jump to the conclusion that the physical nature of the job places police officers at increased risk of LBP; however, police recruits enter the police force at a younger age (approximately 25 years of age in the municipal police surveyed) when a lower incidence rate would be expected. Younger aged subjects are found to report acute LBP (deGirolamoa 1991, deZwart 1997) while increasing age was linked with greater numbers of chronic lower back pain due to reoccurrence of previous injury (Waxman et al. 2000). The results indicate that LBP is a mutable problem throughout life, although the complete healing of the original injury can be related to reoccurring and chronic LBP (Waxman et al. 2000).

Research in policing, while having identified that lower back pain is a major concern, has not clearly demonstrated those factors associated with higher incidence of lower back pain. The high incidence of lower back pain may be associated with many occupational stressors – the physical stress of arresting a suspect, driving, getting in and out of a vehicle with body armor and gun belts – or lifestyle related issues that are associated with police work – shift work, sedentary nature of the job, and lower fitness with increased years of service. Burton et al. (1998) were able to link the occupational stress of police work to the first onset of lower back pain, suggesting that body armor, vehicular exposure and sports participation were all associated with a more rapid onset of back pain in asymptomatic police officers. Chronic back problems were associated with length of service and not necessarily length of exposure to stressors.

The National Institute of Occupational Safety and Health in the United States documented a strong association with LBP and reoccurring back trouble through comprehensive review of the epidemiological evidence for work related muscular injuries and LBP (Nygard et al. 1987). Their review supported the contention that factors within the physical workplace have an effect on the type and frequency of injuries. Persons most at risk of lower back pain were those performing heavy physical work, lifting and forceful movements, bending and twisting, exposed to whole body vibration or required to hold prolonged, static work postures (Ferguson et al. 2000). Burry and Gravis found 54.7% of all back injuries occurred due to lifting, while 63.6% had a sudden onset due to muscle strain (Burry and Gravis 1988).

The prevalence of lower back pain appears to be higher for those who spend a significant portion of their day driving motor vehicles (Gyi and Porter 1998, Robb and Mansfield 2007, Lis et al. 2006). Brown et al. report the prevalence of lower back pain in RCMP officers to be between 44 and 62% each year (Brown et al. 1998). Interestingly, these authors did not find a significant difference between the prevalence of back pain between those officers who drove for 50% of more of the shift and those that sat/stood

for 50% of the shift. Research out of Britain, however, found self-reported lower back pain to be positively associated with both distance and hours driven in a motor vehicle (Gyi and Porter 1998). Thirty nine percent of the officers in the present study attribute their LBP to prolonged sitting and/or driving.

Prolonged sitting and sustained posture in combination with exposure to whole body vibration may leave police susceptible to LBP and other musculoskeletal disorders. Further, after remaining in a static position for a prolonged period (such as sitting while driving), subsequent reactions and movements are more likely to cause injury (such as getting in and out of a car) (Gyi and Porter 1998, McIntosh et al. 2000). A recent study examining 600 members of the British police force supports the relationship between exposure to driving and reported LBP (Gyi and Porter 1998). Those officers found to be at risk of LBP appeared to be generally taller, wore bulkier clothing, spent 8+ hours of their shift driving or sitting in a vehicle, had insufficient posture when driving and were required to respond to a situation which included strenuous physical activity after prolonged sitting (Gyi and Porter 1998). The 80 traffic police officers surveyed reported traveling in the same car all day during their shift for a 3-3.5 year duration with seats that were never replaced or repaired unless there was obvious damage. Comparing the LBP reported by traffic police to general duty officers, results indicate that 38% and 29% of officers, respectively, had suffered exposure to LBP for greater than 8 days within the last 12 months (Gyi and Porter 1998). Absenteeism for police officers who drove frequently was reported to be high as compared to a general light duty group (11.2 days and 3.0 days, respectively).

Data from the RCMP suggest that 51% of members regard back pain as a major or moderate health problem within the force (Laslett et al. 1991). A 1996 LBP survey revealed that 56% of RCMP members surveyed suffer from acute, chronic or reoccurring LBP (Laslett et al. 1991). In a random sample of police officers Brown et al. found increased back pain and rate of injury in those officers who drove a patrol car as part of their duty (Brown et al. 1998). While 54.9% of the officers sampled report chronic and/or reoccurring LBP only half of those sought medical interventions by means of chiropractic care, physical or occupational therapy, massage therapy or other professional help, comparable to the 64% in the present study. Only 25% reported sick leave although 60% stated that looking back they should have take days off to recover faster and not return to work until they were symptom free (Brown et al. 1998). This is remarkably similar to the present study which reported 63 percent of the officers felt that in retrospect they should have used more sick time to expedite their recovery.

The high incidence rate of LBP in police officers, with little time taken for recovery from injury and ineffective use of the health care system, reinforces the need for effective prevention and treatment methods. While the majority LBP has an etiology in muscular strain, officers sought chiropractic care and bone-base treatment. Further, without complete recovery, officers were using a pharmaceutical based treatment that would leave them drowsy and less capable of making quick and concise decisions. Muller et al. examined risk indicators for lower back pain in a 15 year follow-up of people who had previously experienced lower back pain 44. These authors found that previous

absenteeism due to lower back trouble, the use of analgesics to control lower back pain, and occupation were the most important risk indicators of self-reported work incapacity. For this reason, LBP education, treatment and prevention should be undertaken by police agencies.

In a recent study trunk flexion, back extensor endurance, and physical activity participation were found to be significantly higher in a group of Canadians that reported no history of back pain, as compared to the group who did report a history of lower back pain (Payne et al. 2000). Further, those individuals who reported no history of back pain had significantly lower waist girths. Poor back endurance (Biering-Sorenson 1984) and high levels of adiposity (Han et al. 1997, Nabeel et al. 2007) have previously been associated with risk of lower back pain. Carpenter and Nelson in their review of the literature provided considerable evidence that suggests high levels of hamstring flexibility and abdominal muscular endurance are likely to reduce lower back problems (Carpenter and Nelson 1999). While there is no previous support for the link between physical activity and reduced incidence of lower back pain, Payne et al. found physical activity participation to be a good discriminator of recurring back pain, while the relationship between physical activity and general health is well established (Payne et al. 2000). Recently Nabeel et al. (2007) found police officers who self-reported the highest fitness levels to be least likely to report lower back pain. Officers who were more fit were less likely to report incidence of lower back pain over the previous 12 months (OR 0.37, 95% CI 0.10-0.73) or report chronic pain (OR 0.42, 95% CI 0.19-0.91). Further, these authors found officers reporting a Body Mass Index (BMI) of greater than 35 to be three times more likely to report lower back pain than those within a normal BMI range.

Physical activity and back health are extremely interrelated. However, even in heavy laboring occupations, Nygard did not find the occupational physical stress to be sufficient to cause superior musculoskeletal fitness, especially in older workers (Nygard et al. 1987). This suggests that, while there are many risks associated with heavy labor, the heavy labor itself does not appear to provide a physical conditioning effect that would help prevent occupational-related injury, and an outside fitness program is essential. Within this study, 85% of the officers participated in 3 or more days of physical activity and strengthening exercises. Payne et al. found trunk flexion to be positively related to back health in both males and females, while extensor endurance was positively related to back health (Han et al. 1997). Abdominal strength is seen as a good predictor of future risks for LBP (Han et al. 1997). However, physical measurements alone could not provide sufficient evidence to accurately assess LBP and future prognosis. Recent evidence suggests that psychosocial factors such as attitudes and beliefs, personality and coping strategies towards daily activity and lifestyle are also associated with LBP (Krause et al. 1999, Papageorgiou et al. 1997, Pulliam et al. 2001). From a clinical standpoint, LBP is multi-factorial, therefore, predicting those who may suffer from LBP must incorporate a variety of tests and measures including physical assessments, lifestyle assessments and psychosocial assessments (Devereux et al. 1999). The questionnaire developed for the present analysis therefore asked specific questions in each of these areas.

The etiology of LBP is no longer specific to physical measures, but has also been linked to various psychosocial determinants (Devereux et al. 1999, McGorry et al. 1999, Linton 2001). For years researchers have been investigating psychological and emotional variables that could directly influence LBP in combination with physical work demands and workloads. These psychosocial determinants include attitudes, beliefs, personality, stress, mood disorders and related coping strategies (Pulliam et al. 2001, Linton 2001, Lundberg 1999). While it was difficult to link the psycho-social and lifestyle factors to LBP in the present study with a small sample size, Brown et al. found strong correlations between LBP and physical factors such as overexertion, lifting, pushing, twisting, turning, prolonged sitting, standing, and psychological factors including mental stress, social support, coping strategies and education level (Fairbank et al. 1980). Similarly, through descriptive analysis of the present results certain lifestyle factors appear to have a relation to LBP, including physical inactivity, job requirements and stress.

Devereux et al. examined the combination of physical and psychosocial factors associated with LBP in 891 workers from various industries (Devereux et al. 1999). Subjects were asked to complete a questionnaire that examined their occupational related lifting characteristics, frequency, exposure to whole body vibration, bending, work positions and psychosocial factors of pressure and workload (time related stress), job satisfaction, social support and job control. The subjects were then categorized into four exposure groups: high physical/high psychosocial, low physical/high psychosocial, high physical/low psychosocial and low physical/low psychosocial. The greater risk factors were found for those who were lifting > 18 kgs, or 4.3-11.3 kg with a repetition of 25 times per day, whole body vibration and heavy lifting periodically throughout the day (McGorry et al. 1999). Of the 818 completed questionnaires 39% had recurrent back pain > 3 times a year for a duration of > 1 week. Half of these subsided within 1-4 weeks, while ¾ remained in mid-moderate discomfort for prolonged periods or chronically. Further, those exposed to high physical and high psychosocial had greater risk for LBP. Although having a low response rate (59%) the results were consistent with other research stating that psychosocial and physical risk factors may affect LBP in combination or independent of one another (McGorry et al. 1999).

Understanding the physical requirements of police work and the literature linking driving (Gyi and Porter 1998, Lis et al. 2006, Robb and Mansfield 2007) and heavy lifting, twisting and turning (deGirolamoa 1991, Nohejl et al. 1987, Yu et al. 1984), one could predict a high incidence of lower back problems in the police force. The present study was designed to determine prevalence of low back pain among police officers and to further identify and outline factors attributed to the onset of LBP. The study confirms that police officers who reported back pain attribute this injury to job related tasks, and in particular, perceived the seat of the patrol car and the duty belt as the most significant contributors to LBP (although little evidence was found to support this). Many factors previously reviewed such as lifting, twisting, standing, bending, pushing and pulling, as well as lifestyle factors such as stress, coping, smoking and physical inactivity, must still be considered when examining LBP.

This study reinforces the need for a comprehensive LBP prevention and treatment strategy within police services. The majority of the officers experienced LBP at some point during their career, with an incidence rate beyond the reported population norm, indicating the need for targeted research and intervention strategies. However, the present results are limited by the small convenience sample from one police detachment, and the fact that the questionnaires were not distributed to police officers on disability. With a larger sample size and wider questionnaire distribution within police services further investigation within this specific setting would allow for more significant findings.

## CONCLUSIONS

Police officers have a high incidence of lower back pain, while its frequency and intensity may be related to the physical requirements of the job. Prevention programs should be considered, while research is required investigating vehicle design (eg. mobile data terminal use), and modification of duties and shifts to avoid prolonged sitting or walking.

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Figure 1. The relationship between Oswestry Disability Scores and years of service (1 = 0-4 yrs; 2 = 5-9 yrs; 3 = 10-14 yrs; 4 = 15-19 yrs; 5 = 20-25 yrs; 6 = 26+ yrs).

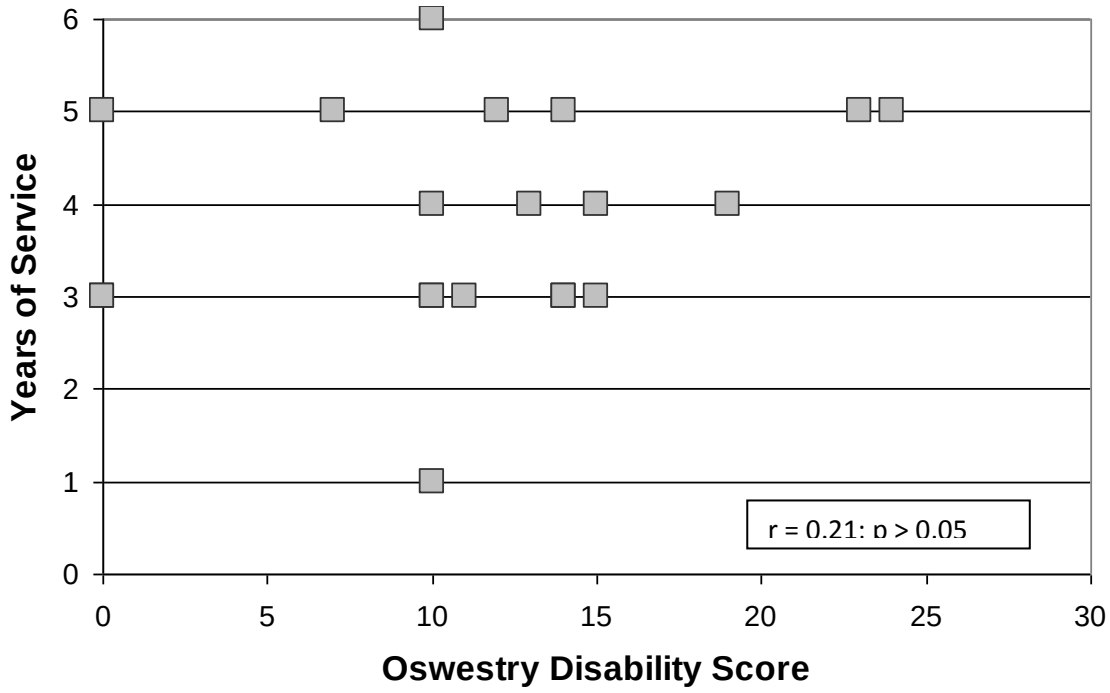
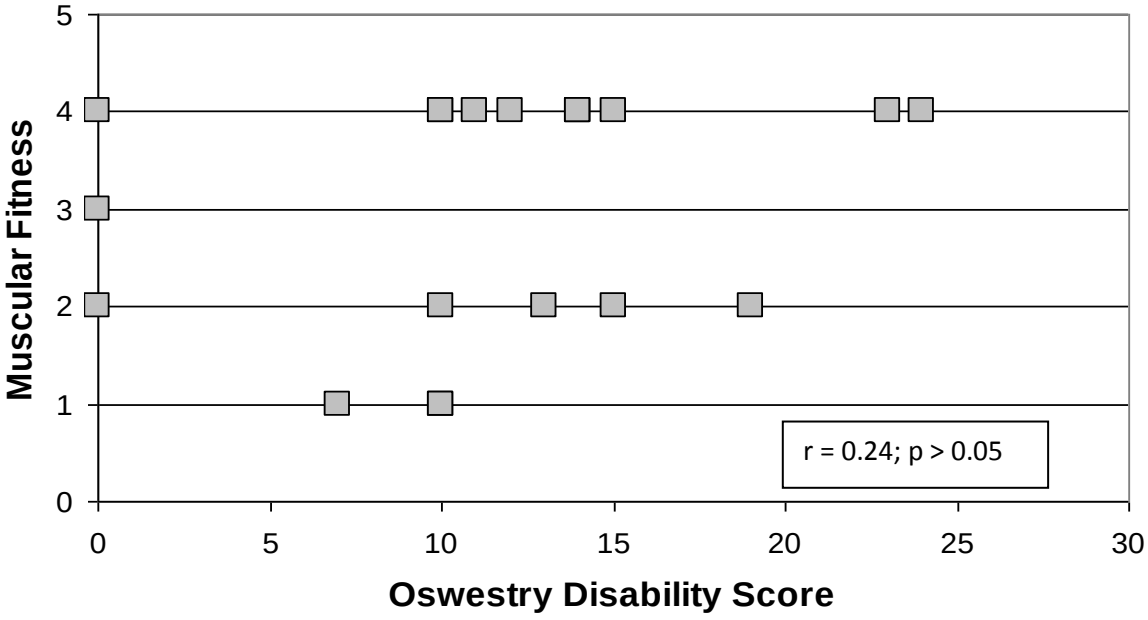
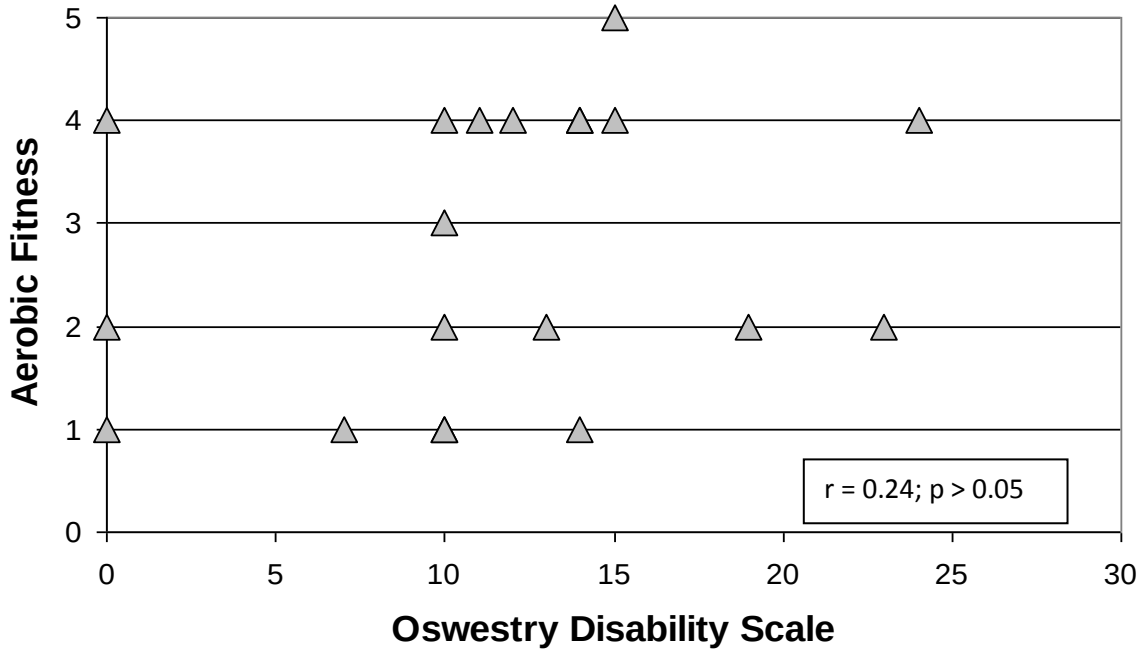


Figure 2. The relationship between perceived fitness (1 = excellent; 2 = above average; 3 = average; 4 = below average; 5 = poor) and level of disability from LBP.



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