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A Survey of Work-Related Injuries of Chiropractors in South Africa

A dissertation submitted to the Faculty of Health Sciences, University of Johannesburg, Johannesburg, in fulfilment of the requirements for the degree of Master of Technology: Chiropractic by

Sarah Dianne Carless
(Student number: 201070424)

Supervisor: ___________________________  Date: ___________________
Dr C. Yelverton

Co-supervisor: ________________________   Date: ___________________
Dr C. Hay
DECLARATION

I, Sarah Dianne Carless, declare that this dissertation is my own, unaided work. It is being submitted as partial fulfilment for the Masters Degree of Technology, in the program of Chiropractic, at the University of Johannesburg. It has not been submitted before for any degree or examination in any other University.

_______________________________________
Sarah Dianne Carless

On the________________day of the month ______________________2017
DEDICATION

To every person who I encountered along this path and those that chose to walk beside me, thank you.

This is to the next adventure.
ACKNOWLEDGEMENTS

To my supervisor, Dr Chris Yelverton, and my co-supervisor, Dr Caroline Hay, thank you for your guidance, support and sense of humour through this whole process. It was a pleasure working with both of you.

To Anesu Kuhudzai and Jaclyn De Klerk at STATKON, thank you for your, always efficient, and professional help in the design of this survey and statistical analysis.

To all the participants, thank you for taking the time to take part in this study. Each contribution was very much appreciated.

To my dad, thank you for allowing me this opportunity to pursue my dreams and providing everything possible to make this experience the best it could be.

To my mom, thank you for always encouraging laughter, wiping away the tears and all of your unconditional love.

To Joey, my partner in crime, thank you for your constant motivation and belief in me. This task was far less daunting for having you by my side.
ABSTRACT

**Purpose:** To determine, by means of a survey, the prevalence of work-related injuries among chiropractors in South Africa. Furthermore, it looks to identify the types of injuries and the regions of the body most commonly affected by said injuries.

**Method:** Emails were distributed to the database of the Allied Health Professions Council of South Africa in order to ensure that the survey was made available to all registered chiropractors in South Africa. Those chiropractors who wished to take part in answering the survey could click on the link provided in the email. The link redirected participants to an independent website where they could answer the survey anonymously. The survey consisted of a series of questions that each participant could answer by clicking on the answers most applicable to them. The link was live from the 15th of September to the 19th of October 2016. A total of 193 valid responses were received.

**Results:** From the data sample that was analysed it was found that work-related injuries were of significant prevalence among chiropractors in South Africa. Results were divided into 3 categories. Acute injuries were reported by 50.5% of the sample group, repetitive strain injuries were reported by 75.0% of the sample group and 51.4% of the sample group reported that their work as a chiropractor had aggravated a previous injury that they had sustained. Across all 3 categories, the body regions most commonly affected were the wrist and hand, lower back and shoulder. The types of injuries most commonly sustained were those affecting the muscles, tendons and ligaments.

**Conclusion:** The analysis of the survey showed that work-related injuries appear to be of significant prevalence among chiropractors in South Africa. The body regions most commonly affected and the types of injuries most commonly sustained are the same across the 3 categories of acute injuries, repetitive strain injuries and previous injuries as a result of any other cause.
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1 INTRODUCTION

1.1 Problem Statement

Work-related injuries are a potential in all professions worldwide. These injuries place a substantial socioeconomic impact on all parties involved, from the professionals themselves to the society as a whole (Silverstein, Vikari-Juntura & Kalat, 2002). The medical profession, and more specifically the chiropractic profession, are no exceptions to this statement.

Musculoskeletal disorders are more prevalent than other work-related injuries within the United States (U.S. Bureau of Labour Statistics, 2015) and certain industries and occupations are noted to have up to a three to four times increased rate than the overall frequency. Jobs that feature physical attributes such as rapid work pace, repetitive movements, heavy lifting, forceful manual exertions and awkward body postures are known to be at risk of developing work-related musculoskeletal conditions (Punnet & Wegman, 2004).

Within the healthcare industry, a number of professions have an overlap of work activities, most of which include physically demanding work and exposure to a range of psychosocial hazards (Anderson & Oakman, 2016). Professionals such as dentists, hygienists, nurses, home care workers and physical therapists all have a high prevalence of musculoskeletal work-related injuries and all share similar physical work demands (Holm & Rose, 2006).

Many healthcare industries have carried out research studies on work-related injuries amongst professionals like those mentioned above. These studies aim to identify prevalence and types of injuries occurring. They also look to identify potential risk factors and the effect these injuries are having on the professionals within their respective industries.

The chiropractic profession has been noted to have similar physically demanding work and exposure to psychosocial hazards associated with the development of work-related musculoskeletal injuries (Anderson & Oakman, 2016). However, only a few studies have investigated work-related injuries associated with chiropractic practice (Ndetan, Rupert,
Bae & Singh, 2009) and the studies that have been conducted have been isolated with a significantly small sample size. None of these studies have been conducted amongst the chiropractic community within South Africa.

Therefore, there is a need for such research to be carried out on this topic amongst the chiropractors of South Africa. It is necessary to identify the prevalence of injuries as well as the specific types and body regions most commonly affected. The causes of such injuries can be identified as specific risk factors. Finally, the effects on the individual practitioners as well as any possible adaptations in work activities in order to compensate for injuries sustained and prevent further injuries could generate interesting information for the chiropractors of South Africa.

1.2 Aim of Study

The aim of this study is to determine, by means of a survey, the prevalence of work-related injuries among chiropractors in South Africa. Furthermore, it looks to identify the types of injuries and the regions of the body most commonly affected by said injuries.

1.3 Benefit of the Study

Possible benefits of this study could include simply generating new information on the topic of work-related injuries amongst chiropractors, specifically within a South African context. Furthermore, it could provide details regarding the prevalence, types of injuries and the regions of the body most commonly affected by said injuries. Any trends identified could be compared to trends in other locations around the world in order to ascertain if South Africa is in sync with the global trends.

The results of this study could identify risk factors associated with work activities of a chiropractic practitioner, including areas of the body more susceptible to injury or the specific tasks more commonly responsible for these work-related injuries. This information could be beneficial to all chiropractic professionals as it could allow them to be more cautious when they encounter these risk factors within their own practice.
Finally, this study may identify new information warranting further study and will hopefully inspire further research into the topic of work-related injuries amongst chiropractors in South Africa.
2 LITERATURE REVIEW

2.1 Introduction

Work-related injury has been defined as any injury either caused, or contributed to, by an event or exposure within the work environment. These factors may either have resulted in a new condition or aggravate a pre-existing condition (U.S. Bureau of Labour Statistics, 2012). The South African Department of Labour has defined occupational injuries as any workplace accident that resulted in injury, disability or death (The South African Department of Labour, 2010).

The Bureau of Labour Statistics reported that the amount of 916,440 was the total number of days-away-from-work as a direct result of nonfatal occupational injury and illness within private industry (U.S. Bureau of Labour Statistics, 2015). This has had a substantial impact on professionals, businesses, governments and society as a whole (Silverstein, Viikari-Juntura & Kalat, 2002).

In the following section, literature pertinent to this study will be discussed in order to better understand the prevalence of work-related injuries, types and body regions most affected; and how these concepts could be related to the chiropractic profession.

2.2 Work-Related Injuries

The World Health Organisation has recognised that disorders are work-related when the work activities and work conditions have significantly contributed to their development or exacerbation but are not the sole determinant of causation (World Health Organization, 1985). Hazards within the work place may have resulted in a number of conditions including, but not limited to: injuries, cancer, hearing loss as well as disorders affecting the respiratory, musculoskeletal, cardiovascular, reproductive and neurological systems, skin and mind (World Health Organization, 2009).

For the purpose of this study, both, musculoskeletal and neurological work-related injuries were of primary focus and will be pertinent throughout this literature review. The discussed work-related injuries have been divided into 3 categories, namely acute
injuries, repetitive strain injuries and pre-existing injuries that may have been aggravated by chiropractic work habits.

2.2.1 Musculoskeletal work-related injuries

Of the above listed work-related conditions, musculoskeletal conditions were the primary focus of this research study as these conditions were noted to be one of the more common conditions, reportedly accounting for 32.0% of all injury and illness cases in the United States throughout 2014 (U.S. Bureau of Labour Statistics, 2015).

Musculoskeletal conditions included disorders that were described as either inflammatory or degenerative in nature (Punnet & Wegman, 2004), thus including both acute injuries and repetitive strain injuries, respectively. These conditions have been known to cause pain and functional impairment (Buckle & Devereux, 2002).

Conditions of the musculoskeletal system have affected structures such as bones, muscles, tendons, ligaments and joints as well as their supporting structures such as peripheral nerves and blood vessels (Punnet & Wegman, 2004).

A. Anatomy

The musculoskeletal system is made up of the muscle tissue and muscular system with its known interactions with the bones and joints of the skeletal system (Moore, Dalley & Agur, 2014).

The skeletal system

The skeletal system is divided into two functional parts, the axial skeleton and the appendicular system. The axial skeleton incorporates the bones of the head, neck and trunk. The appendicular system incorporates the bones of the upper and lower limbs, and includes those of the shoulder and pelvic girdles which unite the appendicular system to the axial skeleton.

Cartilage and bone are the two components of the skeleton. Cartilage is a resilient, semi-rigid form of connective tissue. It provides flexibility within the skeleton as well as accommodates smooth, low-friction, gliding surfaces for free movement at the articulation
sites. Comparatively, bone is a highly specialised, hard form of connective tissue that makes up most of the skeleton. Bone has a number of functions including, but not limited to, support for the body, protection for vital structures and the mechanical basis for movement. Two types of bone present in the skeleton are compact bone, made up of more solid matter and fewer number of smaller sized spaces, and spongy or trabecular bone that is made up of less solid matter and a greater number of bigger sized spaces.

Joints or articulations are unions between two or more bones of the skeleton. Joints exhibit a number of forms and functions. Some joints exhibit no movement, others only allow slight movement and some are freely moveable (Moore, Dalley & Agur, 2014). Joints are the site were the skeletal system and muscular system meet and interact.

**The muscular system**

All the muscles of the body make up the muscular system. Three types of muscle are present within the muscular system: skeletal muscle, cardiac muscle and smooth muscle. Muscle cells or muscle fibres, the basic component of muscles, are specialised contractile cells. Depending on each muscle, they are organised so as to be able to move body parts or temporarily alter the shape of internal organs.

Skeletal muscle is voluntary somatic muscle. It makes up the gross skeletal muscles of the muscular system and therefore has been the primary muscle of interest during this research study. The functions of skeletal muscle are locomotion, static support and the provision of heat.

Cardiac muscle is involuntary visceral muscle. It forms the muscular wall of the heart, namely the myocardium, and functions to pump blood from the heart. Cardiac muscle is also present in the walls of the aorta, pulmonary vein and superior vena cava.

Smooth muscle is involuntary visceral muscle. It forms part of the walls of most vessels and hollow organs. It functions to move substances through these vessels and hollow organs by coordinated sequential contractions. It is also present in the skin, forming the erector muscles of hairs, and in the eyeball where it controls lens thickness and pupil size (Moore, Dalley & Agur, 2014).
B. Causes of musculoskeletal work-related injuries

All soft tissues, including those mentioned above as well as fascia, synovial tissue and cartilage, fatigue or fail once sufficient force was applied. Fatigue or failure may be reached by any activity during work, daily living or recreation (Buckle & Devereux, 2002).

For the purpose of this study the following musculoskeletal injuries were focussed on: fracture, dislocation, subluxation, muscle strain, tendinopathy, ligament sprain, synovitis and possible intervertebral disc involvement.

Commonly work-related injuries were easily linked to a single risk factor or hazardous agent within the workplace. However, work-related musculoskeletal conditions were slightly different as they were considered to be multifactorial in nature. Thus their incidence could not be linked to any one hazardous agent. Rather, previous research found that these work-related musculoskeletal conditions were as a result of combined physical, psychosocial and individual occupational risk factors (David, 2005).

As noted in figure 2.1, on the following page, musculoskeletal disorders of the upper limb develop as a result of interactions between genetic, morphological, psychological and biomechanical factors. Although this model developed by Kumar spoke specifically of the upper limb, the factors mentioned mirror those identified by others and could be associated with all musculoskeletal disorders (Aptel, Aublet-Cuvelier & Cnockaert, 2002). Risk factors specific to the healthcare profession, and more specifically the chiropractic profession are outlined later in this chapter.
Figure 2.1: Model for multifactorial interactions causing musculoskeletal disorders of the upper limb (Kumar, 2001)

2.2.2 Neurological work-related injuries

Neurological injury can affect both the central and peripheral nervous systems; and neuropathy commonly describes any problem affecting the nerves in general. However, the term neuropathy is more accurately used to describe problems of the peripheral nervous system, specifically, rather than the central nervous system (Webberley, 2016).
As the peripheral nerves form part of the supportive frame-work of the musculoskeletal system (Punnet & Wegman, 2004), injury to them may be primary, as a direct result of one of the mechanisms discussed below, or secondary to an injury affecting one or more of the structures of the musculoskeletal system. For this reason it was difficult to isolate neurological injuries from musculoskeletal injuries and there might have been some overlap.

A. Anatomy

The nervous system is divided both structurally and functionally. Structurally, the nervous system is divided into the central nervous system (CNS) and the peripheral nervous system (PNS). Functionally, the nervous system is divided into the somatic nervous system (SNS) and the autonomic nervous system (ANS).

Neurons and neuroglia are the two main cell types found within the nervous system. Neurons are the structural and functional units of the nervous system specialised for rapid communication. Neuroglia are non-neural and non-excitale cells. Neuroglia function to support, insulate and nourish the neurons.

The central nervous system
The CNS consists of the brain and spinal cord. Functions of the CNS are to integrate and coordinate incoming and outgoing neural signals and to carry out higher mental functions.

The peripheral nervous system
The PNS consists of the remainder of the nervous system distal to the CNS that conducts impulses to and from the CNS ultimately connecting the CNS with peripheral structures of the body.

Nerves of the PNS consist of a bundle of nerve fibres outside of the CNS, three connective tissue coverings and the blood vessels that provide nourishment. The nerves are relatively strong and resilient due to the three connective tissue coverings, namely the endoneurium (inner), perineurium (middle) and epineurium (outer). Afferent (sensory) fibres convey neural impulses from the sense organs to the CNS. Efferent (motor) fibres convey neural impulses from the CNS to the effector organs.
Nerves are either cranial nerves or spinal nerves. Cranial nerves consist of 12 pairs of nerves that exit the cranial cavity via foramina in the cranium and communication occurs between cranial nerves, and between cranial nerves and upper cervical spinal nerves. Spinal nerves consist of 31 pairs of nerves that exit the vertebral column via intervertebral foramina at each specific spinal cord segment. Each spinal nerve converges to form two nerve roots, an anterior (ventral) nerve root consisting of efferent (motor) fibres and a posterior (dorsal) nerve root consisting of afferent (sensory) fibres. These anterior and posterior roots unite within the intervertebral foramen a mixed spinal nerve (Moore, Dalley & Agur, 2014).

B. Causes of neurological work-related injuries

Central nervous system injury, specifically that of the spinal cord has an annual incidence of 15 to 40 cases per million. These injuries have various potential causes, which included work-related injuries (Sekhon & Fehlings, 2001). Proximal to the injury site, stumps begin to regenerate and these sprouts are sent to the injury site where their growth is blocked and the sprouts are soon retracted. As a result, permanent disability follows (Moore, Dalley & Agur, 2014) and therefore these injuries are often far more serious and although not impossible, are unlikely to be present in this particular study.

Peripheral nerve injuries are more likely to be present in this study as the mechanisms of injury are less severe and may include stretch-related injuries, lacerations or compression-type injuries (Burnett & Zager, 2004). In 1943, Seddon described three basic types of peripheral nerve injury, namely neuropraxia, axonotmesis and neurotmesis. Neuropraxia describes a failure of conduction in a nerve in the absence of structural changes most likely due to blunt injury, compression or ischaemia. These injuries usually resolve and a return of function occurs. Axonotmesis describes a disruption of the axon and the myelin sheath but with preservation of the connective tissue fragments. These injuries usually regenerate spontaneously and regeneration is of good quality. Neurotmesis is a partial or complete severance of a nerve with disruption of the axon and its myelin sheath as well as the connective tissue fragments. Regeneration does not occur in these injuries (Lee & Wolfe, 2000).
2.2.3 Body regions most commonly affected

The body regions most commonly involved were the lower back, neck and upper extremity. Although not mentioned above, the lower extremity has been receiving more attention in recent research studies (Punnet & Wegman, 2004). These injuries include both a combination of patient-related risk factors and biomechanical stresses. Muscle contraction, repetitive motion or extreme joint positioning (Aptel, Aublet-Cuvelier & Cnockaert) are biomechanical factors common to injuries affecting all body regions.

Upper extremity injuries have been reported to account for 20 to 30 percent, or even more, of work-related injuries. These conditions are commonly seen in manual-intensive occupations. Back and lower extremity conditions have been identified in many occupations, one of which being patient-care workers (Punnet & Wegman, 2004).

In one systemic review conducted, amongst allied health professionals, the prevalence rates and reported areas of injuries were documented. These results can be seen in table 1 below. Areas of the body were divided into the spine, arms and legs. The lower back was the most commonly affected region of the spine and the upper extremity was found to be more commonly affected than the lower extremity (Anderson & Oakman, 2016).

<table>
<thead>
<tr>
<th>Authors</th>
<th>Career prevalence (%)</th>
<th>1 y prevalence (%)</th>
<th>Area of body affected (%)</th>
<th>Legs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adegoke et al [32]</td>
<td>91.3</td>
<td>Lower back 69.8%</td>
<td>Shoulder 22.2%</td>
<td>Hip &amp; thigh 0.3%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Neck 31.1%</td>
<td>Forearm 5.6%</td>
<td>Knee 15.9%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Upper back 14.3%</td>
<td>Wrist &amp; hand 20.6%</td>
<td>Ankle &amp; foot 9.5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Thumb 11.1%</td>
<td></td>
</tr>
<tr>
<td>Abrowayeh et al [36]</td>
<td>47.6</td>
<td>Lower back 32%</td>
<td>Shoulder 13%</td>
<td>Hip &amp; thigh 3%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Neck 21%</td>
<td>Elbow 4%</td>
<td>Knee 11%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Upper back 19%</td>
<td>Hand &amp; wrist 11%</td>
<td>Ankle &amp; foot 6%</td>
</tr>
<tr>
<td>Bork et al [13]</td>
<td>61</td>
<td>Lower back 45%</td>
<td>Wrist &amp; hand 20.6%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Upper back 28.7%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Neck 24.7%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Campo et al [38]</td>
<td>28</td>
<td>Lower back 6.6%</td>
<td>Shoulder 3.2%</td>
<td>Hip &amp; thigh 2.3%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Neck 4.9%</td>
<td>Elbow 1.4%</td>
<td>Knee 2.1%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Upper back 2.4%</td>
<td>Hand &amp; wrist 5.3%</td>
<td>Ankle &amp; foot 2.2%</td>
</tr>
<tr>
<td>Campo et al [14]</td>
<td>33</td>
<td>Lower back 15.7%</td>
<td>Shoulder 7.3%</td>
<td>Knee 4.3%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Neck 10.2%</td>
<td>Elbow 3.7%</td>
<td>Hip &amp; thigh 3.1%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Upper back 7.1%</td>
<td>Wrist &amp; hand 13%</td>
<td>Ankle 2.8%</td>
</tr>
<tr>
<td>Cromie et al [33]</td>
<td>91</td>
<td>Lower back 62.5%</td>
<td>Shoulder 22.9%</td>
<td>Hip 7.3%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Neck 47.6%</td>
<td>Elbow 13.2%</td>
<td>Knee 11.2%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Upper back 41%</td>
<td>Wrist &amp; hand 21.8%</td>
<td>Ankle 7.1%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Thumb 33.6%</td>
<td></td>
</tr>
<tr>
<td>Dyrkacz et al [41]</td>
<td>55.7</td>
<td>Neck, spine, &amp; torso 41.8%</td>
<td>Shoulder 33.4%</td>
<td>Lower extremities</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Head &amp; face 6.7%</td>
<td>Elbow 41.8%</td>
<td>18.1%</td>
</tr>
<tr>
<td>Glover et al [42]</td>
<td>68</td>
<td>58</td>
<td></td>
<td></td>
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<tr>
<td>Grooten et al [43]</td>
<td>53.5</td>
<td>Lower back 56.5%</td>
<td>Shoulder 43.4%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Neck 39.6%</td>
<td>Wrist &amp; hand 58.5%</td>
<td></td>
</tr>
<tr>
<td>Hill et al [44]</td>
<td>96</td>
<td>Lower back 69%</td>
<td>Shoulder 73%</td>
<td>Knee 23%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Neck 50%</td>
<td>Elbow 27%</td>
<td>Hip 19%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Upper back 15%</td>
<td>Wrist &amp; hand 54%</td>
<td>Ankle &amp; foot 8%</td>
</tr>
</tbody>
</table>

Table 1: Prevalence rates and reported area of injury (Anderson & Oakman, 2016)
2.3 Musculoskeletal Work-Related Injuries amongst Health Care Professionals

Work-related musculoskeletal injuries and disorders have been of great significance in the healthcare sector. Specifically within this sector are allied health professionals who provide services for individuals who are sick, injured or have a disability. Within the United States, this group of allied health professionals comprised of occupational groups that have similar job roles such as physiotherapists, occupational therapists, osteopaths, exercise physiologists and chiropractors. These allied health professionals undertake a variety of work activities and have been exposed to a number of hazards and risks associated with a higher chance of developing work-related musculoskeletal disorders (Anderson & Oakman, 2016).

There was a notable overlap that existed between the range of work activities undertaken by healthcare workers such as nurses and those allied health professionals mentioned above. All roles involved physically demanding work and exposure to a range of psychosocial hazards such as high workloads, time pressure or limited job control (Anderson & Oakman, 2016). Jobs that feature physical attributes such as rapid work pace, repetitive movements, heavy lifting, forceful manual exertions and awkward body postures are known to be at risk of developing work-related musculoskeletal conditions (Punnet & Wegman, 2004), all of which are noted in the work activities of healthcare professions.
A number of different healthcare professions have conducted research into the prevalence of work-related injuries and the causes pertinent to each of their specific professions.

2.3.1 Work-Related Injuries amongst Nurses

In one research study, conducted in British Columbia, healthcare support service workers and aids were identified as the two occupations that experienced the highest incidence of work-related injuries. Nursing, in particular, was noted to be physically demanding. Work activities often involve heavy lifting, bending, twisting and other awkward body postures known to be associated with the development of work-related musculoskeletal disorders. The psychological demands are also thought to amplify these physical exertions and increase risk of injury (Alamgir, Cvitkovich, Yu & Yassi, 2007).

Also mentioned, in the above study, was that nurses working in nursing homes and residential care facilities had a greater incidence of injuries than those nurses working in a hospital setting (Alamgir, et al., 2007). The Bureau of Labour Statistics noted that incidence rates in 2004 were 9.7 injuries per 100 full-time employees for nurses working in nursing homes and residential care facilities and only 8.3 injuries per 100 full-time employees for nurses working in hospitals (Bureau of Labour Statistics, 2005). This has been attributed to the level of care required in each healthcare setting; patients in nursing homes and residential care facilities are often more vulnerable, elderly residents who require much lifting and transferring (Alamgir, et al., 2007).

These patient handling activities, such as lifting and transferring noted above, have been acknowledged as a major contributor to the high incidence of musculoskeletal work-related injury amongst healthcare workers. More specifically, these activities have been acknowledged as a major contributor to the high incidence of lower back pain amongst healthcare workers.

In another study, conducted amongst nurses in south-west Nigeria, it was found that 84.8% of respondents had experienced work-related musculoskeletal pain or discomfort at some point in their careers. Of these respondents, 78.0% reported that they had experienced these symptoms in the last 12 months and that lower back (44.1%), neck
(28.0%) and the knees (22.4%) were the most commonly affected body regions. This study also identified job risk factors of which the 3 most common were working in the same positions for long periods, lifting or transferring dependent patients and treating an excessive number of patients in one day (Tinubu, Mdaba, Oyeyemi & Fubunmi, 2010).

2.3.2 Work-related injuries amongst hospital workers

In one particular study, compensation claims data was analysed in order to ascertain information of musculoskeletal disorders among hospital workers over a 7 year period. Hospital workers included nurses, emergency medical workers, physicians, physical therapists and occupational therapists, nursing aids/assistants and mental health workers. Also included were medical technicians such as ultrasound technicians, radiographers and phlebotomists, as well as other healthcare professionals such as physician assistants, medical scientists, lab technicians, pharmacy workers and nutritionists. Non-healthcare workers also included were patient transporters, patient representatives, housekeeping, maintenance, food service and management.

In this study, 42.9% of the musculoskeletal disorders were as a result of patient handling. The occupation most commonly affected were emergency medical workers where over 70.0% of injuries were attributed to patient handling activities. Other factors identified were lifting (26.4%) most commonly affecting emergency medical workers, nurses and nursing aids; twisting and pushing, both accounting for 5.0% of injuries.

A significant majority, 92.8%, of all injuries reported were sprains and strains. The body region most commonly affected was the lower back in both healthcare and non-healthcare workers. Emergency medical workers were, again, most significantly affected with 34.2% of their injuries affecting the lower back. Other body regions included the distal upper extremity (14.1%), knees (10.5%) and shoulders (9.7%) (Kim, Dropkin, Spaeth, Smith & Moline, 2011).

2.3.3 Work-related injuries amongst manual therapists

Manual therapy is considered a physical treatment for musculoskeletal pain and disability. It is most commonly utilised by physical therapists, massage therapists, physiotherapists, occupational therapists, chiropractors, osteopaths and osteopathic physicians (French,
Brennan, White & Cusack, 2010). Techniques and specific activities were profession specific, but there was some general overlap.

A. Work-related injuries amongst physical therapists

Physical therapy is defined as a holistic approach based on the manual treatment of soft tissue. Although the term physical therapist is sometimes used interchangeably with physiotherapist, the two are different as noted by their qualifications. Physical therapy is a 3 year part time degree that consists of far less clinical hours than that required to complete a physiotherapy degree (Morgan, 2015). Even though not recognised in South Africa, physical therapists are recognised in a number of locations around the world and for this reason will be discussed separately in this chapter.

Physical therapists, like chiropractors, routinely perform manual therapies, such as soft tissue mobilizations as one example. This means that structures such as the lower back and upper limb are exposed to risk factors associated with musculoskeletal and neurovascular disorders (Salik & Ozcan, 2004).

In one Australian research, in which 824 physical therapists were surveyed, 91% of respondents reported experiencing work-related musculoskeletal pain or discomfort. The most common areas affected was the lower back, affecting 48% of the respondents, followed by the neck and upper back both affecting 12.2% of respondents. In this particular study manipulation and mobilisation techniques as well as other hands-on treatments were associated with a higher risk of developing work-related musculoskeletal disorders. Other causes identified in this research included lifting patients, performing manual orthopaedic techniques, performing the same task repeatedly and working in the same position for long periods. Of these respondents, 17.7% changed their specialty area of practice or left the profession altogether (Cromie, Robertson & Best, 2000).

In a comprehensive narrative review, studies that evaluated both lifetime and 12-month prevalence, found the prevalence to be high with a lifetime prevalence of 55-91% and a 12-month prevalence of 40-91.3%. In all the reviewed studies the lower back was the most commonly affected body region accounting for up to 79.6% of life-time prevalence and up to 73.1% of 12-month prevalence. The lower back was followed by the neck, upper back and shoulders as the most commonly affected areas, respectively. The risk factors
identified were all associated with hard physical work. The individual risk factors included: tasks involving joint loading, extreme flexion of the trunk, frequent heavy lifting and transferring of patients, maintaining an awkward or static posture, bending and twisting, working in the same position for long periods of time, and psychological factors (Milhem, Kalichman, Ezra & Alperovitch-Najenson, 2016).

B. Work-related injuries amongst physiotherapists

Physiotherapists, again like chiropractors, carry out many manual therapies. These manual therapies include mobilisations, manipulations and massage (West & Gardner, 2001). These work activities are performed repetitively and were identified as significant risk factors (Salik & Ozcan, 2004).

In one research study carried out in North and Central Queensland, 445 questionnaires were sent out to all the registered physiotherapists in the region. The physiotherapists were questioned about both non-musculoskeletal work-related injuries, which made up 8.0% percent of responses, and musculoskeletal-work related injuries which made up, a far more significant, 55.0% of responses. Once again, the lower back was the most commonly affected body region with a career prevalence of 35.0% among respondents. In this study, the hand was the next most prevalent body region affected followed by the neck.

Other than acute or repetitive strain injuries, respondents were asked about any previous injuries that may have been aggravated by the work as physiotherapists to which 45.0% of respondents answered ‘yes’. In these cases, again the lower back was the most commonly affected body region, followed by the neck, hand and then the knee, respectively.

The risk factors identified amongst these physiotherapists were very similar to those identified amongst physical therapists and included: working in the same position for long periods, working in static postures that involved flexion and/or rotation, continuing to work while injured and performing manual therapy. All of these factors combined were reported by 50.0% of respondents. Other, less significant risk factors identified were: repetition of work activities, lifting or transferring dependent patients as well as carrying, lifting or moving equipment (West & Gardner, 2001).
2.4 The Chiropractic Profession

Chiropractic is a healthcare profession that is concerned with the diagnosis, treatment and prevention of musculoskeletal conditions. There is an emphasis on manual therapies including spinal manipulative therapy and other joint and soft tissue manipulations (World Federation of Chiropractic, 2009). In one study, a consensus was reached amongst American chiropractors, to define manual therapy as “Procedures by which the hands directly contact the body to treat the articulations and/or soft tissues” (Gatterman & Hansen, 1994). The primary aim of chiropractic treatment is aimed at restoring function to spinal segments and not solely the relief of pain.

The primary form of chiropractic treatment is manual therapy which includes manipulations and mobilizations. A manipulation combines controlled force, high velocity, low amplitude, leverage and direction. A manipulation is applied to specific joints and surrounding tissues in order to restore movement and, thus function, to previously fixated joints (World Health Organisation, 2005).

Although chiropractic manipulations and mobilizations are recognised by the International Chiropractic Association as the primary form of treatment (Wiegand, 2008), chiropractors are also known to make use of a number of non-manipulative therapies. This in conjunction with other work habits could possibly lead to work-related injuries.

Although research into work-related injuries amongst chiropractors is limited to a handful of isolated studies, the work activities performed by chiropractors including both manipulative and non-manipulative therapies are similar to the work activities of the other healthcare professions mentioned previously. As there is more literature available on these other professions, it suggests the importance of such research in the understanding of work-related injuries and the necessity for more research of this nature to be carried out within the chiropractic profession.

2.4.1 Work-related injuries amongst chiropractors

A handful of isolated studies have identified work-related musculoskeletal injuries to be prevalent within the chiropractic profession. Such studies include a New York study in
which, of the 69 respondents, the majority of injuries reported affected the lower back and upper extremities (Homack, 2005). In another study in the United States, 57.0% of the chiropractors that had been in practice for at least 15 years reported having sustained work-related injuries most commonly to the hand, wrist and lower back (Rupert & Ebete, 2004).

In what appears to be one of the largest studies conducted amongst chiropractors, surveys were sent out to 1000 randomly selected chiropractors within the United States. A total of 397 valid surveys were obtained and indicated that 40.1% of respondents reported experiencing a total of 252 injuries while working. In this study it was noted that upper extremity injuries were most commonly reported and the three most commonly affected body regions were the wrist/hand/finger occurring in 42.9% of respondents, the shoulder occurring in 25.8% of respondents and the lower back occurring in 24.6% of respondents (Holm & Rose, 2006).

In this same study, most of the injuries reported were those affecting soft tissues and included sprains (44.4% of respondents), tendonitis (35.3% of respondents) and strains (32.5% of respondents). Other injuries reported, in decreasing order of prevalence, were intervertebral disc injuries, neuropathies, tears of ligaments or tendons, dislocations and fractures. Majority of these injuries were as a result of cumulative trauma (54.8%) or an initial acute episode with subsequent flare-ups (23.4%) (Holm & Rose, 2006).

### 2.4.2 Causes of work-related injuries among chiropractors

As mentioned previously, the primary form of chiropractic treatment is manual therapies including both manipulative and non-manipulative therapies (World Health Organisation, 2005).

These manual therapies exhibit risk factors that were noted in previous studies and literature of a number of other healthcare professions. However, these risk factors have also been identified in chiropractic research. Risk factors such as maintaining prolonged positions (Holm & Rose, 2006) and maintaining prolonged awkward positions are both noted whilst performing both manipulative and non-manipulative therapies. These positions often culminated in a combination of repeated lifting, forward flexion, lateral
flexion and rotation (Ndetan, et al., 2009), forces which are known to put increased pressure on the spine and associated soft tissues (Daynard, et al., 2001).

Although manual therapies made up the bulk of daily activities, a number of other work-related activities were present and, sometimes, unavoidable. These activities were also indicated as causes of work-related musculoskeletal conditions and included positioning a patient for manipulation and lifting a patient off the table (Holm & Rose, 2006).

Patient handling, again made up a significant portion of the daily activities within the chiropractic profession. Patient handling was considered a combination of activities performed in order to accomplish a single task (Kim, et al., 2011). Similarly, two studies conducted amongst nurses and other hospital workers, found that lower back pain had a high lifetime prevalence affecting 74.0% of chiropractors but the exact mechanism for the development of lower back pain was not yet established. The only common risk factor appeared to be patient handling as noted in the above mentioned professions (Lome & Naqvi, 2013).

Therefore, not specific to any one task but rather identified in a combination of work activities, the activities identified as the greatest risk factors included lifting, bending, twisting, unpredictable environments, whole body repetitive movements, fast work pace, and high spinal loading forces (Kim, et al., 2011). All of these factors, either individually or combined, increased both compression and shearing forces on the spine and soft tissue structures (Daynard, et al., 2001) and thus lead to possible fatigue or failure related to injury.

2.5 Conclusion

Throughout this chapter, numerous healthcare professions were discussed in order to ascertain the prevalence, types and body regions most commonly affected by musculoskeletal work-related injuries. A number of risk factors were also identified so as to determine areas of overlap between different professions related to similar work-related activities.

As research into the topic of work-related injuries amongst chiropractors was limited to small, isolated studies; the results of studies conducted amongst these other healthcare
professions, was relied upon to identify similarities that may exist within the chiropractic profession.

Physically demanding work combined with psychological stresses were noted in many of the studies. These two factors have been noted in previous literature, to be significant factors in the development of any musculoskeletal disorder. Similarities were also drawn between work-related activities and the prevalence of injuries, as well as between the types of injuries and the body regions most commonly affected. All of this previous literature was beneficial when compared to the results obtained in this study.
CHAPTER 3
3 METHODOLOGY

3.1 Introduction

This chapter aims to explain, in full, the method in which this study was performed and provide details on the survey development, ethical considerations, data capturing and analysis.

3.2 Study Design

This study was a quantitative survey based study. The survey, in its entirety, focused on many aspects of work-related injuries of chiropractors in South Africa. However, only answers pertinent to the prevalence, types and body regions most commonly affected were utilised during this study.

3.3 Study Protocol

The survey was based on existing literature and designed with assistance from the University of Johannesburg’s Statistics Department (STATKON).

3.3.1 Participant recruitment

The survey was made available to all chiropractors registered with the Allied Health Professions Council of South Africa (AHPCSA). All registered chiropractors received an email inviting them to participate in this study. The email included an information letter (Appendix A) and a consent form (Appendix B). Those chiropractors who wished to take part in answering the survey could click on the link provided (http://take-survey.com/statkon/WorkRelatedInjuries.htm) in the email to access the online survey (Appendix C). The link was live from the 15th of September to the 19th of October 2016.

In order for the data collected from each survey to be used in this study, the necessary inclusion criteria of this study needed to be met by both the participant and the information they provided in completion of the survey.
3.3.2 Inclusion criteria

Each participant needed to comply with the following criteria in order to partake in this study:

1. Participants had to be currently practicing in South Africa and thus registered with the Allied Health Professions Council of South Africa.
2. Participants had to have access to the email from the Allied Health Professions Council of South Africa and therefore had to have internet access and valid email addresses.

3.3.3 Sample selection and size

Emails were distributed to the database of the Allied Health Professions Council of South Africa (AHPCSA) in order to ensure that the survey was made available to all registered chiropractors in South Africa. At the time that the email was first distributed, there were a total of 781 registered chiropractors with the AHPCSA. Of the 781 emails distributed; 28 emails were undelivered and 11 of the registered chiropractors did not have email addresses. This meant that a total of 742 emails were successfully delivered.

According to the sample size table (Krejcie & Morgan, 1970) provided by STATKON, a total of 250 responses was acceptable as this was considered a good representative of chiropractic community in South Africa as it covered 32.01% of all registered chiropractors.

The online survey was initially live for a two week period but during this time an insufficient number of responses were received. The survey was therefore distributed once more to the AHPCSA database. At that time, there were a total of 781 registered chiropractors with the AHPCSA. Of the 781 emails distributed; 37 emails were undelivered and 10 of the registered chiropractors did not have email addresses. This meant that a total of 734 emails were successfully delivered. At the end of the second two week period of the survey being live there were a total of 193 valid responses.

The number of successfully delivered emails differed from the time that the invitation email was first distributed to the second time that the invitation email was distributed. This
difference was due to a number of the practitioners who had contacted the AHPCSA to
notify them that they were either no longer practicing in South Africa or no longer
practicing at all. These responses were recorded as emails that were undelivered when
the second invitation email was distributed.

3.4 Preparation of Data Collection

Before the survey could be distributed, this study required approval from The Faculty
Higher Degrees Committee (number: HDC-01-37-2016) (Appendix D) and The Faculty
Academic Ethics Committee (ethics number: REC-01-102-2016) (Appendix E). Once this
study had received the necessary clearance the survey could be distributed to the
AHPCSA database.

3.4.1 Survey development

This survey (Appendix C) was designed based on previous literature of musculoskeletal
work-related injuries within the chiropractic profession as well as other healthcare
professions. A previous study, Work-Related Injuries of Doctors of Chiropractic in the
United States, formed the frame work that this study was based on. The two researchers
of this previous study were contacted in order to obtain the original survey that was used
during their study. However, both researchers no longer had access to the original survey
and questions were then extracted from their results (Holm & Rose, 2006).

These questions were then modified and further developed based on pertinent questions
of a similar research survey of study conducted in America amongst a different field within
the healthcare profession. The research, titled ‘Cause, Prevalence, and Response to
Occupational Musculoskeletal Injuries Reported by Physical Therapists and Physical
Therapist Assistants’ provided the survey that was used during this study (Holder, et al.,
1999).

Once the questions had been developed, STATKON was approached to assist with the
final design and coding for the survey. The survey was then emailed to the researcher in
order to test the survey. Any problems detected were then corrected and ensured that
the final survey was easy to understand and complete, answers were filtered correctly
through the survey and that the data was correctly saved.
3.4.2 Survey content

The survey (Appendix C) was divided into 4 sections: Section A, Section B, Section C and Section D. Section A covered demographic questions. Section B covered questions relevant to acute injuries. Section C covered questions relevant to repetitive strain injuries. Section D covered questions relevant to previous injuries that may have been aggravated by working as a chiropractor.

In each section, the participants were provided with multiple choice answers. In each question the participants were asked to select the option that was most applicable to them. In some questions multiple answers were accepted and the participants could select more than one option. If a participant found that none of the options were applicable to them, they could select the option of “other” and then specify their answer by typing it out in the box provided.

The survey did not take longer than 10 minutes to complete online. Once the participants had completed all the questions they would select the “submit” option at the end of the survey. The answers were then saved and could not be traced back to any one participant in order to ensure complete anonymity. Only data that was pertinent to this study was used in this dissertation.

3.5 Data Collection

Participants in this study consisted of 781 chiropractors registered with AHPCSA. There were a total of 193 valid responses that made up the sample group of this study.

Each participant received an email inviting them to take part in this study. The email included an information letter (Appendix A) outlining the purpose of the study and how the survey worked. If the participants wished to participate in this study they could click on the link provided in the email. The link would direct the participants to the website created by STATKON where the consent form (Appendix B) could be found and consent either given or declined. Once consent had been given, the participants could then begin the online survey (Appendix C).
An online survey is a familiar concept and thus was a user friendly method of collecting data for both the researcher and participants alike in this study. Interviewer bias was eliminated ensuring that the participants were in no way influenced by the interviewer and allowed participants to be more honest in their responses (Statpac Inc, 2014). For the researcher, advantages included: low costs, less time and more accurate results culminating in a fast and uncomplicated method of data collection (Smart Survey, 2016). Disadvantages included: a lower response rate than other methods of data collection and the researcher did not have control of who answers the survey (Statpac Inc, 2014). However, the advantages exceeded the disadvantages making it was a suitable design for this study.

3.6 Data Analysis

3.6.1 Statistical procedure

The results of the completed surveys were analysed by STATKON, the University of Johannesburg’s Statistics Department. Data analysis consisted of frequencies, descriptive statistics and custom tables. Frequencies described categorical data in order to determine the amount of times each specific answer was given. Descriptive statistics made use of mean, median, interquartile range, standard deviation, minimum and maximum to describe the continuous data. Finally, custom tables were used to describe the data collected from the questions where respondents may provide more than one answer if applicable.

The data was then placed into tables and graphs for visual interpretation. The analysis of the findings of this data can be found in chapter 4.

3.7 Reliability and Validity

3.7.1 Validity

Validity ensures that the results obtained in a study meet all of the requirements of the scientific research method (Shuttleworth, 2008). This survey focussed on work-related injuries of chiropractors in South Africa. More specifically the survey focussed on the
prevalence, types and body regions most commonly affected by these work-related injuries. There is limited information regarding work-related injuries of chiropractors globally as there have only been a limited number of isolated studies conducted worldwide. Therefore, previous studies done amongst the chiropractic profession as well as other healthcare professions were utilised during the survey development and design.

A. External validity

External validity refers the ability to generalize based on the results obtained in a specific study (Shuttleworth, 2008). The sample was formed by inviting all registered chiropractors in South Africa to partake in the survey. The sample is a representative of the population that were prepared to answer the survey. Therefore results will be according to the sample group’s experience in practice and cannot be generalized to the entire population of chiropractors in South Africa. The results can, however, generate some new information that could be added to limited research available on work-related injuries amongst chiropractors.

B. Content validity

Content validity falls under test validity which is an indicator of the amount of meaning that can be placed on a set of results. Content validity is the estimate of how much a measure represents every element of construct (Shuttleworth, 2008). Content validity was ensured in this study as the survey was designed and the questions developed based on previous literature and surveys from similar studies conducted both within the chiropractic profession and other healthcare professions. Once the questions had been developed, STATKON assisted with the final design and coding for the survey.

C. Face validity

Face validity is a measure of how representative a research study is at face value and whether it appears to be a good project (Shuttleworth, 2008). This was ensured as each participant received an email inviting them to take part in this study. The email included an information letter (Appendix A) outlining the purpose of the study and how the survey worked. If the participants wished to participate in this study they could click on the link provided in the email. The link would direct the participants to the website created by
STATKON where the consent form (Appendix B) could be found and consent either given or declined. Once consent had been given, the participants could then begin the online survey (Appendix C). Once the participants had completed all the questions they would select the “submit” option at the end of the survey. The answers were then saved and could not be traced back to any one participant in order to ensure complete anonymity. This is an essential aspect in getting participants to take part in this study and in order to maintain face validity.

3.8 Ethical Considerations

All participants received an email containing an information letter (Appendix A) as well as a consent form (Appendix B) specific to this study. The information letter outlined the steps taken to ensure anonymity and confidentiality of each participant. No personal details were recorded anywhere on the email or website and as a result, it was not possible for the researcher or anyone else to identify each participant’s responses once these had been submitted. Furthermore, the information letter stated that participation in this study was completely voluntary and that it was possible to stop completion of the survey at any stage. However, once the survey had been submitted their data could not be removed from the results due to the anonymity of the answers. The consent form provided two options to each participant, either the option to agree to give consent or the option to disagree to give consent. Only once the option to agree to give consent had been ticked would each participant be directed to an independent website to answer the survey (Appendix C). No personal details were required for completion of this process. However, due to anonymity, participants were not able to extract any data once submitted. Participants could gain access to the results of this study by contacting the researcher.

The anti-plagiarism software, Turnitin, was used to ensure that no plagiarism occurred in this thesis. This is proven by the Turnitin report (Appendix F).
CHAPTER 4
4 RESULTS

4.1 Introduction

This chapter will present the results of the prevalence of work-related injuries among chiropractors in South Africa, as well as the types of injuries and the regions of the body most commonly affected by said injuries.

Emails were distributed to the database of the Allied Health Professions Council of South Africa (AHPCSA) in order to ensure that the survey was made available to all registered chiropractors in South Africa. At the time that the email was first distributed, there were a total of 781 registered chiropractors with the AHPCSA. Of the 781 emails distributed; 28 emails were undelivered and 11 of the registered chiropractors did not have email addresses. This meant that a total of 742 emails were successfully delivered.

The online survey was initially live for a two week period but during this time an insufficient number of responses were received. At that time, there were a total of 781 registered chiropractors with the AHPCSA. Of the 781 emails distributed; 37 emails were undelivered and 10 of the registered chiropractors did not have email addresses. This meant that a total of 734 emails were successfully delivered. At the end of the second two week period of the survey being live there were a total of 193 valid responses which represents 24.71% of the registered chiropractors in South Africa. However, participants did not always answer every question, therefore the number of responses indicated by the (n) value, varies for each question.

4.2 Demographic Information of the Sample Population

The gender distribution was almost equally shared between males and females. Of the valid responses, 91 were from male participants (47.6%) and 100 were from female participants (52.4%).

The average age of participants was 37.18 years of age. The youngest participant was 24 years of age and the oldest participant was 81 years of age. This provided an age range of 57 years.
The average height of participants was 172.46 centimetres. The shortest participant was 147.00 centimetres tall. The tallest participant was 197.00 centimetres tall. This provided a range of 50.00 centimetres. The average weight of participants was 74.99 kilograms. The lightest participant was 45.00 kilograms and the heaviest participant was 114.00 kilograms. This provided a weight range of 69.00 kilograms.

The majority of participants had been in practice between 1 and 5 years, these participants made up 27.7% (53 responses) of the sample group. This category was closely followed by participants who had been in practice between 11 and 16 years as well as participants who had been in practice for longer than 16 years with each category making up 21.5% (41 responses) of the sample group. Participants who had been in practice between 6 and 10 years and participants who had been in practice for less than 1 year made up 15.2% (29 responses) and 14.1% (27 responses) of the sample group respectively.

The minimum number of patients seen in any given week was 0 patients and the maximum was 200 patients. This provided a range of 200 patients. The average number of patients each participant saw in any given week was 42.63 patients.

108 participants (57.1%) ran a family practice, 71 participants (37.6%) ran a practice without any special interest and 10 participants (5.3%) ran a practice with a special interest in paediatric cases.

Within each practice, participants made use of the following techniques: 164 participants (86.8%) practiced diversified technique, 10 participants (5.3%) practiced low force techniques, 5 participants (2.6%) practiced Gonstead technique, 4 participants (2.1%) practiced Thompson Technique, 4 participants (2.1%) practiced Sacro Occipital Technique and 2 participants (1.1%) practiced instrument assisted techniques.

4.3 Acute Injuries

Of the valid 192 responses, 50.5% of the sample (97 participants) reported that they had sustained an acute injury as a direct result of their work as a chiropractor. These participants made up the sample group for the rest of the questions in this section (n=97).
The other 49.5% of the sample group (95 participants) who reported that they had not sustained such an injury were redirected to the following section at this point.

As seen in figure 4.1 below, a substantial majority of participants, 40.2% (37 participants), reported sustaining these acute work-related injuries between their first and fifth year of practice. This category was followed by participants who reported sustaining acute work-related injuries less than one year into practice and between the sixth and tenth years of practice accounting for 27.2% (25 participants) and 23.9% (22 participants) of the sample, respectively. Participants who sustained these injuries between 11 and 16 years and after 16 years made up the minority accounting for 5.4% (5 participants) and 3.3% (3 participants), respectively.

The body regions most commonly affected were the wrist and hand, lower back and the shoulder. The wrist and hand was affected in 57 participants, the lower back in 47 participants and the shoulder in 38 participants. The neck was affected in 27 participants, the thoracic spine in 21 participants, the chest and ribs in 7 participants and the elbow in 6 participants. The body regions least commonly affected were those of the lower limb, namely the hip, the knee and the ankle and foot. Acute injuries were only reported by 3 participants at each of these regions. These results are depicted in figure 4.2. Two participants reported that other body regions, not listed in the multiple choice list, were affected by acute injuries. These body regions were the ribs and the groin.

Figure 4.1: Pie chart indicating the years of practice during which acute work-related injuries were sustained (n=92)
The types of acute work-related injuries are depicted in figure 4.3 and most commonly reported were muscle strains, reported by 69 participants. This was followed by tendinopathies, ligament sprains and subluxations reported by 38 participants, 34 participants and 31 participants, respectively. The less common types of acute work-related injuries reported were injuries involving the intervertebral disc (14 participants), neuropathies (6 participants) and synovitis (6 participants). Fractures and dislocations were, each, only reported by 1 participant. 7 participants reported that other types of injuries, not listed in the multiple choice list, were sustained. 2 participants reported ganglion cyst formation, the other types of injuries reported were bruising, a burst vein, dequervain’s tenosynovitis, facet joint dysfunction and a labral tear.
Participants reported a wide variety of activities that were the cause of their acute work-related injuries sustained as noted in figure 4.4 on the following page. The most common activity performed at the time of sustaining an acute work-related injury was performing an adjustment, reported by 61 participants. The second most common activity responsible for these injuries was performing repetitive tasks, reported by 53 participants. Other activities commonly responsible for these injuries were positioning a patient (28 participants), bending or twisting (27 participants), maintaining a prolonged position (25 participants) and working when physically fatigued (25 participants). Activities reported by fewer participants included lifting, applying modalities and slipping, tripping or falling each reported by 11 participants, 5 participants and 2 participants, respectively. Two participants reported that other activities, not listed in the multiple choice list, were responsible for them sustaining acute work-related injuries. These activities were ischaemic compression and soft tissue release.
Figure 4.4: Bar chart indicating the activities responsible for the acute work-related injuries (n=93)

As depicted in figure 4.5, of those participants who reported having sustained an acute work-related injury, 21.5% (20 participants) reported not having adapted the way in which they practice. In comparison, a greater majority of the sample, 66.7% (62 participants), reported having adapted their practice techniques.

4 participants (4.3%) decreased the average number of patients they saw per week and 3 participants (3.2%) took time off. 4 participants reported other ways in which they altered the way in which they practiced not listed in the multiple choice list. These alterations included seeking rehabilitation and strengthening to adapt to work requirements, altering their chiropractic table, perfecting technique and setup and, lastly, self-strapping to limit movement.
4.4 Repetitive Strain Injuries

There was a minor unforeseeable error with the filters of the programme used at this point of the online survey. If participants selected “no” as their answer to the first question of Section B, related to the occurrence of acute injuries, they were supposed to be redirected to the first question of Section C related to the occurrence of repetitive strain injuries. However, the programme redirected participants to the second question of Section C related to the body region affected by repetitive strain injuries. This meant that these participants, firstly, did not see the first question of Section C ultimately decreasing the sample size of this question dramatically, and secondly, there is uncertainty if they answered the second question of Section C with regards to acute injuries or repetitive strain injuries. The data analysis of these two questions is included below, however, it should be noted that this data may be skewed and not be a true reflection of the sample group of this study.

Repetitive strain injuries were reported by 90 participants (n=120) accounting for 75.0% of the valid responses. The other 30 participants who reported that they had not sustained such an injury were redirected to the following section at this point.

The body region reported to be most commonly affected by repetitive strain injuries was the wrist and hand, reported by 36 participants. Other more commonly affected areas
were the lower back (18 participants), shoulder (17 participants) and the thoracic spine (13 participants). The neck was reported by 8 participants, the elbow by 6 participants and chest or ribs by 2 participants. The only body region not reported to be affected by repetitive strain injuries was the knee. And those body regions less commonly reported to be affected by repetitive strain injuries were those of the lower limb, namely the hip or thigh and the ankle and foot region each only reported by one participant. These results are depicted in figure 4.6 below.

![Figure 4.6: Bar graph indicating the body regions affected by repetitive strain work-related injuries (n=59)](image)

Participants were requested to state the exact repetitive strain injury that they experienced, to which 81 participants responded. The recorded answers were analysed according to the body region most commonly affected and the type of injury reported. These results, depicted in figure 4.7 and figure 4.8 respectively, although similar to the data above are a more accurate representation of the sample group as no errors in the programme were experienced at this question.

The body region most commonly affected by repetitive strain injuries was the hand and wrist, reported by 43 participants. Other body regions more commonly affected were the lower back (18 participants), shoulder (14 participants) and the neck (8 participants). The body regions less commonly affected by repetitive strain injuries were the elbow (6 participants), thoracic spine (5 participants), chest or ribs (3 participants), knee
(participants) and the hip or thigh and ankle or foot which were each reported by 1 participant.

![Bar graph indicating the body regions affected by repetitive strain work related injuries](image)

**Figure 4.7: Bar graph indicating the body regions affected by repetitive strain work related injuries**

The two most common types of injuries reported were muscle strains (29 participants) and tendinopathies (26 participants). Other types of injuries reported were ligament sprains (9 participants), neuropathies (2 participants), fractures (1 participant) and intervertebral disc involvement (1 participant). 11 participants reported that other types of injuries, not listed in the multiple choice list, were sustained. These injuries included: ganglion cyst formation, osteoarthritis, costochondritis, instability, degenerative joint disease, inflammation, facet joint syndrome, carpal tunnel syndrome, capsulitis, headaches and spondylosis.
Of the participants who had sustained repetitive strain injuries, 78.4% (69 participants) reported that these injuries had been aggravated by their work as a chiropractor. This is depicted in figure 4.9 below.

The majority of participants, 60 participants (53.6%), had adapted the way in which they practice. 5 participants (4.5%) decreased the number of patients they saw per week and 1 participant (0.9%) reported having taken time off. These results are depicted in figure 4.10 on the following page. 6 participants (5.4%) reported other ways in which they altered
the way in which they practiced not listed in the multiple choice list. These alterations included attending treatment for their injury, increasing the use of modalities, avoiding techniques known to aggravate the injury, increasing personal training to improve fitness levels, self-strapping to increase stability and support and minimising bending.

Figure 4.10: Pie chart indicating the ways participants altered the way in which they practice (n=112)

4.5 Previous Injuries

Section D of the survey addressed musculoskeletal injuries sustained by participants as a result of any other cause other than their work as a chiropractor. 64.5% of the sample group (118 participants) reported that they had sustained such an injury, whereas 35.5% (65 participants) reported that they had not sustained such an injury as depicted in figure 4.11 on the following page.
The body region most commonly reported to have been affected by these previous injuries are depicted in figure 4.12 and include the lower back, reported by 50 participants. Other body regions commonly affected were the shoulder (30 participants), wrist and hand (29 participants) and the neck (22 participants). Other body regions affected were the knee (21 participants), thoracic spine and ankle or foot, each affected in 18 participants. The body regions that were reported the least to be affected by these injuries were the chest and ribs, and the elbow. The chest and ribs were affected in 9 participants and the elbow was affected in 6 participants. 4 participants reported that other body regions, not listed in the multiple choice list, were affected by previous injuries. These body regions were the sacroiliac joint, calf and the skull and/or brain.
The two most common types of injuries reported were muscle strains and ligament sprains, reported by 67 and 41 participants respectively. Other injuries more commonly reported were tendinopathies, subluxations and injuries involving the intervertebral disc. Injuries less commonly reported were neuropathies, synovitis and dislocations. These results are depicted in figure 4.13 below. 8 participants reported other types of injuries including an anterior cruciate ligament rupture with associated meniscoid tear, concussion, labral tear, scoliosis and spondylolisthesis. 1 participant reported that they had previously been involved in a motor vehicle accident.
As noted in figure 4.14, of the participants who had sustained these types of injuries, 51.4% (57 participants) reported that these injuries had been aggravated by their work as a chiropractor and 48.6% (54 participants) reported that these injuries had been not been aggravated by their work as a chiropractor.

![Pie chart indicating previous injuries aggravated by work as a chiropractor](image)

**Figure 4.14: Pie chart indicating previous injuries aggravated by work as a chiropractor (n=111)**

More participants, 54 participants, reported having adapted the way in which they practice compared to the 48 participants who reported that they had no adapted the way in which they practice. 3 patients reported that they decreased the number of patients that they saw per week. 4 patients reported having taken time off. These results are depicted in figure 4.15 on the following page. 3 participants reported other ways in which they altered the way in which they practiced not listed in the multiple choice list. These alterations included undergoing surgeries and other forms of maintenance treatment as well as increasing personal exercise to improve fitness.
Figure 4.15: Pie chart indicating the ways participants altered the way in which they practice (n=112)
CHAPTER 5
5 DISCUSSION

5.1 Introduction

The findings of the results of Chapter 4 are discussed and explained throughout this chapter. The aim of this study was to determine, by means of a survey, the prevalence of work-related injuries among chiropractors in South Africa. Furthermore, this study looked to identify the types of injuries and the regions of the body most commonly affected by said injuries.

5.2 Demographic Information of the Sample Group

5.2.1 Gender distribution

There were 91 males (47.6%) and 100 females (52.4%) who took part in this survey. As participants were invited to take part in this survey by an invitation email, there was no way to control the distribution of gender of the participants. However, the near equal distribution of gender may suggest that work-related musculoskeletal injuries affect both genders equally.

Analysis of the cross correlation between gender and the development of work-related injuries falls outside of the aim of this study. Further analysis of the data obtained in this study should be performed.

5.2.2 Age distribution

A minimum of 6 years of tertiary education is required to qualify as a chiropractor in South Africa. Therefore, one can assume that the youngest age that a student could qualify is 24 years of age. It was noted in this study as the youngest participant was 24 years of age.

The Durban University of Technology (DUT) was the first institution to offer the chiropractic course from 1983. The University of Johannesburg was the second institution to offer the chiropractic course with the first class of students graduating in 1999 (Scott-Crossley, 2015). Therefore, participants younger than the age of 50 years were more
likely to have qualified in South Africa and those older than 50 years of age could have obtained their qualification at an international institution.

With regards to an association between age and sustaining a work-related injury, previous studies found no association (Holm & Rose, 2006). Analysis of the cross correlation of age and injuries sustained falls outside of the aim of this study. However, this does warrant further analysis of the data obtained during this study.

5.2.3 Height and weight of participants

The average height of participants was 172.46 centimetres and the average weight was 74.99 kilograms. Using these values the average body mass index (BMI) was calculated as 25.2 for the sample group.

Previous studies found no association between the height or weight of chiropractors and sustaining work-related injuries (Holm & Rose, 2006). However, further research and analysis should be conducted to determine whether a correlation between BMI and the prevalence of work-related injuries exists within the chiropractic profession of South Africa.

5.2.4 Years in practice

The largest category represented by the sample group were those participants who had been in practice between 1 and 5 years. This could indicate that participants in this category were most commonly affected by work-related injuries and one could hypothesise that this may be as a result of their inexperience.

An American study found that injuries were most commonly reported in the first 5 years of practice. This was attributed to new chiropractors using less than optimal biomechanics when performing manipulations. It was also noted that it was likely that new doctors have not learnt how to modify their techniques to reduce mechanical stress on their bodies (Holm & Rose, 2006).

However, further research and analysis would be required to verify that this was the case with the data obtained in this study.
5.2.5 Average number of patients seen per week

Majority of the sample group reported seeing between 0 and 50 patients with an average of 42.63 patients during any given week. A significant minority of the sample group reported seeing an average of 200 patients per week. The number of patients seen was most likely positively associated with the number of years in practice and injuries would most probably follow a similar trend as noted above.

In a study, that investigated the prevalence of musculoskeletal injuries among students attending a chiropractic college, a substantial, though not statistically significant, difference in the mean number of weekly thrusts performed was identified (Ndetan, et al., 2009). It could be hypothesized that those chiropractors who reported seeing more patients a week performed more manipulations than those who reported seeing less patients per week. The amount of repetitive thrusts performed may result in muscle fatigue and could contribute to the potential of sustaining injuries (Ndetan, et al., 2009).

5.2.6 Practice-related data

As only 10 participants reported that the focus of their practice was a special interest in paediatric patients, it could be hypothesised that chiropractors treating paediatric patients have a lower prevalence of work-related injuries. This may be due to the smaller size of patients and related decreased forces required during treatment techniques such as manipulations and mobilizations.

5.2.7 Technique most commonly used in practice

A significant majority of the sample group practiced diversified technique within their given practices. Both DUT and UJ teach diversified technique as the main technique of their curriculums. This was most likely the reason that 86.8% of participants practiced diversified technique. This was similar to the 88.2% of American chiropractors who practiced diversified technique in a similar study. In this American study, it was noted that chiropractors reported using diversified technique most commonly when injuries were sustained (Holm & Rose, 2006).
It may be hypothesised that chiropractors who practiced diversified technique developed more work-related injuries than those who practiced any other technique. In addition, the prevalence of chiropractors making use of diversified technique could have skewed the results. Once again, further research and analysis would need to be carried out to clarify any associations between techniques used and injuries sustained.

5.3 Prevalence of Work-Related Injuries

5.3.1 Acute injuries

The percentage of the sample group that reported having sustained an acute work-related injury as a direct result of their work as a chiropractor was 50.5% (97 participants). This was compared to the 49.5% (95 participants) of the sample group that reported not having sustained such an injury.

A limited number of isolated studies have been conducted amongst various chiropractic populations. Although these studies do not differentiate between acute, repetitive strain and previous injuries, the results of these studies are still significant. Similar results were seen in a study conducted within the United States which found that 57.0% of participants reported sustaining work-related injuries (Rupert & Ebete, 2004). In another study conducted throughout the United States, 40.1% of respondents reported sustaining work-related injuries (Holm & Rose, 2006). The variation in percentage noted could be due to the larger sample group (397 participants) compared to the 193 participants that formed the sample group of this study. The larger the sample group, the smaller the possibility of a sampling error (Krejcie & Morgan, 1970).

Majority of the sample group, 40.2% (37 participants), reported sustaining these acute work-related injuries between their first and fifth year of practice. This could correlate to the fact that the majority of participants, 27.7% (53 participants), had been in practice between 1 and 5 years. This result was echoed in Holm and Rose’s research. This suggests that recent graduates use less than optimal biomechanics when adjusting and are still in the process of modifying their techniques to reduce biomechanical stresses associated with performing manipulations (Holm & Rose, 2006).
5.3.2 Repetitive strain injuries

The percentage of the sample group that reported having sustained repetitive strain injuries was 75.0% (90 participants). Due to the unforeseen error of the programme that affected the filters at this stage of the survey, the data analysis related to the prevalence of repetitive strain work-related injuries may not be a true reflection of the sample group. A more accurate reflection may be noted from the 42.0% (81 participants) of the sample group that recorded the exact repetitive strain injury that they had sustained.

Not many previous studies differentiated between acute injuries and repetitive strain injuries. In one study, cumulative trauma injuries were most commonly reported amongst chiropractors. However, it should be noted that the sample group of this study consisted of chiropractors who had been in practice for at least 15 years (Rupert & Ebete, 2004).

In another, Australian study, specific reference is made to the prevalence of acute injuries and repetitive strain injuries with, a combined, 55.0% or participants reporting that they had sustained such injuries (West & Gardner, 2001). The higher prevalence in this study may be due to it being conducted amongst physiotherapists and not chiropractors.

These injuries result from repetitive and high-velocity forces that have physical consequences on the soft tissue structures over time (Holm & Rose, 2006). The lower prevalence amongst South African chiropractors may be due to 41.8% (80 participants) of the sample group being in practice for less than 1 year or between 1 and 5 years. This could be significant as repetitive strain injuries develop over a longer period of time.

5.3.3 Previous injuries

The percentage of participants who reported sustaining a musculoskeletal injury as a result of any other cause other than their work as a chiropractor was 64.5% (118 participants). Of these participants, 51.4% (57 participants) reported that their work as a chiropractor had aggravated these injuries. This result was similar to an Australian research study that reported 45.0% of participants acknowledging that their work had aggravated a previously sustained injury (West & Gardner, 2001).
5.4 Body Regions Affected

The body regions most commonly affected by acute injuries were the wrist and hand (57 participants), lower back (47 participants) and the shoulder (38 participants). The body regions most commonly affected by repetitive strain injuries were the wrist and hand (36 participants), lower back (18 participants) and the shoulder (17 participants). The body regions most commonly affected by previous injuries were the lower back (50 participants), the shoulder (30 participants) and the wrist and hand (29 participants). This illustrates an obvious trend throughout all 3 categories of injuries.

Holm and Rose’s study noted that injuries to the wrist, hand and fingers were most commonly reported. These body regions were followed by the shoulder and lower back (Holm & Rose, 2006). These body regions were again, seen to be the most affected in another study conducted throughout the United States (Rupert & Ebete, 2004) and one conducted in New York (Homack, 2005).

Previous studies found that repetitive forceful work was indicated as the cause of the development of musculoskeletal work-related injuries of the wrists and hands. This combined with the wrists being in flexion/extension or ulnar/radial deviation, as noted during manipulative techniques, is linked to the cause of these injuries at the wrist and hand (Holm & Rose, 2006).

Delivering side-posture manipulations to patients has, previously, been noted as a significant cause of lower back and shoulder injuries. These side-posture manipulations require the chiropractor to be flexed and rotated at the trunk repetitively and for prolonged periods of time (Holm & Rose, 2006). Both have been identified as risk factors for the development of musculoskeletal work-related injuries (Punnet & Wegman, 2004). Repetition and prolonged postures were also noted at the shoulder during side-posture manipulations that result in muscular fatigue around the shoulder joint (Holm & Rose, 2006). With sufficient amounts of force, muscular fatigue would ultimately lead to failure and thus musculoskeletal injury (Buckle & Devereux, 2002).

The above mentioned work activities could be noted as direct causes of both acute and repetitive strain injuries affecting the wrist and hand, lower back and shoulder. However, there can be no link made between these work-activities and previous injuries as a result
of any other cause other than their work as a chiropractor. Therefore, there needs to be another cause for the similar prevalence of the body regions affected. Although not responsible, these work activities may be the aggravating factor to previous injuries affecting the wrist and hand, lower back and the shoulder. This could cause chiropractors to be more aware of previous injuries to these body regions in comparison to previous injuries affecting other body regions less commonly affected by work activities of chiropractors.

5.5 Types of Injuries

The most common types of acute work-related injuries were muscle strains (69 participants), tendinopathies (38 participants) and ligament sprains (34 participants). The most common types of repetitive strain injuries affected the muscles, tendons and ligaments. The most common types of previous injuries as a result of any other cause other than work as a chiropractor were muscle strains (67 participants), ligament sprains (41 participants) and tendinopathies (30 participants). This indicates that the majority of injuries, in all categories, affect the soft tissues.

This trend could be noted in other chiropractic studies. Similar findings were noted by Holm and Rose as well as Homack. The trend could also be noted amongst other health care professionals such as physical therapists (Holder, et al., 1999) and physiotherapists (Anderson & Oakman, 2016).

5.6 Consolidation of Discussion

The response rate of the survey was 24.7%. This represents just less than one quarter of the chiropractic community of South Africa. Although this is a lower response rate than noted in similar studies, it has been previously noted that surveys of physicians have higher validity than that of the general public (Young, 2005).

Although not always categorised the same, the prevalence of musculoskeletal work-related injuries were comparable to results noted in similar studies of the chiropractic profession worldwide. It is also notable that these results were comparable to results obtained from similar studies among other manual therapists such as physical therapists and even other healthcare professionals such as nurses.
Across all healthcare professions, 2 primary factors have been identified as significant contributors to the development of musculoskeletal work-related injuries. Physically demanding work and a range of psychosocial hazards have been identified as these risk factors (Anderson & Oakman, 2016). The physicality of chiropractic work activities such as performing a manipulation, performing repetitive tasks, positioning a patient or maintaining a prolonged position were noted as the most common causes of the development of acute work-related injuries. This again mirrored the findings of similar studies conducted across multiple healthcare professions relating physically demanding activities to the tissue fatigue or failure associated with injury (Buckle & Devereux, 2002). A significant amount of work-related injuries were attributed to working when physically fatigued; this cause encompasses both the physicality as well as the psychosocial nature of the work activities of chiropractors here in South Africa.

This study identified the wrist and hand, lower back and the shoulder to be the 3 most commonly affected body regions. These results, once again, mirrored the findings across multiple healthcare professions on a global scale. This was previously attributed to muscle contraction, repetitive motion and joint position (Aptel, Aublet-Cuvelier, Cnockaert, 2002). These 3 factors are noted at all 3 of these body regions during a number of work activities of chiropractors, but predominantly while performing a manipulation.

Musculoskeletal work-related injuries to the lower limb were far less prevalent across all 3 categories of injuries in this study. This holds true that upper extremity conditions were more commonly seen in manual intensive occupations (Punnet & Wegman, 2004).

In conclusion, the results of this study related to the prevalence of work-related injuries, the body regions most commonly affected and the types of injuries was found to be comparable to a number of similar studies conducted among chiropractic communities worldwide. As these studies were limited to a few isolated studies, similar studies among other healthcare professionals were also compared. Similarities in these other healthcare professions were identified with the chiropractic profession and the results were, once again, comparable.
CHAPTER 6
6 CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

There was a significant prevalence of work-related injuries amongst chiropractors in South Africa. 50.3% of the sample group reported sustaining acute work-related injuries as a direct result of their work as a chiropractor and 42.0% of the sample group reported sustaining repetitive strain injuries as a direct result of their work as a chiropractor.

Although not directly related to work as a chiropractor, 64.5% of the sample group reported sustaining a previous injury as a result of any other cause. More significantly, 51.4% of these previous injuries were aggravated by activities related to work as a chiropractor.

In addition to the prevalence of work-related injuries, this study aimed to identify the body regions most commonly affected by these work-related injuries. Three body regions were significantly prevalent amongst acute injuries, repetitive strain injuries and previous injuries. These body regions were the wrist and hand, lower back and the shoulder. The body regions least commonly affected were those of the lower limb.

Lastly, identifying the specific types of work-related injuries was also an aim of this study. Majority of all injuries reported, across all 3 categories, affected soft tissue structures. The structures specifically affected were the muscles in the form of muscle strains, tendons in the form of tendinopathies and ligaments in the form ligament sprains. All of these injuries were related to fatigue and ultimate failure of the mentioned relative soft tissue structures.

6.2 Recommendations

The following recommendations are made pertaining to future research:

1. Increase the survey response rate. This could be achieved with a smaller sample size being selected allowing participants to be contacted by phone call or setting up interviews with each participant. Emails are commonly ignored or overlooked. Phone calls or scheduled interviews increase the potential of
participants taking part in the study and ensures participants answer all the questions providing a stable sample group throughout the study. Anonymity could still be insured, by asking no personal information.

2. Increasing the survey response rate, could also be achieved by offering incentives such as Continuous Professional Development (CPD) points could be offered to those chiropractors willing to take part in the study.

3. Further analysis of the data collected from this study could be done to identify any possible correlations between the demographic information, e.g. gender and age, and the prevalence of work-related injuries as well as the types and body regions most commonly affected.

4. A similar study could be conducted amongst chiropractic students and the results compared to the results of this study.
REFERENCES


Available at: http://www.bls.gov/news.release/pdf/osh2.pdf
[Accessed 22 May 2016].

[Accessed 30 September 2016].


APPENDIX A

DEPARTMENT OF CHIROPRACTIC
FACULTY OF HEALTH SCIENCES

INFORMATION LETTER

Good Day,

My name is Sarah Carless. I WOULD LIKE TO INVITE YOU TO PARTICIPATE in a research study on “Work-Related Injuries of Chiropractors in South Africa”.

Before you decide on whether to participate, I would like to explain to you why the research is being done and what it will involve for you. If you have any questions about the survey, feel free to email or call me. This explanation should take about 10 to 20 minutes. The study is part of a research project being completed as a requirement for a Master's Degree in Chiropractic through the University of Johannesburg.

THE PURPOSE OF THIS STUDY is to determine the prevalence of work-related injuries among chiropractors in South Africa as well as identify the types of injuries and the regions of the body most commonly affected by said injuries.

Below, I have compiled a set of questions and answers that I believe will assist you in understanding the relevant details of participation in this research study. Please read through these. If you have any further questions I will be happy to answer them for you.

DO I HAVE TO TAKE PART? No, you don’t have to. It is up to you to decide to participate in the survey. The details of the survey will be described in this information sheet. If you agree to take part, I will then ask you to give consent by clicking on the box provided on the consent form.

WHAT EXACTLY WILL I BE EXPECTED TO DO IF I AGREE TO PARTICIPATE? Once consent has been given, you will be directed to the online survey via the link provided. The survey consists of 26 questions all of which are either short questions or multiple choice. You will be required to answer the questions of the survey as honestly as possible.
WHAT WILL HAPPEN IF I WANT TO WITHDRAW FROM THE STUDY? If you decide to participate, you are free to withdraw your consent at any time without giving a reason and without any consequences. If you wish to withdraw your consent, you may withdraw before submission of answers, by exiting the webpage. Although, once answers has been submitted at the end of the survey, the answers cannot be withdrawn.

IF I CHOOSE TO PARTICIPATE, WILL THERE BE ANY EXPENSES FOR ME, OR PAYMENT DUE TO ME: You will not be paid to participate in the study and there will be no expenses asked of you.

RISKS INVOLVED IN PARTICIPATION: There are no anticipated risks involved in completing this survey.

BENEFITS INVOLVED IN PARTICIPATION: The data collected in the survey could determine the prevalence and types of work-related injuries of chiropractors and serve as a platform for further research in this field.

WILL MY TAKING PART IN THIS STUDY BE ANONYMOUS? Yes. Anonymous means that your personal details will not be recorded anywhere on the email or website. As a result, it will not be possible for me or anyone else to identify your responses once these have been submitted.

WHAT WILL HAPPEN TO THE RESULTS OF THE RESEARCH STUDY? The results will be written into a research report that will be assessed. In some cases, results may also be published in a scientific journal. In either case, you will not be identifiable in any documents, reports or publications. You will be given access to the study results if you would like to see them, by contacting me.

WHO IS ORGANISING AND FUNDING THE STUDY? The study is being organised by me, under the guidance of my research supervisor at the Department of Chiropractic in the University of Johannesburg. The University of Johannesburg has provided a supervisor linked bursary to assist in funding the research study.

WHO HAS REVIEWED AND APPROVED THIS STUDY? Before this study was allowed to start, it was reviewed in order to protect your interests. This review was done first by the Department of Chiropractic, and then secondly by the Faculty of Health Sciences Research Ethics Committee at the University of Johannesburg. In both cases, the study was approved.

WHAT IF THERE IS A PROBLEM? If you have any concerns or complaints about this research study, its procedures or risks and benefits, you should ask me. You should contact me at any time if you feel you have any concerns about being a part of this study. My contact details are:

Sarah Carless
072 418 8842
Email: sd.carless@gmail.com

You may also contact my research supervisor:
Dr. Chris Yelverton
Email: chrisy@uj.ac.za
If you feel that any questions or complaints regarding your participation in this study have not been dealt with adequately, you may contact the Chairperson of the Faculty of Health Sciences Research Ethics Committee at the University of Johannesburg:

Prof. Marie Poggenpoel  
Tel: 011 559-6686  
Email: mariep@uj.ac.za

**FURTHER INFORMATION AND CONTACT DETAILS:** Should you wish to have more specific information about this research project information, have any questions, concerns or complaints about this research study, its procedures, risks and benefits, you should communicate with me using any of the contact details given above.

Researcher:  
Sarah Carless

CLICK HERE TO PROCEED TO CONSENT AND SURVEY
A Survey of Work-Related Injuries of Chiropractors in South Africa

Please click in each box below and mark it with an x:

☐ I confirm that I have read and understand the information letter dated (date) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

☐ I understand that my participation is voluntary and that I am free to withdraw from this study at any time without giving any reason and without any consequences to me.

☐ I agree to take part in the above study.
DEPARTMENT OF CHIROPRACTIC

Survey on Work-Related Injuries of Chiropractors in South Africa

Thank you for taking the time to complete this survey. Please answer the questions as honestly as possible. Please note that all answers are completely anonymous and cannot be traced back to you.

Section A: Demographics

1. What is your gender?

1 Male
2 Female

2. What is your age?


3. What is your height in centimeters?


4. What is your weight in kilograms?


5. How many years have you been in practice?

1 Less than 1 year
2 1-5 years
3 6-10 years
4 11-16 years
5 More than 16 years
6. What is the average number of patients you see in any given week?  

7. Do you have a special interest as the focus of your practice? Please select only one block.  

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8. What technique do you mostly utilize within your practice? Please select only one block.  

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**Section B: Acute injuries as a direct result of your work as a chiropractor**

9. Have you sustained any acute musculoskeletal injuries as a direct result of your work as a chiropractor?  

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10. During what year of practice was your injury sustained?  

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<td>6-10 years</td>
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<tr>
<td>4</td>
<td>11-16 years</td>
</tr>
<tr>
<td>5</td>
<td>More than 16 years</td>
</tr>
</tbody>
</table>
11. What body region(s) was (were) affected? You may select more than one block if applicable.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>0. No</th>
<th>1. Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1</td>
<td>Neck</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.2</td>
<td>Thoracic spine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.3</td>
<td>Lower back</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.4</td>
<td>Chest or ribs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.5</td>
<td>Shoulder</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.6</td>
<td>Elbow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.7</td>
<td>Wrist and hand</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.8</td>
<td>Hip or thigh</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.9</td>
<td>Knee</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.10</td>
<td>Ankle and foot</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.11</td>
<td>Other</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

12. What type of injury did you sustain? You may select more than one block if applicable.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>0. No</th>
<th>1. Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1</td>
<td>Fracture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.2</td>
<td>Dislocation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.3</td>
<td>Subluxation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.4</td>
<td>Muscle strain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.5</td>
<td>Tendinopathy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.6</td>
<td>Ligament sprain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.7</td>
<td>Synovitis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.8</td>
<td>Neuropathy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.9</td>
<td>Intervertebral Disc Involvement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.10</td>
<td>Other</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
13. What activity were you doing when you sustained your injury? You may select more than one block if applicable.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>0. No</th>
<th>1. Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.1</td>
<td>Performing an adjustment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.2</td>
<td>Positioning a patient</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.3</td>
<td>Applying modalities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.4</td>
<td>Bending or twisting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.5</td>
<td>Lifting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.6</td>
<td>Maintaining a prolonged position</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.7</td>
<td>Performing repetitive tasks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.8</td>
<td>Slipping, tripping or falling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.9</td>
<td>Working when physically fatigued</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.10</td>
<td>Other</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

14. How have you altered the way in which you practice as a result? Please only select only one block.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>I have not adapted the way in which I practice</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Adapted practice techniques</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Decreased the number of patients I see per week</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>I have taken time off</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>I have stopped practicing</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>

Section C: Repetitive strain injuries as a result of your work as a chiropractor

15. Have you sustained a repetitive strain injury as a result of your work as a chiropractor?

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No</td>
</tr>
<tr>
<td>1</td>
<td>Yes</td>
</tr>
</tbody>
</table>
16. What body regions(s) was (were) affected? You may select more than one block if applicable.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>0. No</th>
<th>1. Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>16.1</td>
<td>Neck</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.2</td>
<td>Thoracic spine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.3</td>
<td>Lower back</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.4</td>
<td>Chest or ribs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.5</td>
<td>Shoulder</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.6</td>
<td>Elbow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.7</td>
<td>Wrist and hand</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.8</td>
<td>Hip or thigh</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.9</td>
<td>Knee</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.10</td>
<td>Ankle and foot</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.11</td>
<td>Other</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

17. Please state the exact repetitive strain injury that you sustained: _________

18. Since your injury, have your symptoms been aggravated by your work as a chiropractor?

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>0. No</th>
<th>1. Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

19. If yes, what activities do you find aggravate your injury? You may select more than one block if applicable.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>0. No</th>
<th>1. Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>19.1</td>
<td>Performing an adjustment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19.2</td>
<td>Positioning a patient</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19.3</td>
<td>Applying modalities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19.4</td>
<td>Bending or twisting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19.5</td>
<td>Lifting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19.6</td>
<td>Maintaining a prolonged position</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19.7</td>
<td>Performing repetitive tasks</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
20. Have you altered the way in which you practice as a result?

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>I have not adapted the way in which I practice</td>
</tr>
<tr>
<td>1</td>
<td>Adapted practice techniques</td>
</tr>
<tr>
<td>2</td>
<td>Decreased the number of patients I see per week</td>
</tr>
<tr>
<td>3</td>
<td>I have taken time off</td>
</tr>
<tr>
<td>4</td>
<td>I have stopped practicing</td>
</tr>
<tr>
<td>5</td>
<td>Other</td>
</tr>
</tbody>
</table>

Section D: Previous injuries aggravated by your work as a chiropractor

21. Have you sustained any musculoskeletal injuries as a result of any other cause than your work as a chiropractor?

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No</td>
</tr>
<tr>
<td>1</td>
<td>Yes</td>
</tr>
</tbody>
</table>

22. How many years ago was your injury sustained?

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

23. What body region(s) was (were) affected? You may select more than one block if applicable.

<table>
<thead>
<tr>
<th></th>
<th>0. No</th>
<th>1. Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>22.1</td>
<td>Neck</td>
<td></td>
</tr>
<tr>
<td>22.2</td>
<td>Thoracic spine</td>
<td></td>
</tr>
<tr>
<td>22.3</td>
<td>Lower back</td>
<td></td>
</tr>
<tr>
<td>22.4</td>
<td>Chest or ribs</td>
<td></td>
</tr>
<tr>
<td>22.5</td>
<td>Shoulder</td>
<td></td>
</tr>
<tr>
<td>22.6</td>
<td>Elbow</td>
<td></td>
</tr>
<tr>
<td>22.7</td>
<td>Wrist and hand</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>22.8</td>
<td>Hip or thigh</td>
<td></td>
</tr>
<tr>
<td>22.9</td>
<td>Knee</td>
<td></td>
</tr>
<tr>
<td>22.10</td>
<td>Ankle and foot</td>
<td></td>
</tr>
<tr>
<td>22.11</td>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>

24. What type of injury did you sustain? You may select more than one block if applicable.

<table>
<thead>
<tr>
<th></th>
<th>0. No</th>
<th>1. Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>23.1</td>
<td>Fracture</td>
<td></td>
</tr>
<tr>
<td>23.2</td>
<td>Dislocation</td>
<td></td>
</tr>
<tr>
<td>23.3</td>
<td>Subluxation</td>
<td></td>
</tr>
<tr>
<td>23.4</td>
<td>Muscle strain</td>
<td></td>
</tr>
<tr>
<td>23.5</td>
<td>Tendinopathy</td>
<td></td>
</tr>
<tr>
<td>23.6</td>
<td>Ligament sprain</td>
<td></td>
</tr>
<tr>
<td>23.7</td>
<td>Synovitis</td>
<td></td>
</tr>
<tr>
<td>23.8</td>
<td>Neuropathy</td>
<td></td>
</tr>
<tr>
<td>23.9</td>
<td>Intervertebral Disc Involvement</td>
<td></td>
</tr>
<tr>
<td>23.10</td>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>

25. Since your injury, have your symptoms been aggravated by your work as a chiropractor?

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No</td>
</tr>
<tr>
<td>1</td>
<td>Yes</td>
</tr>
</tbody>
</table>

26. Have you altered the way in which you practice as a result?

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>I have not adapted the way in which I practice</td>
</tr>
<tr>
<td>1</td>
<td>Adapted practice techniques</td>
</tr>
<tr>
<td>2</td>
<td>Decreased the number of patients I see per week</td>
</tr>
<tr>
<td>3</td>
<td>I have taken time off</td>
</tr>
<tr>
<td>4</td>
<td>I have stopped practicing</td>
</tr>
<tr>
<td>5</td>
<td>Other</td>
</tr>
</tbody>
</table>
If you have completed above information for work-related injuries of chiropractors in South Africa, click here. Thank you for participating in the survey.
APPENDIX D

FACULTY OF HEALTH SCIENCES
HIGHER DEGREES COMMITTEE

HDC-01-37- 2016
26 July 2016

TO WHOM IT MAY CONCERN:

STUDENT: CARLESS, SD
STUDENT NUMBER: 201070424

TITLE OF RESEARCH PROJECT: A Survey of Work-Related Injuries of Chiropractors in South Africa

DEPARTMENT OR PROGRAMME: CHIROPRACTIC
SUPERVISOR: Dr C Yelverton CO-SUPERVISOR: Dr C Hay

The Faculty Higher Degrees Committee has scrutinised your research proposal and concluded that it complies with the approved research standards of the Faculty of Health Sciences; University of Johannesburg.

The HDC would like to extend their best wishes to you with your postgraduate studies

Yours sincerely,

Prof B Shaw
Chair: Faculty of Health Sciences HDC
Tel: 011 559 6891
Email: brandons@uj.ac.za

APPENDIX E
FACULTY OF HEALTH SCIENCES

RESEARCH ETHICS COMMITTEE
NHREC Registration no: REC-241112-035

REC-01-102- 2016
26 July 2016

TO WHOM IT MAY CONCERN:

STUDENT: CARLESS, SD
STUDENT NUMBER: 201070424

TITLE OF RESEARCH PROJECT: A Survey of Work- Related Injuries of Chiropractors in South Africa

DEPARTMENT OR PROGRAMME: CHIROPRACTIC

SUPERVISOR: Dr C Yelverton CO-SUPERVISOR: - Dr C Hay

The Faculty Academic Ethics Committee has scrutinised your research proposal and confirm that it complies with the approved ethical standards of the Faculty of Health Sciences; University of Johannesburg.

The REC would like to extend their best wishes to you with your postgraduate studies.

Yours sincerely,

Prof M Poggenpoel
Chair : Faculty of Health Sciences REC
Tel: 011 559 6689
Email: mariep@uj.ac.za