An investigation of attitudes and underlying beliefs toward low back pain among osteopathy students using the Back Pain Attitudes Questionnaire (Back-PAQ)

Hester Hilbink

Abstract

An investigation of attitudes and underlying beliefs toward low back pain among osteopathy students using the Back Pain Attitudes Questionnaire

Background: Chronic low back pain (LBP) is considered one of the most disabling health conditions worldwide. There is overwhelming evidence that psychosocial factors are important risk factors in the development and maintenance of chronic LBP. It appears that healthcare practitioners’ attitudes and beliefs regarding LBP can significantly influence the views of their patients.

Aims: To identify common LBP attitudes and belief orientations of New Zealand osteopathy students. The secondary aim was to investigate psychometric properties of the tool, the Back Pain Attitudes Questionnaire (Back-PAQ) which has had limited prior testing.

Methods: An online cross-sectional survey was conducted that included basic demographic information, the Health Care Providers’ Pain and Impairment Relationship Scale (HC-PAIRS) and the Back Pain Attitudes Questionnaire (Back-PAQ). Students marked on a Likert scale how strongly they agreed or disagreed with each item in the questionnaire. The convergent validity and internal consistency of the Back-PAQ was also evaluated against the HC-PAIRS.

In total 83 students participated in this study.

Results: The median Back-PAQ and HC-PAIRS scores for students across all year levels were 6.5 and 46.0 respectively. Median Back-PAQ scores for Year 1 and 2 students were 10.0 and for Year 4 and 5 students’ 17.0. Third year students’ scored 11. Scores for the HC-PAIRS for Year 1 and 2 students were 54.0, Year 3 students scored 50 and for Year 4 and 5 students were 35.0. The Back-PAQ had ‘good’ internal consistency (α= 0.88) and acceptable convergent validity (Pearson’s r = - 0.77, P value <0.001) when measured against the HC-PAIRS.

Conclusions: Overall, osteopathy students hold less than optimal attitudes and beliefs about the back, and back pain that are not in line with best practice guidelines. However, the study revealed promising results in that students in their final 2 years of study scored significantly more favourably than Year 1 and 2 students. The new tool Back-PAQ showed promising results for clinical application whereby good internal consistency and acceptable convergent validity were found.

Keywords: chronic low back pain, biopsychosocial factors, attitudes, beliefs, psychometric properties
Declaration

Name of candidate: Hester Hilbink

This research project entitled “An investigation of attitudes and underlying beliefs toward low back pain among osteopath students using the Back Pain Attitudes Questionnaire” is submitted in partial fulfillment for the requirements for the Unitec degree of Master of Osteopathy.

CANDIDATE’S DECLARATION

I confirm that:

- This Research Thesis represents my own work;
- The contribution of supervisors and others to this work was consistent with the Unitec Regulations and Policies.
- Research for this work has been conducted in accordance with the Unitec Research Ethics Committee Policy and Procedures, and has fulfilled any requirements set for this project by the Unitec Research Ethics Committee.

Research Ethics Committee Approval Number: 2015-1078

Candidate Signature: 

Date: 12 April 2018

Student number: 1400952
Acknowledgments
I would like to give sincere thanks to Megan McEwen, Dr Elizabeth Niven and Rob Moran who supervised the project and to all students who participated in this study. In addition, I would like to thank family and friends for their support.
Table of Contents

Abstract .......................................................................................................................................... ii
Declaration ...................................................................................................................................... iii
Acknowledgments .............................................................................................................................. v
Table of Contents ............................................................................................................................. vi
Abbreviations .................................................................................................................................... viii

SECTION 1: LITERATURE REVIEW .................................................................................................. 1

Introduction ....................................................................................................................................... 2

A brief history of ancient pain theories .............................................................................................. 3

Modern pain theories .......................................................................................................................... 5
  Specificity Theory ............................................................................................................................. 5
  The Gate Control Theory .................................................................................................................. 5
  The Biopsychosocial Model ............................................................................................................. 6
  The Neuromatrix Theory ................................................................................................................ 6
  Pain—stress—reactivity cycle ........................................................................................................... 7

Associated pain definitions and epidemiology .................................................................................. 7
  The definition of pain ........................................................................................................................ 7
  Chronic pain epidemiology ............................................................................................................. 8
  Low back pain definitions .............................................................................................................. 9
  Low back pain epidemiology .......................................................................................................... 9

Low back pain and associated disability ......................................................................................... 10

Efficacy of low back pain interventions .......................................................................................... 12
  The role of biomechanical dysfunction and low back pain .......................................................... 13

Reasons for continued treatment despite persistent pain .................................................................. 14

The role of an individual experiencing low back pain .................................................................... 15
  Low back pain beliefs .................................................................................................................... 15
  Psychosocial factors and pain ........................................................................................................ 16

Overview of instruments ................................................................................................................... 18
  Modified Healthcare Providers’ Pain and Impairment Relationship Scale (HC-PAIRS) ................. 18
  The Back Pain Attitudes Questionnaire (Back-PAQ) ................................................................ 19

The role of a health care practitioner ................................................................................................ 19
  Health care practitioners’ attitudes and beliefs on low back pain ................................................. 19

Current guidelines for the management of low back pain ................................................................. 21

Conclusion ......................................................................................................................................... 23

Reference .......................................................................................................................................... 24

SECTION 2: MANUSCRIPT ............................................................................................................ 40
Abstract .......................................................................................................................... 41

INTRODUCTION .............................................................................................................. 42

METHODS ......................................................................................................................... 43
  Design ............................................................................................................................... 43
  Participants ......................................................................................................................... 44
  Pilot testing of the survey ................................................................................................. 44
  Data collection procedures ............................................................................................ 44
  Instruments used in the study ......................................................................................... 44

DATA ANALYSIS .............................................................................................................. 47

RESULTS ............................................................................................................................ 47
  Back-PAQ Themes ........................................................................................................... 52
  Psychometric properties ................................................................................................. 54

DISCUSSION ...................................................................................................................... 54
  Comparison with other studies ....................................................................................... 55
  Gender ............................................................................................................................... 56
  Themes .............................................................................................................................. 56
  Internal consistency and convergent validity .................................................................. 57

Strengths and limitations ................................................................................................. 57

Further recommendations ............................................................................................... 58

Conclusion ........................................................................................................................ 58

References ......................................................................................................................... 59

SECTION 3: APPENDICES ............................................................................................... 63

Appendix 1. Student Questionnaire on Back Pain .............................................................. 64

Appendix 2. Questionnaire .............................................................................................. 65

Appendix 3. Ethics Approval ............................................................................................ 68
**Abbreviations**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>LBP</td>
<td>Low back pain</td>
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<tr>
<td>HCP</td>
<td>Healthcare practitioner</td>
</tr>
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<td>ACC</td>
<td>Accident Compensation Corporation</td>
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<tr>
<td>Back-PAQ</td>
<td>Back Pain Attitudes Questionnaire</td>
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<tr>
<td>HC-PAIRS</td>
<td>Healthcare Providers’ Pain and Impairment Relationship Scale</td>
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<tr>
<td>GP</td>
<td>General Practitioner</td>
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</tbody>
</table>
Section 1: Literature Review
Introduction

“Pain may be the warning signal that saves lives of some people, but it destroys the lives of countless others” (Melzack, 2001, p.1378).

The following literature review presents past and current theories of pain. Although the review will explore acute and chronic pain, it will concentrate on low back pain (LBP) in particular. The review discusses pain theory evolution, pain definitions, LBP pain epidemiology, past and present healthcare models and efficacy of treatment interventions.

Low back pain (LBP) is an extremely common condition in Western society causing significant personal, social and economic cost (Copeland, Taylor, & Dean, 2008). In New Zealand, the Accident Compensation Corporation (ACC) reported almost $280 million spent on low back claims alone in 2008 (ACC, 2008). Despite better understanding of pain physiology, the incidence rates of LBP and associated disability continue to rise exponentially (Waddell, 2004; Waddell, 1996; Darlow, 2013). In New Zealand, LBP is considered a leading cause of health loss (Swain & Johnson, 2014). Low back pain cases can be challenging as often no evidence of underlying tissue damage or pathology can be found to explain the basis of pain (Gatchel, Peng, Peters, Fuchs, & Turk, 2007). These cases of LBP are generally considered non-specific and benign, nevertheless, a significant proportion of individuals do not recover after 3 to 4 months experiencing chronic pain (Croft, Macfarlane, Gary, Papageorgiou, & Silman, 1999). Chronic pain is not only highly prevalent, costly, disabling and difficult to treat but also has strong associations with depression and anxiety (Swain & Johnson, 2014). It is also now widely accepted that psychosocial influences play an important role in the development and maintenance of non-specific chronic LBP (Adler, 2009; Darlow, Dowell, Baxter, & Perry, 2013). It has also been recognised that patients’ attitudes and beliefs about their back and back pain are important risk factors in the transition from acute to chronic pain (Demmelmaire, Asenlof, Lindberg, & Denison, 2009; Linton, Vlaeyen, & Ostelo, 2002; Pincus et al., 2007). Furthermore, healthcare practitioners (HCPs) hold a diverse range of beliefs and attitudes about LBP and subsequently influence patients’ attitudes and beliefs and recovery outcomes (Coudeyere et al., 2006; Houban et al., 2005; Poiraudeau et al., 2006). Research now suggests that the attitudes and beliefs of a HCP, as well as their clinical behaviour, are critical in facilitating patient recovery or reinforcing related disability (Darlow et al., 2013; Gatchel et al., 2007).
Individuals with LBP often seek continued treatment from musculoskeletal therapists such as osteopaths, physiotherapists and chiropractors (Evans et al., 2005). Healthcare professionals therefore carry a responsibility to treat and manage LBP effectively to avoid iatrogenic disability. A recent study (n=91) of New Zealand practicing osteopaths revealed that there was scope to provide better care in assisting recovery outcomes in patients with chronic LBP (Rushworth, 2015). The study asked osteopaths to complete a number of established instruments measuring attitudes and beliefs on pain and the back. Instruments included the Fear Avoidance Belief Tool (FABT), Tampa Scale of Kinesiophobia for Health Care Practitioners (TSK-HC), Health Care Providers’ Pain and Impairment Relationship Scale (HC-PAIRS) and a newer measure, Back Pain Attitudes Questionnaire (Back-PAQ). Respondents’ overall mean scores were middle of the range across all instruments measured suggesting less than optimal attitudes and beliefs regarding LBP. These beliefs included negative feelings and thoughts of our back. To complement Rushworth’s (2015) findings, this study aimed to identify osteopath students’ attitudes and underlying beliefs towards LBP. This current study may identify aspects of pain education in the osteopathy programme that may benefit from review and subsequently help reduce inappropriate treatment and management advice for future practice. As a secondary aim, this research also evaluated the psychometric properties of a relatively new instrument measuring attitudes and beliefs regarding the back and back pain to help establish its validity for future use.

A brief history of ancient pain theories

Pain theory has an extensive and complicated history as humans have long sought explanations for its existence and ways to alleviate it. The complexity of pain theory has been demonstrated by the diverse and varied beliefs throughout history, which has divided philosophers and physicians from ancient civilizations to relatively modern times (Maharty, 2012). Over time, many theoretical frameworks have been proposed to explain the basis of pain and pain theory. These have generally reflected the cultural, religious and social constructs of that given era. Interestingly, some key concepts that existed in ancient times are still current in today’s understanding of pain theory (Maharty, 2012).

In ancient Egypt and Greece it was believed that gods were held responsible for creating pain (Wordsworth, 2011). It was thought that demons would enter the nostril or ear to attack the heart and blood vessels to inflict pain and suffering (Maharty, 2012; Wordsworth, 2011). In this era pain was largely regarded as a result of a sinful act (Wordsworth, 2011). It is not
surprising then that the word ‘pain’ is derived from the Greek word “Poine”, the Roman spirit of punishment and in Latin “Poena”, the Greek goddess of revenge (Wordsworth, 2011). Pain was not considered a sensation but rather an emotion like sadness or grief (Khan, Raza, & Khan, 2015). Plato (428-348 BC) famously described pain as a “passion of the soul” (Khan, et al., 2015). Both Plato and Aristotle (384-322 BC) saw the relationship between mind and body fundamental to human existence in medicine: “As you ought not to attempt to cure the eyes without the head or the head without the body, so neither ought you to attempt to cure the body without the soul . . . for the part can never be well unless the whole is well” (Plato, n.d., as cited in Miles, 2009, p.946). The dynamic interplay of mind and body that was so important throughout this ancient era is now regarded as a fundamental concept in current pain theory (LeFort et al., 2015). In addition, the concept of pain as an emotional experience was a significant idea that holds value today and is even expressed in the present definition of pain (Waddell, 2004). Pain is currently defined by the The International Association for the Study of Pain (IASP) as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage” (IASP, 2017).

The notion that disease was due to physiological changes was not formally introduced until Hippocrates’ physicians challenged the supernatural by theorising that pain was experienced due to a disruption in the humors in the body (Wordsworth, 2011). Anatomists, Herophilus (304-250 BC) alongside Erasistratus (304-250 BC) provided evidence that the heart worked as a pump to push blood around the body and argued that the brain, not the heart was responsible for experiencing pain (Dallenbach, 1939). This concept was still largely overshadowed by Plato and Aristotle’s ideas and it was not until Galen (131-201 AD), perhaps the most famous Roman physician, began to get an appreciation of neuroanatomy that this theory gained more support (Wordsworth, 2011). Galen described the body holding a set of soft nerves and theorised that pain was caused by intense irritation of these tissues (Tashani & Johnson, 2010). Although pain was described on a structural basis, it was still commonly thought that the mind had a significant influence over the body and it appeared they believed that symptoms could be alleviated by thought. For example, Cicero (106-143 BC) stated that emotions could cause physical illness and that “man can help his own cure through philosophy” (Cicero, n.d., as cited in Gelder, Gath, Mayou, & Cowen, 1998, p.145). Avicenna (980-1037 AD), a renowned Muslim physician and philosopher further classified pain to be a sensation independent from touch or temperature. Avicenna also challenged Galen’s theory by proposing that pain could exist beyond tissue damage and described this
pain as “not true pain” (Tashani & Johnson, 2010). Avicenna believed that this type of pain could not be treated through traditional methods due to an absent cause (Tashani & Johnson, 2010). Despite rudimentary knowledge of neurophysiology it appears that physicians of that time understood and acknowledged the complexity of pain mechanisms. Subsequently, in the dark ages (500AD- 1500 AD) Western pain theory evolution almost ceased as the church became responsible for patient care (Allen & Waddell, 1989). Pain was considered once again to be a direct result of sin and in this case, punishment by God. Pain was considered a godly punishment for disbelievers and for those who disobeyed the church (Dallenbach, 1939). The church held a great deal of power over its congregation in medieval times and emphasising the role of sin in pain may have had profound psychological and social impact on the sick and injured (Wordsworth, 2011).

**Modern pain theories**

**Specificity Theory**

Nearing the time of the Enlightenment, Descartes (1596-1650), a French philosopher, detailed a simplistic cause-and-effect pain relationship by introducing the Specificity Theory (Dubner et al., 1979., as cited by Moayedi et al., 2013). In this theory, pain is described purely as a physical sensation based on the premise that damaged tissues activate specific pain receptors which, in turn project nerve impulses through the spinal cord to a specific pain center in the brain (Melzack, 1993; Helms & Barone, 2008). This concept subsequently dominated scientific literature for almost 300 years and left no room for the ‘body-mind’ interaction that was so influential in ancient times (LeFort et al., 2015). The Specificity Theory proposed that the more intense the pain the greater the amount of associated tissue damage and those who suffered from pain without signs of pathology or injury were regarded as insane (Moayedi & Davis, 2013; Wordsworth, 2011). Without acknowledgement of a central pain mechanism this was a difficult time for individuals experiencing chronic pain (Melzack, 1993).

**The Gate Control Theory**

In 1965, as two scientists, Ronald Melzack and Patrick Wall revolutionised pain theory with the publication of The Gate Control Theory of Pain (Melzack & Wall, 1965; Moayedi et al., 2013). The theory proposed a hypothetical gate in the dorsal horn of the spinal cord which could modulate transmission of sensory information by opening and closing (Melzack & Wall, 1965). Simply put, if the ‘gate’ was open, nerve impulses continued up the spinal cord
to the brain which sensed danger and pain, whereas if the gate was partially closed then a reduction of impulses travelled through to the brain reducing the pain experience.

Significantly, Melzack & Wall’s (1965) theory proposed the ‘gate’ could be opened and closed in a number of ways such as through past experiences of pain, pain beliefs, social and cultural constructs as well as emotions. They argued that the influences mentioned above could either facilitate or inhibit the gate thereby modifying an individual’s experience of pain (Katz & Rosenbloom, 2015). This was an important breakthrough for pain theory as it not only formally introduced the involvement of a central mechanism but highlighted the subjective nature of pain.

**The Biopsychosocial Model**

Around the same time as the introduction of the Gate Control Theory, George Engel, a psychiatrist, was also challenging the popular belief that pain was purely biomedical (Moayedi et al., 2013). The Biomedical Model assumes disease/illness to be fully accounted for by deviations of normal biological variables (Borrell-Carrió, Suchman, & Epstein, 2004). Engel felt the reductionist approach in which disease/illness consists only of pathology or dysfunction was insufficient further strengthening the role of psychosocial factors in pain. (Engel, 1977; Melzack & Wall, 1965). The model demonstrates the interplay of biomechanical and physical factors as well as psychosocial influences supporting Melzack and Wall’s (1965) theory of a central mechanism. Engel stated psychosocial factors such as thoughts, emotions, previous pain experiences and behaviour, socio-economic and socio-environmental standing, medical care systems, cultural and religious beliefs as well as technological impact were all important contributing factors to an individual’s pain experience (Gatchel et al., 2007; Engel, 1977).

**The Neuromatrix Theory**

In 1996, Melzack built on his previous theory by introducing the Neuromatrix Theory. Its key premise is that while sensory input may be responsible for initiating an initial pain experience it is not the sole causal mechanism and can even occur entirely independent of it (Katz & Rosenbloom, 2015; Melzack, 2001). Melzack (2001) introduced the conceptual framework to explain the multidimensional experience of pain and in particular to explain the neural mechanisms of chronic pain. The concept describes a characteristic neurosignature, defined as a pattern of nerve impulses which are generated within a neural network called the body-self matrix within the brain (Melzack, 2001). The neurosignature may be triggered by sensory inputs although it may also occur entirely independently to produce an output such as pain.
In chronic pain, the neuromatrix responds to nociceptive and non-nociceptive mechanisms which allow for reduced and even absent sensory stimuli to produce a pain experience (Moseley, 2003).

**Pain-stress-reactivity cycle**

More recently attention has focused on the pain-stress-reactivity cycle and its influence in chronic pain (Vachon-Presseau et al., 2013). Stressors, regardless of source, activate a cascade of chemical interactions in the body, primarily the hormone cortisol. Short-term stress has been demonstrated to cause the pituitary gland to secrete adreno-corticotrophic hormone, which acts on the adrenal gland to secrete cortisol (Gatchel et al., 2007). While this situation is entirely appropriate in short-term acute stress (flight or fight mode) it may have disastrous consequences over a prolonged period of time. Although little empirical evidence exists to demonstrate the involvement of the endocrine system in chronic pain, the concept of allostatic load is considered an important, although novel component in the maintenance of chronic pain (Slade, Sanders, & By, 2012). In an individual facing a recurrent stressor, maladaptive physiological responses appear to be active which may contribute to an individual’s chronic pain state (Slade et al., 2012; Vachon-Presseau et al., 2013). This concept was demonstrated in a small study (n=34) whereby participants with chronic LBP had higher levels of cortisol when compared to healthy subjects. Prolonged activation of the stress regulation system has been demonstrated to contribute to the breakdown of bone, muscles, and neural tissue which may potentially lead to the pain-stress-reactivity cycle (Gatchel et al., 2007).

Our understanding of pain mechanisms has substantially evolved over the last few centuries and while acute pain is well understood, the mechanisms behind the transition from acute to chronic pain are still relatively unknown and largely debated. What is clear is that pain is no longer described solely as a physical sensation and instead considered a complex multifactorial dynamic experience (Shipton, Ponnamperuma, Wells, & Trewin, 2013; Mitchell et al., 2010; Meredith, Ownsworth, & Strong, 2008; Darlow et al., 2008).

**Associated pain definitions and epidemiology**

**The definition of pain**

The International Association for the Study of Pain (IASP) defines pain, in general, as “an unpleasant sensory and emotional experience associated with actual or potential tissue
damage” (Bonica, 1979, p 14.). Although the definition is widely accepted, in 2011, Wright published a comprehensive review which suggested that the definition, which is now more than 30 years old, was ambiguous and no longer adequate (Wright, 2011). Instead, Wright (2011) proposed the following definition: “Pain is the unpleasant sensation that has evolved to motivate behaviour which avoids or minimises tissue damage or promotes recovery” (p.56). It is interesting that in Wright’s (2011) definition, pain is regarded again as purely sensory and based on our current knowledge of pain mechanisms this appears less accurate than the IASP’s pain definition developed more than three decades ago.

Currently it is understood that acute and chronic pain are due to different physiological mechanisms and pain is divided into three categories: acute, sub-acute and chronic (Helms & Barone, 2008). Acute pain is the body’s warning signal, which makes the individual aware of possible, or actual tissue damage whereby it stimulates the “fight or flight” response in the sympathetic nervous system (Helms & Barone, 2008). Acute pain can be understood in a biomedical sense in that potentially damaged or damaged tissues send nerve impulses to the brain to get out of harm’s way and gradually resolves once injured tissue heal. This type of pain is considered fundamental to survival and classified as generally lasting no more than 6 weeks (Burton et al., 2006). Sub-acute pain refers to pain that is not yet chronic but has passed the acute phase and occurs between 6 weeks and 3-6 months (Burton et al., 2006). Chronic pain is characterised by pain persisting for more than 3-6 months (Burton et al., 2006) or, alternatively, pain that lasts longer than the expected period of healing (Rozenberg, 2008). It is important to note that acute and chronic pain display different characteristics: acute pain is generally intense and often localised to one area of the body whereas chronic pain can vary in intensity and can be felt in many areas of the body (LeFort et al., 2015). The concerning aspect of chronic pain is that it has no survival value, meaning that it no longer serves as an accurate warning signal to the body. Additionally, chronic pain has been shown to lead to long-term loss of function, disability and significant personal, social and economic costs (LeFort et al., 2015).

**Chronic pain epidemiology**

The 2011/12, New Zealand Health survey (n=17,000) reported approximately 1 in 6 (16.9%) New Zealanders experienced chronic pain at the time the survey was administered (Ministry of Health, 2012). Chronic pain was defined as experiencing pain in excess of 6 months. The same survey found that chronic pain was more prevalent in older people (25-30% of adults
over 35 years of age), in Māori ethnicities (18%) as well as individuals experiencing lower socioeconomic living standards (19%) (Ministry of Health, 2012). Asian and Pacific ethnicities were reported as least affected. Women were more likely to experience chronic pain than men (17% and 15%, respectively). Chronic pain sufferers reported the two main areas affected were joints followed by back and neck (Ministry of Health, 2012). Men reported a higher relationship between chronic pain and injury while women were more likely to attribute their pain to an existing health condition (Ministry of Health, 2012). The same study also stated a higher number of chronic pain sites and pain severity was found to correlate with lower physical function scores and lower mental health scores (Ministry of Health, 2012; Dominick et al., 2011).

**Low back pain definitions**

Low back pain is defined as pain originating or experienced in the region of the back below the costal margin and above the inferior gluteal folds (Burton et al., 2006). In most cases onset is sudden and self-limiting, with symptoms gradually resolving within six weeks (Hestbaek, et al., 2003). Nevertheless, for a number of individuals, longer episodes of pain are experienced. The transition from acute to chronic pain is poorly understood and while most people recover from acute LBP within 6 weeks, a significant proportion (3-10%) continue to experience pain despite there being no evidence of tissue damage (Klenerman et al., 1995; Vlaeyen & Linton, 2000; Waddell, 2004; Linton et al., 2007; Rainville et al., 2011). Objective clinical signs and symptoms of LBP are problematic as up to 90% of cases are diagnosed as non-specific due to lack of identifiable pathology such as absent neurological signs and imaging findings (van Tulder, Koes, & Bombardier, 2002). Another challenge when diagnosing causation of LBP is that evidence shows little correlation between pain and structural abnormalities (Vroman, Warner, & Chamberlain, 2009).

**Low back pain epidemiology**

In New Zealand, there have been very few studies investigating epidemiology of LBP and figures are usually based on North American or European studies (Shipton, Ponnamperuma, Wells, & Trewin, 2013). In Europe, studies suggest lifetime prevalence of LBP is up to 84% with as many as 23% experiencing non-specific chronic LBP (Airaksinen et al., 2006). Studies also report that approximately half of those individuals with LBP will go on to experience associated disability (Airaksinen et al., 2006). The Global Burden of Disease Injuries, and Risk Factors Study undertaken in 2010 is considered the most comprehensive global epidemiological study involving 195 countries. This reported global prevalence at
9,4% with prevalence and burden increasing with age (Buschbinder et al., 2013). The study also established LBP as the leading cause of disability worldwide. (Buchbinder et al., 2013; Vos et al., 2012). Experts estimated that this will substantially increase in both developing and developed nations (Brooks, 2006; Hoy et al., 2014). Low back pain has also been shown as a leading cause of work absence and work limitation globally (Hoy et al., 2014). Alarmingly, LBP has been shown to commonly develop during adolescence (Smith, O’Sullivan, Beales, & Straker, 2012). In a systematic review, 17% of respondents aged 12 reported experiencing LBP which escalated to 60% by 18 years of age (Hill & Keating, 2009). Consequently, adolescent LBP is considered a predictor of adult LBP (Hestbaek, Leboeuf-Yde, Kyvik, & Manniche, 2006; Jeffries, Milanese, & Grimmer-Somers, 2007). In the New Zealand population, McBride et al., (2004) reported that 67% of individuals between the ages of 45-65 years had experienced recurrent LBP at some stage in their life. A more recent New Zealand study reports lifetime prevalence of LBP as much higher at 87% (Darlow et al., 2014). In a cohort of 969 participants aged 26, 54.1% of participants reported experiencing recurrent LBP in the previous 12 months. Furthermore, 10.7% of those individuals reported taking time off work (the majority fewer than 7 days) while 13 individuals needed someone to care for them due to their pain (McBride et al., 2004). In the same study, 448 participants reported having a current occupation and no difference was found in LBP severity and frequency in the distribution of professional, clerical, technical or trade jobs. Based on the data from this study the authors suggested that LBP is common in young New Zealanders.

**Low back pain and associated disability**

Studies show that disability levels associated with LBP are more closely related to behaviour and psychosocial aspects rather than biomechanical and sensory deficits (Campbell & Edwards, 2009; Gatchel et al., 2007; Sindhu et al., 2012). It has also been suggested that LBP related disability is influenced by social constructs based on poor mental health, adverse beliefs about health and recovery, as well as social and cultural factors (Allan & Waddell, 1989). Disability associated with LBP, measured by an inability to work, increased more than eight-fold between the 1950’s to early 1990’s (Palmer, Walsh, Bendall, Cooper, & Coggon, 2000). Interestingly, this came at a time where many physically demanding jobs were declining due to the automation of machines and a reduction of physical stressors to the spine (Palmer et al., 2000).
There are many proposed factors as to why pain can lead to increased disability. If acute pain is interpreted as dangerous, a cycle of disuse may occur causing loss of function and therefore disability (Leeuw et al., 2007). Thus, the ‘threat value’ of pain, can often be responsible for pain behaviour (Moseley, 2003). Allan and Waddell (1989) suggested the way in which back pain was viewed in the past has significantly influenced how we view the natural history of back pain recovery and associated disability today. Since the 1800’s back pain changed from being a symptom to a disease and individuals suffering from back pain expected a mechanical explanation. In addition, in the early 1900’s orthopaedics saw strict bed rest as the most appropriate treatment intervention for LBP, further increasing the ‘threat value’ of LBP (Allan & Waddell, 1989; Palmer et al., 2000). Disability associated with LBP has also been shown to increase at the start of the modern healthcare system when LBP was established as work-related and a compensable condition (Allan & Waddell, 1989). Furthermore, the introduction of routine imaging in patients presenting with LBP has been associated with an increase of pain-related disability and slower recovery outcomes (Flynn, Smith, & Chou, 2011; Webster, Bauer, Choi, Cifuentes, & Pransky, 2013). Several studies have shown that patients’ knowledge of abnormalities detected by imaging may actually worsen their self-perception of spinal health and lead to poor recovery outcomes by increasing fear-avoidance behaviour (Flynn et al., 2011; Palmer et al., 2000; Webster et al., 2013). Webster et al. (2013) demonstrated in a large study (n=1000) the iatrogenic consequences of imaging in a sample of workers with acute disabling occupational LBP. Clinical information was collected in participants with acute disabling LBP and grouped into ‘non-specific LBP’ and LBP with a ‘radiculopathy diagnoses’. Participants were further grouped into ‘early Magnetic Resonance Imaging’ (MRI) (< 30 days post onset) and ‘no MRI’. Thirty seven percent of patients experiencing ‘non-specific LBP’ and 79% of patients with a ‘radiculopathy diagnosis’ received an early MRI. Clinical data shows early MRI groups experienced higher disability levels regardless of radiculopathy status and on average $12,948 to $13,816 higher medical costs than the ‘no MRI group’ (Webster et al., 2013). A number of systematic reviews have also shown that little correlation exists between clinical findings (imaging) and symptoms associated with LBP (Allan & Waddell, 1989; Brinjikji et al., 2015; Flynn et al., 2011; Lateef & Patel, 2009). In a study of asymptotic patients 60 years and older, imaging showed that 36% of participants had disc herniation’s, 21% had spinal stenosis and over 90% had disc degeneration and disc bulging (Boden, Davis, Dina, Patronas, & Wiesel, 1990). This supports the belief that early MRI, without indication, can result in strong iatrogenic effects (Webster et al., 2013). It has also been suggested that abnormalities seen on imaging tend not to be
predictive of future LBP (O’Sullivan, 2012). Imaging in the absence of progressive neurological symptoms and other “red flags” for example, infection, cancer and cauda equine syndrome, is therefore no longer considered best practice or aligned with clinical guidelines (ACC, 2004; Chou, Qaseem, Owens, Shekelle, & Clinical Guidelines Committee of the American College of Physicians, 2011; Lateef & Patel, 2009).

**Efficacy of low back pain interventions**

Individuals who experience chronic LBP repeatedly see musculoskeletal therapists for their pain despite evidence demonstrating that manual therapy alone is unlikely to permanently resolve symptoms (McPhillips-Tangum, Cherkin, Rhodes, & Markham, 1998; Delitto et al., 2012; Gore, Sadosky, Stacey, Tai, & Leslie, 2012). Today, there is widespread agreement by leading pain experts that most conventional LBP treatments such as manual therapy and stabilising exercises is not only ineffective for individuals experiencing non-specific chronic LBP but also entirely inappropriate (O’Sullivan, 2012). Individuals experiencing chronic LBP are often prescribed stability and strengthening exercises, corticosteroid injections, back braces and in extreme cases stabilisation surgery (Jarvik et al., 2005 van Middelkoop et al., 2011). A large systematic review of randomised controlled trials was carried out to investigate the effectiveness of traditional LBP interventions. These included manual therapy, exercise therapy, back education, cognitive behavioral treatment, transcutaneous electrical nerve stimulation (TENS), massage, traction, lumbar supports, and heat/cold therapy. Overall, the evidence for the efficacy of manual therapy for reducing LBP was low. Long-term reduction of signs and symptoms of LBP across all treatment modalities was also demonstrated as low (van Middelkoop et al., 2011). In addition, the authors concluded that due to the poor quality of studies and insufficient data conclusions on the clinical effectiveness of back schools, low-level laser therapy, patient education, massage, traction and lumbar support, appropriate recommendations could not be made (van Middelkoop et al., 2011). The same study also found little evidence to suggest that exercise therapy improved post-treatment pain intensity and disability as well as long-term function. This is in contrast to other studies which suggest exercise therapy an effective tool to reducing chronic LBP (Wells et al., 2014). A large systematic review demonstrated favourable results with exercise therapy. Thirty seven randomised controlled trails were critiqued and the authors concluded that exercise therapy was effective at not only reducing pain but improving long-term function (van Middelkoop et al., 2010). However, no evidence existed to suggest one type of exercise was more superior to another and the authors found that the effect size was small.
across all studies. In another study, specific motor control and stabilisation exercises were shown to be ineffective as an successful intervention (Unsgaard-Tøndel, Fladmark, Salvesen, & Vasseljen, 2010).

Historically, assessment and management for all types of LBP in clinical practice was based on a biomechanical or biomedical model. In this view, signs and symptoms were seen as a direct result of structural abnormalities (Eland, 2013). Assessment was generally aimed at identifying the cause of dysfunction through labeling specific structures, lesions or impairments (Maitland, 1898; Lederman, 2011). In addition, pain severity was thought to be directly proportional to tissue damage (Gatchel, Peng, Peters, Fuchs, & Turk, 2007). It has been proposed that inadequate treatment results and poor long-term recovery outcomes are likely to have prompted a paradigm shift from pathoanatomical to biopsychosocial in the last decade (O'Sullivan & Lin, 2011). However, despite this focal change, non-specific chronic LBP continues to be a major problem with more individuals experiencing the condition each year (Cherkin et al., 2009; O'Sullivan, 2012). There may be many reasons why modern healthcare has not yet solved the issue of chronic LBP and some of the possible barriers are discussed below.

The role of biomechanical dysfunction and low back pain

The assumption that LBP symptoms and disability can be prevented by better ergonomics, reduced mechanical loading, postural adaptations, motor control exercises and rest has recently come into question (O'Sullivan, 2012; Vargas-Prada & Coggon, 2015). Authors, Vargas-Prada & Coggon (2015) suggest that biomechanical maladaptation or dysfunction may be appropriate to some musculoskeletal disorders but have limited applicability to common non-specific chronic LBP disorders. In fact, the persistent belief that pain is a result of structural degeneration, biomechanical and/or motor control deficits resulting in instability may have the potential to drive pain-related behaviour (Brown, 2009; O'Sullivan, 2012). Unfortunately, clinical practice that identifies hypo-mobile and malalignment, reinforcing a biomechanical mechanism is still common practice amongst manual therapists when dealing with non-specific chronic LBP today. O'Sullivan (2005) strongly suggested that diagnostic labels such as “instability” should solely be reserved for unstable spondylolisthesis and fractures. This idea was supported by Jarvik et al. (2015) who argued that no conclusive evidence exists to demonstrate a clear relationship between instability and non-specific chronic LBP. However, in spite of this view, patients presenting with non-specific chronic
LBP continue to be provided with biomedical diagnoses on the basis of biomechanical beliefs with potentially disastrous consequences on recovery outcomes (PuenteDura & Flynn, 2016).

Another common belief amongst manual therapists is that sitting postures and back pain are correlated and upright lordotic postures are frequently advocated in management of LBP (O’Sullivan, Smith, Beales, & Straker, 2011). To date, conflicting evidence exists regarding the relationship between poor sitting posture and back pain (O’Sullivan et al., 2011; Smith, O’Sullivan, Beales, & Straker, 2012). A comprehensive systematic review of 53 studies showed no evidence of a relationship between sagittal spinal curvature and spinal pain (Christensen & Hartvigsen, 2008). Another similar systematic review identified 35 studies and regardless of study quality failed to find a positive correlation between sitting posture and LBP (Hartvigsen, Leboeuf-Yde, Lings, & Corder, 2000). In fact, the authors found that higher quality studies demonstrated marginally negative associations (Hartvigsen et al., 2000). A study investigating the correlation of sitting duration and LBP demonstrated that increased sitting times did not increase the risk of developing non-specific chronic LBP and the authors suggested that occupational sitting is unlikely to be a causative factor in the population of workers studied (Roffey, Wai, Bishop, Kwon, & Dagenais, 2010). In contrast, a greater degree in slump (increased thoracic kyphosis while sitting) was weakly associated with adolescent back pain however the authors suggested that psychological factors had a greater association (Smith et al., 2012). Overall, epidemiological literature does not support popular opinion that sitting durations and sitting postures are associated with LBP.

**Reasons for continued treatment despite persistent pain**

Participants in a study (n= 240 adults) experiencing non-specific chronic LBP were exposed to 8 weeks of either general exercise, motor control exercises or spinal manipulative treatment (Ferreira et al., 2007). Outcomes measured at 6 weeks, 8 months and 12 months revealed while motor control exercises and spinal manipulative therapy produced slightly better functional outcomes at 6 weeks no difference was found in medium or long term measures (Ferreira et al., 2007). Despite evidence demonstrating little to no effect of manual therapy on long-term recovery outcomes with patients experiencing non-specific chronic LBP, individuals continued to seek treatment. In a study investigating patient discharge protocols amongst physiotherapist, chiropractors and osteopaths for chronic LBP found that 10% of practitioners continued to treat despite almost no improvement over three months (Pincus, Vogel, Breen, Foster, & Underwood, 2006). The authors of the study believed this
number to be much higher and suggest this discrepancy was due to practitioners selecting independent goals for treatment. Practitioner goals included providing emotional support and counseling, as well as preventative treatment with emphasis on providing short-term relief. They did not appear to include the commonly desired outcomes such as overall decreased levels of pain, improved function, decrease in disability and the return to normal activities at work (Pincus et al., 2006). The patient’s expectation of multiple treatments, continuation of care as well as searching for a diagnosis were factors that may also help explain why patients continued treatment despite no overall significant improvement (Pincus et al., 2006). It seems the limited success of manual therapy on chronic LPB recovery outcomes has not deterred patients from seeking continued care in this modality. It could be expected that practitioners are willing to see patients on a regular basis for monetary reasons and the patients themselves may wish to continue treatment in order to validate their pain (Pincus et al., 2006). A systematic review of studies investigating patient expectations of treatment for LBP, found that patients sought health care for a clear diagnosis and confirmation that their pain is real (Verbeek, Sengers, Riemens, & Haafkens, 2004). While research has demonstrated little to no evidence exists in support for manual therapy in long-term reduction of pain and improved function, it has been established that manual therapists can provide short-term symptomatic relief in patients with chronic LBP. The mechanism by which manual therapy improves pain is multifactorial and is likely to be strongly influenced by the interaction between practitioner, patient and the environment where the intervention itself is provided (Bialosky et al., 2011). The placebo effect is suggested to be one of these mechanisms. Pain research demonstrates that placebo is an active and successful hypo-analgesic agent and more than likely plays a role in short-term pain relief (Bialosky et al., 2011; Lyby, Aslaksen, & Flaten, 2010; Morton, Watson, El-Deredy, & Jones, 2009). A patient may experience positive mood changes after treatment which may contribute to short-term symptomatic relief in manual therapy (Bialosky et al., 2011).

**The role of an individual experiencing low back pain**

**Low back pain beliefs**

Patients’ underlying beliefs, attitudes and behaviour regarding their back and back pain are associated with differences in LBP disability and recovery outcomes (Smith 2012; Westman 2011). These include the belief that bed rest and activity avoidance is the appropriate course of action when experiencing low back pain. In addition, the belief that the back is a vulnerable structure which needs protection can lead to increased vigilance and worry. A
study amongst adolescents demonstrated a relationship between negative back pain beliefs and higher occurrence of LBP as well as an increased interference with and absenteeism from school and work (Smith et al., 2012). Another study demonstrated that individuals who related their back pain to an injured structure were more likely to experience associated disability and adopt more passive coping strategies such as rest and manual therapy (Briggs et al., 2010). A survey by Darlow et al. (2014) involving 602 New Zealanders found that in general, respondents hold negative beliefs and attitudes regarding their back and back pain. The belief that LBP is due to degeneration that cannot be resolved also appears to have negative recovery outcomes (Darlow et al., 2015; Sloan & Walsh, 2010). Alarmingly, the belief that the back is vulnerable and fragile is widespread amongst New Zealanders who experience back pain (Darlow et al., 2015; Lin et al., 2013; Stenberg, Fjellman-Wiklund, & Ahlgren, 2014). The survey also revealed that respondents viewed the spine as a vulnerable structure that was easy to injure, required good posture, and needed good lifting technique with strong muscles to protect it (Darlow et al., 2014). Back pain may also be regarded as more significant than other areas in the body experiencing pain as it may indicate failure of an important structure of the body, the spinal cord. (Darlow et al., 2015; Sloan & Walsh, 2010). Back pain has been demonstrated to have considerable impact on daily life, sports, hobbies and employment and may also be considered as more threatening than when experiencing pain in other areas of the body (Bunzli, Watkins, Smith, Schütze, & O’Sullivan, 2013; Lin et al., 2012). Consequently, activities that place load on the back such as twisting, heavy lifting, sitting and even bending are considered dangerous by many people with LBP (Darlow et al., 2016; Stenberg et al., 2014).

**Psychosocial factors and pain**

The evidence of psychosocial factors contributing to and maintaining chronic pain mechanisms in LBP is overwhelming (Campbell et al., 2013; Darlow et al., 2013; Fritz, George, & Delitto, 2001; Gatchel et al., 2007; Grunnesjo, 2011). Much research has focused on investigating the relationship between psychosocial factors and chronic pain. Factors such as catastrophising, fear-avoidance, helplessness, pain related anxiety, low self-efficacy, low mood, depression, limited physical exercise, un-readiness to change, low acceptance, hypervigilance, low job satisfaction, unemployment and low expectations of recovery are just some characteristics demonstrated to contribute to maladaptive responses in pain (Burton, Waddell, & Main, 2006; Campbell et al., 2013; Darlow et al., 2015; Gatchel et al., 2007). A New Zealand study (n=874) measuring levels of disability, depression, self-efficacy and
psychological distress in participants attending a leading pain clinic found that patients were more likely to experience increased pain severity for longer durations as well as increased disability if they catastrophised about their pain, experienced depression and/or had low self-efficacy scores (Shipton et al., 2013). Low acceptance of pain was also regarded as a contributing factor to increased associated disability (Shipton et al., 2013; McCracken & Vowles, 2006; McCracken & Zhao O’ Brian, 2010).

Biological factors such as age, obesity, previous history of acute LBP and work injury have also been shown to increase the risk of chronic LBP (Vos et al., 2012). Furthermore, cultural backgrounds have been suggested as an explanation of the marked variation of musculoskeletal complainants in the back, neck and upper-limb alongside associated disability reported by workers carrying out similar jobs (Vergio, Madan, Reading, Palmer, & Coggan, 2008). The authors suggested pain and coping behaviours are influenced by prevalent, culturally-determined beliefs (Coggon et al., 2013; Vergio, et al., 2008). In response to these factors, HCPs and researchers have developed a number of well-validated tools such as the Healthcare Providers’ Pain and Impairment Relationship Scale (HC-PAIRS) that help measure psychosocial factors impacting on an individual’s chronic pain experience.

**Fear-avoidance beliefs**

One psychological factor that has received significant attention is fear-avoidance behaviour. The Fear-Avoidance Model was developed by Letham in 1983 to explain the psychological basis of the transition from acute to chronic pain in the absence of pathology (Lethem, Slade, Troup, & Bentley, 1983). The model is based on the premises that fear of pain leads to an individual avoiding using the painful area which then creates disability, disuse and/or depression which is further reinforced by catastrophising. Pain catastrophising can be defined as “an exaggerated negative orientation toward actual or anticipated pain experience” (p.90) and is considered another important psychosocial factor to chronic pain mechanisms (Gatchel et al., 2007). This model has since been adapted by Vlaeyen and Linton (2000) and is a leading paradigm for many chronic musculoskeletal pain conditions (Wideman et al., 2013).

In the model, interpretation of pain may lead to two very different outcomes. One pathway describes recovery promotion if an individual does not display fear-avoidance behaviour and resumes normal daily activities of life. The other pathway describes fear-avoidance behaviour and a subsequent cycle of disuse and disability. It is important to remember that avoidance of
using the painful area is an appropriate coping response in acute pain experiences. However, fear-avoidance behaviour in the acute phase of injury will paradoxically contribute to a chronic state (Leeuw et al., 2007; Lethem, Slade, Troup, & Bentley, 1983; Vlaeyen & Linton, 2000). It is suggested that fear-avoidance occurs in anticipation of pain rather than as a response to pain and in time becomes a learned habitual behaviour (Vlaeyen & Linton, 2000; Waddell, 2004). Importantly, recent studies also reveal that fear-avoidance beliefs in acute pain may predict the level of chronicity, with larger effects on disability and long-term sick leave rather than an increase in pain intensity itself (Gheldof et al., 2010; Jensen, Karpatschof, Labriola, & Albertsen, 2010).

As with most theoretical models there are limitations in their practicality and the Fear-Avoidance Model is no exception. The simplistic sequential and cyclic nature of the model has been questioned (Mosely, 2011; Wideman et al., 2013). The Fear-Avoidance Model emphasises a cyclical relationship between risk factors where as more recent findings support cumulative interactions. For example, patients with a greater number of risk factors have a higher cumulative risk load and are more likely to develop prolonged pain and disability (Westman, Boersma, Leppert, & Linton, 2011; Wideman & Sullivan, 2012). Nevertheless, it is recognised that fear-avoidance beliefs are detrimental to recovery and strongly correlate to rising disability, particularly when displayed in the acute phase (wertli et al., 2014; Stisen, Tegner, bendix & esbesen, 2015).

Overview of instruments
There are several well-established instruments that measure beliefs and attitudes about pain. This study will use the Healthcare Providers’ Pain and Impairment Relationship Scale (HC-PAIRS), a well-recognised and used tool (Houben et al., 2005). It will also use a relatively new tool which was developed in New Zealand called the Back Pain Attitudes Questionnaire (Back-PAQ) (Darlow et al., 2014). Below is a brief overview of each instrument.

**Modified Healthcare Providers’ Pain and Impairment Relationship Scale (HC-PAIRS)**
The HC-PAIRS was one of the first measures available to identify HCPs attitudes and beliefs developed by Rainville, Bagnall and Phalen (1995), adapted from the Pain and Impairment Scale designed by Riley, Ahern and Follick (1988). Since then it has been widely used and accepted as a reliable and valid tool in measuring health care providers’ attitudes and beliefs on the relationship between pain and impairment (Houben et al., 2005). A modified version
(Evens et al., 2005) was used in this study in which the term ‘chronic low back pain’ has been replaced by ‘low back pain’ in order to align better with the tool, Back-PAQ. The instrument still serves to measure how beliefs affect physical function and consists of 13 items. The modified HC-PAIRS has been used previously in Evan’s et al. (2005) study testing the effectiveness of an education intervention on reported behaviour and beliefs of UK chiropractors, osteopaths and physiotherapists both in private practice and national healthcare services.

The Back Pain Attitudes Questionnaire (Back-PAQ)

The relatively new tool, the Back Pain Attitudes Questionnaire (Back-PAQ) was developed by Darlow, Perry, Mathieson, Stanley, Melloh, Marsh, Baxter and Dowell (2014) and explores respondents’ own attitudes and beliefs about the back and back pain. The tool was established after conducting in-depth interviews with New Zealanders experiencing acute and chronic LBP and is unique in that existing tools measure beliefs on HCPs views of their patient’s pain rather than the beliefs they hold about their own back and back pain. Darlow et al. (2014) suggest in this perspective, a more accurate insight into practitioner advice and management of back pain may occur. The tool is also designed to be applied to both practitioner and patient unlike other tools that require modifications to adjust for this transfer. However, as the tool is relatively new it has had limited testing with just two studies investigating psychometric properties (Darlow et al., 2014; Rushworth, 2015). Despite this, these studies report positive results with Darlow et al. (2014) reporting adequate internal consistency (α=0.70; 95% CI 0.66 to 0.73) and Rushworth (2015) demonstrating acceptable internal consistency and excellent test-retest reliability (α= 0.91 and ICC = 0.84). Rushworth (2015) also showed moderate correlation to other well-known tests including the Fear Avoidance Beliefs Tool (FABT), Tampa Scale of Kinesiophobia for Health Care Providers (TSK-HC) and the HC-PAIRS.

The role of a health care practitioner

Health care practitioners’ attitudes and beliefs on low back pain

In addition to an individual’s beliefs and attitudes regarding pain, there is ample evidence to suggest practitioner behaviour is also a crucial element in the development and maintenance of a patient’s chronic pain state (McCracken & Eccleston, 2003; Coudeyre et al., 2006; Darlow et al., 2012; Darlow et al., 2013; Parsons et al., 2007). A systematic review of 17 studies found strong evidence that primary HCPs beliefs about back pain are associated with
the beliefs of their patients (Darlow et al., 2012). They also found moderate evidence to suggest HCPs with a biomedical orientation of treatment style or elevated fear-avoidance beliefs prescribed reduced work hours and recommend limiting physical activity. Rainville et al. (2011) demonstrated a direct correlation between practitioner attitudes and beliefs and subsequent pain severity in patients with non-specific chronic LBP. Studies have also demonstrated that HCPs beliefs and attitudes on this subject are diverse (Bishop, Thomas, & Foster, 2007; Daykin & Richardson, 2004; Slade et al., 2014). A number of HCPs hold inappropriate fear-avoidance beliefs about LBP (Coudeyre et al., 2006; Vlaeyen & Linton, 2000). In a qualitative interview study (n=23), Darlow et al. (2013) reported that although participants used the internet and their social circle to gather information and advice, HCPs had the greatest impact on respondents’ attitudes and beliefs regarding the back. A study into nurses’ attitudes and beliefs on chronic LBP identified a lack of pain curriculum in training as well as inappropriate faculty attitudes and beliefs were contributing to inappropriate clinical advice (Prem et al., 2011). The same study also revealed that HCPs in general lack adequate knowledge when caring for patients with chronic pain (Prem et al., 2011). Furthermore, Brown and Richardson (2006) suggest that inappropriate practitioner attitudes and beliefs such as the back is a vulnerable structure that needs more protection then other areas of the body may explain widespread inadequate treatment success in regard to therapeutic interventions. Slade et al. (2014) believe barriers for successful primary care adherence to clinical guidelines for low back pain patients may be due to the vast range of attitudes and beliefs about the condition held by HCPs.

According to Moseley (2007), a leading pain educator, four key points are essential in understanding the concept of chronic pain: (i) pain severity does not accurately reflect tissue damage (ii) social, psychological and somatic factors modify a pain experience (iii) as pain persists it becomes less accurate to measure tissue damage by pain severity (iv) pain can be conceptualised as tissue damage by the brain. Reinforcing unhelpful beliefs by advocating strengthening and stabilising exercises, adjusting postures, correct lifting techniques, avoiding painful movements in regard to non-specific LBP are now considered unhelpful for recovery outcomes (Darlow et al., 2012). Furthermore, patient assessment should include screening for abnormal patient cognitive behaviour, ‘yellow flags” (e.g. psychosocial factors such as fear avoidance behaviour and catastrophising) alongside maladaptive movement patterns (Brown, 2009). Discrediting common low back pain ‘myths’ (long-held and out of
date beliefs) as well as unrealistic expectations in imaging and diagnostic testing are all now considered important aspects of LBP management (Jenkins et al., 2015; O’Sullivan, 2012).

Explaining the biological process of pain has been shown to change pain related attitudes, pain related disability and reduce catastrophising. Reconceptualising pain as protective output of the brain rather than viewing it as an accurate indicator of tissue damage is now considered an important part of chronic pain management (Traeger et al., 2014). One new approach in the management of LBP includes patient education in neurobiology and neurophysiology of pain, known as ‘pain neuroscience education’ (PNE) (Clarke, Ryan, & Martin, 2011; Puementura & Flynn, 2016). In this construct, a patient with chronic LBP pain is able to understand that pain and tissue injury are not related and perceive pain as less threatening (Moseley, 2004). A randomised controlled trial reported promising results following PNE in patients with chronic pain, however these findings are based on self-report measures in which the extent of intervention success is highly subjective (Moseley, Nicholas, & Hodges, 2004). Puementura and Flynn's (2016) review of the literature on this topic present a case for balancing PNE alongside manual therapy. The authors argued that manual therapy as a standalone intervention places a patient’s focus of their LBP as biomechanical or as a structural issue which may reinforce unhelpful pain beliefs. They strongly suggested a balance of pain neuroscience education alongside manual therapy as appropriate to meet the expectations of a patient with chronic LBP (Puementura & Flynn, 2016).

**Current guidelines for the management of low back pain**

Chronic LBP has been linked to lack of adherence to current evidence and inappropriate treatment interventions (Lluch Girbés, Meeus, Baert, & Nijs, 2015). Unlike acute and subacute LBP there is currently no definitive treatment protocol for chronic LBP. In New Zealand, The Accident Compensation Committee (ACC) have set best practice guidelines to support HCPs treating patients with acute and sub-acute pain but no similar treatment model exists for pain that is deemed chronic. Best practice guidelines ensure effectiveness and efficacy in healthcare and in particular achieving consistency in treatment approaches based on evidence-based research. Although there are no best practice guidelines for chronic pain, current thinking encourages treatment interventions on addressing maladaptive processes driving chronic pain disorders rather than signs and symptoms (O’Sullivan, 2012). In addition, O’Sullivan and Lin (2011) have produced a framework (Figure 1.) for HCPs to
guide assessment and management for patients with acute LBP to reduce the risk of contributing to chronic pain mechanisms.

**Figure 1.** Framework for assessment and targeted management of patients with low back pain (O’Sullivan & Lin, 2014, p.10).

Many aspects of O’Sullivan and Lin’s (2014) framework is in accordance with ACC’s guidelines. The ACC (2004) advise careful clinical assessment to rule out “red flags” and further assess for psychosocial risk factors. In the absence of serious pathology ACC (2004) recommend practitioners reassure and explain the natural history of LBP recovery, continue normal daily activities, incorporate physical activity and return to work. They also strongly recommend avoiding inappropriate labels and a diagnosis that may cause anxiety and fear-avoidance behaviour (ACC, 2004). Currently, leading pain experts suggest HCPs should develop a greater understanding of pain as a complex multidimensional experience and pain
They also suggest developing more effective communication to explore a patient’s pain beliefs, coping strategies, fears, life stressors and other psychosocial factors (Nijs, Roussel, van Wilgen, Köke, & Smeets, 2013; O’Sullivan, 2013). In addition, identifying ideas or beliefs that are considered unhelpful, in order to positively influence these negative factors through education and support, is recommended. Furthermore, practitioners should avoid any negative messages that may reinforce pain beliefs and behaviour such as “the back is weak or unstable” (Darlow et al., 2016). Lastly, encouragement to returning to normal daily activities and self-management is considered critical in facilitating recovery (O’Sullivan & Lin, 2014).

**Conclusion**

There is ample evidence to demonstrate that not only do HCPs hold a diverse range of beliefs and attitudes about LBP but more importantly, what they say and do can affect patient recovery outcomes. (Coudeyere et al., 2006; Houban et al., 2005; Poiraudeau et al., 2006). It is therefore important for HCPs to acknowledge and understand the association between their beliefs and attitudes about LBP and the impact it may have on their patients. Today, the role of a musculoskeletal therapist has moved beyond a “hands on” manual therapy approach and HCPs are now encouraged to understand pain neurophysiology as well as be able to inform and advise patients on this topic. Attitudes and beliefs of HCPs and healthcare students have been relatively unexplored in New Zealand. Therefore this study was designed to identify common attitudes and beliefs among osteopath students in New Zealand. This may be helpful in identifying and targeting areas of focus to positively influence any attitudes and beliefs that may not be appropriate or in line with the various guidelines that currently exist. Secondly, this study will use a relatively new and unexplored tool, the Back-PAQ to measure students’ attitudes and beliefs. To my knowledge, its psychometric properties have only been tested in two prior studies, one on a sample of New Zealanders and the other on registered osteopaths and physiotherapists. This study aims to add to this existing data.
Reference


Unsgaard-Tøndel, M., Fladmark, A. M., Salvesen, Ø., & Vasseljen, O. (2010). Motor control exercises, sling exercises, and general exercises for patients with chronic low back pain:


Section 2: Manuscript

Note: This manuscript has been prepared in accordance with the “Guide for Authors” for the Journal, *Musculoskeletal Science and Practice*. The manuscript is formatted using Elsevier’s ‘Your Paper Your Way’ initiative as explained in their guidelines available online here: https://goo.gl/XM3LB0
Abstract

An investigation of attitudes and underlying beliefs toward low back pain among osteopathy students using the Back Pain Attitudes Questionnaire

Background: Chronic low back pain (LBP) is considered one of the most disabling health conditions worldwide. There is overwhelming evidence that psychosocial factors are important risk factors in the development and maintenance of chronic LBP. It appears that healthcare practitioners’ attitudes and beliefs regarding LBP can significantly influence the views of their patients.

Aims: To identify common LBP attitudes and belief orientations of New Zealand osteopathy students. The secondary aim was to investigate psychometric properties of the tool, the Back Pain Attitudes Questionnaire (Back-PAQ) which has had limited prior testing.

Methods: An online cross-sectional survey was conducted that included basic demographic information, the Health Care Providers’ Pain and Impairment Relationship Scale (HC-PAIRS) and the Back Pain Attitudes Questionnaire (Back-PAQ). Students marked on a Likert scale how strongly they agreed or disagreed with each item in the questionnaire. The convergent validity and internal consistency of the Back-PAQ was also evaluated against the HC-PAIRS. In total 83 students participated in this study.

Results: The median Back-PAQ and HC-PAIRS scores for students across all year levels were 6.5 and 46.0 respectively. Median Back-PAQ scores for Year 1 and 2 students were 10.0 and for Year 4 and 5 students’ 17.0. Third year students’ scored 11. Scores for the HC-PAIRS for Year 1 and 2 students were 54.0, Year 3 students scored 50 and for Year 4 and 5 students were 35.0. The Back-PAQ had ‘good’ internal consistency ($\alpha = 0.88$) and acceptable convergent validity (Pearson’s $r = -0.77$, P value <0.001) when measured against the HC-PAIRS. Conclusions: Overall, osteopathy students hold less than optimal attitudes and beliefs about the back, and back pain that are not in line with best practice guidelines. However, the study revealed promising results in that students in their final 2 years of study scored significantly more favourably than Year 1 and 2 students. The new tool Back-PAQ showed promising results for clinical application whereby good internal consistency and acceptable convergent validity were found.

Keywords: chronic low back pain, biopsychosocial factors, attitudes, beliefs, psychometric properties
INTRODUCTION

Low back pain (LBP) is a common condition in Western society causing substantial personal, social and economic cost (Copeland et al., 2008). Despite advances in understanding of pain neurophysiology, incident rates of LBP and associated disability continue to rise (Waddell, 2004; Waddell, 1996; Darlow, 2013). In New Zealand, LBP is considered a leading cause of health loss (McBride, Begg, Herbison, & Buckingham, 2004). The majority of LBP cases are considered non-specific and benign, nevertheless, a significant number of individuals experiencing LBP do not recover after 3-4 months resulting in chronic LBP (Croft, Macfarlane, Gary, Papageorgiou, Thomas, & Silman, 1999). Chronic pain is not only prevalent, costly, disabling and difficult to treat, it has strong associations with depression and anxiety (Swain & Johnson, 2014). In response to these factors it is now widely accepted that psychosocial influences play an important role in the development and maintenance of non-specific chronic LBP (Adler, 2009; Darlow, Dowell, Baxter, & Perry, 2013). It is recognised that patients’ attitudes and beliefs about their back and back pain are important influences in the transition from acute to chronic pain (Demmelmaire, Asenlof, Lindberg, & Denison, 2009; Linton, Vlaeyen, & Ostelo, 2002; Pincus et al., 2007). Several studies have demonstrated that negative pain beliefs including fear-avoidance behaviour and catastrophising are associated with poor recovery outcomes (Turner & Clancy, 1986; Westman et al., 2011). More recently, evidence exits that suggests healthcare practitioners hold a diverse range of attitudes and beliefs on LBP and can also influence patient recovery (Coudeyre et al., 2006; Darlow et al., 2012; Darlow et al., 2013). A recent systematic review demonstrated patients’ beliefs regarding their own back pain were strongly associated with their practitioners’ beliefs (Darlow et al., 2012). The same review found moderate evidence to suggest healthcare practitioners with a biomedical orientation of treatment style, or elevated fear-avoidance beliefs, prescribed reduced work hours and recommended limiting physical activity. It is important to note that both these actions conflict with clinical guidelines for the management of LBP (ACC, 2004).

Low back pain is one of the most common musculoskeletal complaints for individuals seeking healthcare and individuals will often receive treatment from an osteopath, physiotherapist and/or chiropractor (Houben et al. 2004; Evans et al., 2005). Recently commentators suggest the role of a musculoskeletal therapist has moved beyond a “hands on” manual therapy approach (Lluch Girbés, Meeus, Baert, & Nijs, 2015; O’Sullivan, 2012). It now appears that healthcare practitioners should not only understand pain physiology but that
skills in educating patients on this topic to promote optimal recovery are desirable (Lin et al., 2013; Lluch Girbés et al., 2015; O’Sullivan, 2012). Failure of effective management of chronic LBP has been linked to lack of adherence to current evidence and best practice guidelines (Lluch Girbés et al., 2015). The Accident Compensation Corporation (ACC) alongside The National Health Committee have established best practice guidelines for acute pain and currently there is no specific management pathway for chronic low back pain. Management is based-on ruling out red flags or other conditions and subsequently giving advice and encouraging self-management. This includes exercise and returning to normal activities as much as possible (ACC, 2004). The guidelines also include identifying psychosocial barriers to recovery (yellow flags) that would make coping with back pain more difficult. Chronic low back pain may be associated with yellow flags and patients who return to usual activity and work are less likely to suffer from persistent low back pain (ACC 2004). More recently the National Heath Committee (2015) has recognised that although New Zealand has an established model of care for acute low back pain there are no formal best practice guidelines for chronic low back pain.

The attitudes and beliefs of osteopaths and osteopathy students have been largely unexplored in New Zealand. A recent study revealed that registered New Zealand osteopaths did not have optimal attitudes and beliefs about LBP (Rushworth, 2015) but little is known about the attitudes and beliefs that osteopathy students may hold. Therefore, the aim of this study was to identify osteopath students’ attitudes and beliefs regarding back pain. This may give a better understanding of current pain beliefs and attitudes of students and secondly, help inform and identify areas of focus in education to positively influence these views. A secondary aim of this study was to report selected properties (internal consistency, convergent validity) of the Back-PAQ, a new tool developed in New Zealand that evaluates beliefs and attitudes in regards to the back and back pain.

METHODS

Design
An online cross-sectional web-based survey design was implemented to identify beliefs and attitudes about LBP in New Zealand osteopathy students. The questionnaire consisted of a basic demographic section and two instruments, the modified HC-PAIRS (Evans et al., 2005)
and the Back-PAQ (Darlow et al., 2014). Ethics approval for the study was obtained from the Unitec Research Ethics Committee (2015-1078).

**Participants**
The participants in the study were current osteopath students. Unitec is the only accredited provider for a registrable osteopathy qualification in New Zealand. The programme includes an undergraduate and postgraduate degree programme. The undergraduate programme consists of three years of theoretical and practical components whereas the Master of Osteopathy requires two years of full-time study including 1000 hours of clinical training.

**Pilot testing of the survey**
Prior to commencement of data collection, a convenience sample of five registered osteopaths were invited to complete the questionnaire to provide feedback on ease of use and language comprehension. Feedback indicated that although time consuming, the survey was easy to complete and understand and therefore implemented in the study. It was important to include both instruments in the questionnaire as the HC-PAIRS was included not only to measure student attitudes and beliefs but to correlate scores against the Back-PAQ.

**Data collection procedures**
Due to the small population of New Zealand osteopathy students (n=94) all students were contacted via email from the Unitec email database with information about the study. Information was also posted on the Unitec student discussion forum and on a Facebook group administered by students. Time during class was made available for students to complete the questionnaire and students were asked to bring a laptop or similar device if they wished to participate in the study. An online link was made available to students which gave them access to the questionnaire along with the Participant Information Sheet on the online survey platform (SurveyMonkey Inc. CA, USA) which allowed students to remain anonymous. In addition, the link was sent via email to cater for those who were not present on the day data was collected. Consent information was included and requested in the information sheet. A reminder email was sent the following week to encourage participation for non-respondents. All responses were collected within an eight-week time-frame between May and June, 2016.

**Instruments used in the study**
The questionnaire used demographic items (age, gender, and year level in the programme) followed by the HC-PAIRS (13 items) and Back-PAQ (34 items) to measure student attitudes and beliefs about LBP. The HC-PAIRS is regarded as an effective and valid tool in
measuring an individual’s attitudes and beliefs regarding pain. For this reason, The HC-PAIRS was selected in this study as a tool to measure the Back-PAQ psychometric properties against.

**Modified Healthcare Providers’ Pain and Impairment Relationship Scale**

The Healthcare Providers’ Pain and Impairment Relationship Scale (HC-PAIRS) was one of the first instruments designed to identify healthcare practitioners’ functional expectations of chronic pain patients. This HC-PAIRS was developed by Rainville, Bagnall, and Phalen (1995) and was adapted from the Pain and Impairment Scale designed by Riley, Ahern and Follick (1988) to measure practitioners’ beliefs. Since then, it has been widely used and accepted as a reliable and valid tool for assessment of healthcare practitioners’ attitudes and beliefs toward the relationship between pain and impairment (Houben et al., 2005).

Specifically, the instrument serves to measure how LBP beliefs affect physical function and assists as a predictor for work and activity recommendations. Numerous studies have demonstrated acceptable convergent validity, test-retest reliability and correlation to other similar instruments such as the Fear-Avoidance Behaviour Questionnaire (FABQ) (Waddel, Newton, Henderson, Somerville & Main, 1990) and the Tampa Scale of Kinesiophobia for Health Care Practitioners (TSK-HC) (Miller, Kori & Todd, 1991; Domenech, Segura-Orti, Lison, Espejo-Tort, & Sanchez-Zuriaga, 2013; Houben et al., 2004). Previous factor analysis for HC-PAIRS revealed 3 main themes of attitudes and beliefs including, ‘need for cure’, ‘social expectations’ and ‘functional experiences’ (Rainville et al., 1995). A modified version was used in this study in which the term ‘chronic low back pain’ was replaced by ‘low back pain’ in order to align better with the tool, the Back-PAQ. The modified version of the HC-PAIRS was originally used by Evans, Foster, Underwood, Vogel, Breen and Pincus (2005) in a study testing the effectiveness of an education intervention on reported behaviour and beliefs of UK chiropractors, osteopaths and physiotherapists. The tool consists of 13 items on a 7-point Likert scale ranging from “totally disagree” (1) to “totally agree” (7). The higher the respondents rating, the stronger the belief that LBP justifies disability. Total scoring values range from 15 up to 105.

**Back Pain Attitudes Questionnaire**

The Back Pain Attitudes Questionnaire (Back-PAQ) was developed by Darlow et al., (2014) and explores respondents’ own attitudes and beliefs about the back and back pain. The tool
was developed following in-depth interviews with New Zealanders experiencing acute and chronic LBP. Darlow et al. (2014) acknowledge the number of already established instruments such as the HC-PAIRS and the FABQ but state that these have been developed based on analysis of literature rather than directly on patient views themselves. The tool is also unique in that existing tools measure healthcare practitioners’ beliefs of their patient’s pain rather than the beliefs they hold about their own back and back pain. Darlow et al. (2014) suggests that from this perspective, a more accurate insight into practitioner advice and management of back pain may occur. In addition, the Back-PAQ was designed for application to both practitioner and patient unlike previous tools that require modifications to adjust for this transfer. The Back-PAQ consists of 34 items that respondents are asked to rate on a 5-point Likert scale ranging from “false” (-2) to “true” (+2). Scoring values range from -68 to 68 and items 1, 2, 3, 15, 16, 17, 27, 28, 29, 30, 31 are reverse scored. While there is no specific scoring value that indicates ‘good’ or ‘bad’ attitudes and beliefs, unhelpful and inaccurate beliefs are indicated by negative and low scores whereas higher scoring values indicate more appropriate attitudes and beliefs that are in line with current best practice guidelines set by the ACC (ACC, 2004). Six themes within the questionnaire were identified and can be used to establish areas respondents may hold inappropriate beliefs or attitudes. This may be helpful to identify areas of intervention to positively influence these beliefs (Darlow et al., 2014). The theme, ‘The vulnerability of the back’ relates to the concept that the back is a vulnerable structure that is easy to injury and include items 1-6, 9, 12 and 14. ‘The need to protect the back’ refers to the concept that the back requires protection and are assessed in items 7, 8, 10, 11 and 21. ‘The correlation between pain and injury’ relates to the concept that pain represents injury and tissue damage. These items are 13, 15-17, 22, 29, 30 and 31. ‘The special nature of back pain’ relates to the concept of back pain being more significant or having more impact than pain in other areas of the body. These items are 18-20, 23 and 24. ‘Activity participation while experiencing back pain’ represents beliefs and attitudes surrounding the risk versus the benefits of activity while experiencing back pain. These items are 25-27. The final theme, ‘the prognosis of back pain’ relates to beliefs regarding diagnosis and recovery outcomes of back and include items 28, 32, 33 and 34.

To date, the Back-PAQ has undergone limited testing with just two studies investigating psychometric properties. The first study, an exploratory investigation of the Back-PAQ on 602 New Zealanders aged 18 and above by Darlow et al. (2014) reported adequate internal consistency (α=0.70; 95% CI 0.66 to 0.73). More recently, Rushworth (2015) investigated
selected properties of this tool on 91 practising New Zealand osteopaths and 35 manipulative physiotherapists reporting good overall results. The study demonstrated acceptable internal consistency of $\alpha=0.91$ and excellent test-retest reliability (ICC = 0.84). Rushworth (2015) also showed moderate correlation to other well-known tests, the Fear Avoidance Behaviour Questionnaire (FABQ), the Tampa Scale of Kinesiophobia for Health Care Practitioners (TSK-HC), and the HC-PAIRS.

DATA ANALYSIS
Raw data was exported from the online survey into Microsoft Excel, 2013 to be sorted and tabulated. Data was then imported into the statistical software package, IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM Corp. Missing scores were replaced by a neutral score (the middle value of the Likert scale). Data was used to ascertain scores that measured attitudes and beliefs of respondents as well as psychometric properties of the tool, the Back-PAQ. Prior to data analyses, normality of distribution was calculated using the Shapiro-Wilk statistic along with skewness and kurtosis in addition to visual inspection of P-P and Q-Q plots. Based on the expected sample (n > 30) and on exploration of normality, all statistical tests employed were considered robust to breaches of normality (Field, 2009).

Descriptive statistics were calculated for participants and independent t-tests used to investigate difference in age, gender and year in the programme and their effects on questionnaire scores. Scoring values for themes in the Back-PAQ were identified for each year level. Psychometric testing included convergent validity, internal consistency and checking for ceiling and floor effects. Pearson's correlation coefficients was used to measure convergent validity (Streiner & Norman, 2014). Correlation coefficients were interpreted using Hopkins et al. (2009) descriptors, ranging from ‘trivial’ (r= 0 - 0.01) up to ‘perfect’ (r=1). Internal consistency for each instrument was calculated using Cronbach’s alpha. Cronbach’s alpha values > 0.70 to 0.95 are considered representative of acceptable internal consistency (Pallant, 2001). Ceiling and floor effects were also investigated and were considered when more than 15% of participants select items that constitutes the maximum (ceiling) and minimum (floor) scoring available (Magalhães, Costa, Ferreira, & Machado, 2011).

RESULTS
Out of a possible 94 student respondents, 83 completed the online survey. Four responses had missing data, but overall less than 1% of all values were missing. The breakdown of student participation numbers in this study are: Year 1, 12 out of 19 students; Year 2, 17 out of 19
students; Year 3, 21 out of 21 students; Year 4, 14 out of 14 students and Year 5, 19 out of 21 students. A description of participants is provided in Table 1.

**Table 1.** Descriptive characteristics of respondents

<table>
<thead>
<tr>
<th></th>
<th>Year in programme</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>9</td>
</tr>
<tr>
<td>M</td>
<td>3</td>
</tr>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>U20</td>
<td>4</td>
</tr>
<tr>
<td>20-25</td>
<td>0</td>
</tr>
<tr>
<td>26-30</td>
<td>1</td>
</tr>
<tr>
<td>32-35</td>
<td>3</td>
</tr>
<tr>
<td>36-40</td>
<td>2</td>
</tr>
<tr>
<td>41-45</td>
<td>2</td>
</tr>
<tr>
<td>56-50</td>
<td>0</td>
</tr>
<tr>
<td>51-55</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>12</td>
</tr>
</tbody>
</table>

Overall, the median score for students across all year levels in the Back-PAQ was 6.5 and the HC-PAIRS was 46.0 (Table 2 and Figure 2). For both the HC-PAIRS and the Back-PAQ there was a significant difference in the scores of year 1-2 versus year 4-5 students for the Back-PAQ (p < 0.001) and the HC-PAIRS (p < 0.001) (Table 3). The Back-PAQ and HC-PAIRS scoring values were more favourable in the last two years of the programme (higher scores in Back-PAQ and lower scores in HC-PAIRS) (Table 3.). No significant difference between males and females on both overall Back-PAQ and HC-PAIRS scores was observed (Back-PAQ median score female 7, and Male 7.5, p= 0.0624) (Table 4). Overall, the correlation between age and the Back-PAQ mean score was ‘small’ (Spearman’s rho = 0.16,
p=0.162). Similarly, the correlation between age and the HC-PAIRS score was ‘small’ (Spearman’s rho = -0.12, p=0.292).

Table 2. The Back-PAQ and the HC-PAIRS scores

<table>
<thead>
<tr>
<th>Year in programme</th>
<th>Mean</th>
<th>Median</th>
<th>IQR*</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5.5</td>
<td>56</td>
<td>8</td>
<td>18</td>
<td>77</td>
</tr>
<tr>
<td>2</td>
<td>51.9</td>
<td>51</td>
<td>5</td>
<td>18</td>
<td>78</td>
</tr>
<tr>
<td>3</td>
<td>47.9</td>
<td>50</td>
<td>4</td>
<td>12</td>
<td>72</td>
</tr>
<tr>
<td>4</td>
<td>39.9</td>
<td>40.5</td>
<td>3</td>
<td>13</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>37.3</td>
<td>35</td>
<td>2</td>
<td>20</td>
<td>18</td>
</tr>
<tr>
<td>overall score</td>
<td>46.1</td>
<td>46</td>
<td>4</td>
<td>20</td>
<td>18</td>
</tr>
</tbody>
</table>

Notes: IQR = Interquartile Range
Table 3. Comparison between Year 1-2 and Year 4-5 scores

<table>
<thead>
<tr>
<th></th>
<th>Year 1-2</th>
<th>Year 4-5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Back-PAQ</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>-10</td>
<td>17</td>
</tr>
<tr>
<td>IQR</td>
<td>18</td>
<td>15</td>
</tr>
<tr>
<td>P value</td>
<td>&lt; 0.001</td>
<td></td>
</tr>
<tr>
<td><strong>HC-PAIRS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>54</td>
<td>35</td>
</tr>
<tr>
<td>IQR</td>
<td>8</td>
<td>15</td>
</tr>
<tr>
<td>P value</td>
<td>&lt; 0.001</td>
<td></td>
</tr>
</tbody>
</table>

Notes: P value above indicates significant difference between year level scores

Table 4. Differences in gender scores in the Back-PAQ and the HC-PAIRs

<table>
<thead>
<tr>
<th></th>
<th>Back-PAQ</th>
<th>HC-PAIRS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>Mean</td>
<td>7.9</td>
<td>5.89</td>
</tr>
<tr>
<td>Median</td>
<td>7.5</td>
<td>7</td>
</tr>
<tr>
<td>SD</td>
<td>18.3</td>
<td>16.7</td>
</tr>
<tr>
<td>Min</td>
<td>-28</td>
<td>-20</td>
</tr>
<tr>
<td>Max</td>
<td>37</td>
<td>48</td>
</tr>
<tr>
<td>P value*</td>
<td>0.583</td>
<td>0.208</td>
</tr>
</tbody>
</table>

Notes: A P value above indicates there was no significant difference between male and female scores for the Back-PAQ and the HC-PAIRS.
Figure 1. Box plots demonstrating scoring trends of the HC-PAIRS and the Back-PAQ between year levels
Back-PAQ Themes

Overall, students scored lower in some themes than others (Table 5). The theme, ‘the need to protect’ had the most negative median score (-3.5) whilst the theme ‘the correlation between pain and injury’ had the most favourable score out of all 6 themes (median score=8.0).

Table 5. Scoring values of the Back-PAQ themes

<table>
<thead>
<tr>
<th></th>
<th>Vulnerability</th>
<th>Protect</th>
<th>Pain</th>
<th>Special</th>
<th>Activity</th>
<th>Prognosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min</td>
<td>-1.3</td>
<td>-10.0</td>
<td>-8.0</td>
<td>-10.0</td>
<td>-4.0</td>
<td>-4.0</td>
</tr>
<tr>
<td>Max</td>
<td>-8.0</td>
<td>10.0</td>
<td>16.0</td>
<td>10.0</td>
<td>6.0</td>
<td>8.0</td>
</tr>
<tr>
<td>Median</td>
<td>-1.0</td>
<td>-3.5</td>
<td>8.0</td>
<td>-3.0</td>
<td>3.0</td>
<td>3.0</td>
</tr>
<tr>
<td>IQR</td>
<td>5.0</td>
<td>6.0</td>
<td>7.0</td>
<td>5.0</td>
<td>3.0</td>
<td>5.0</td>
</tr>
</tbody>
</table>

Notes: Vulnerability= ‘the vulnerability of the back’; Protect= “the need to protect the back”; Pain= ‘the correlation between pain and injury’; Special= “the special nature of back pain”; Activity= ‘activity participation whilst experiencing back pain’; Prognosis= ‘the prognosis of back pain’.

Visual inspection of the themes in box plots (Figure 2), demonstrated more appropriate attitudes and beliefs regarding the back and back pain in more senior years of the programme. The theme ‘activity participation whilst experiencing back pain’ showed Year 5 students scored considerably lower than Year 3 and 4 students.
Figure 2. Box plots demonstrating the Back-PAQ theme trends between year levels
Psychometric properties

Internal consistency
The internal consistency of the Back-PAQ scores was tested using Cronbach’s alpha and a value of $\alpha = 0.88$ was calculated. This demonstrated ‘good’ internal consistency and suggests that multiple items of the instrument measure the same construct and are correlated (Pallant, 2010).

Convergent validity
The correlation between the Back-PAQ scores and HC-PAIRS was ‘very high’ (Pearson’s $r = -0.77$, $P < 0.001$) indicating good convergent validity based on operationally defined values for acceptable correlation between $r= 0.5$ and $0.8$.

Floor and ceiling effects
No floor or ceiling effect was observed in the results in the HC-PAIRS and the Back-PAQ thus increasing the reliability of the instrument (Terwee et al., 2007).

DISCUSSION
The primary aim of this study was to investigate attitudes and belief orientations of New Zealand osteopath students about LBP. The data revealed students’ median scores across all year levels in the Back-PAQ was 6.5 and HC-PAIRS was 46.0. Whilst there is no one agreed threshold that constitutes a satisfactory score, negative and low scoring values in the Back-PAQ represent unhelpful and inappropriate beliefs and attitudes whilst the higher the score the more accurate and appropriate beliefs and attitudes respondents hold for recovery promotion (Darlow et al., 2014). Scoring ranges from -68 to +68 and students’ overall scores are in middle of the range on the continuum. In interpreting scoring values of the HC-PAIRS, the higher the total score the more strongly respondents agree with the concept that pain justifies disability (Rainville et al., 1995). The overall median score of HC-PAIRS suggest that students neither strongly agree nor disagree with this notion.

It is comprehensible that students in the first two years of the programme would have limited knowledge surrounding back pain and pain itself and therefore would likely to present with overall poorer scoring values (median Back PAQ scores for Year 1: -10 & Year 2: -12). The curriculum in the first two years of the osteopathy programme is predominately biomedical with focus on anatomy, physiology, and osteopathy theory emphasising structure and function relationships. Importantly, this study shows students in their final year of study demonstrated significantly better scores in both the Back-PAQ and the HC-PAIRS. This may
demonstrate the effectiveness of continued exposure to pain science and LBP education within the osteopathy programme. Several studies support the role of specialised teaching modules on pain beliefs in students (Latimer, Maher, & Refshauge, 2004.; Strong, Tooth, & Unruh, 1999; Unruh, 1995). Although small studies, they provide valuable data that demonstrate beliefs and attitudes may be modified through education. Latimer et al., (2004) showed that physiotherapy students’ attitudes and beliefs regarding chronic back pain changed immediately after a 16 hour teaching module and these beliefs and attitudes were maintained 1 year later. Students in Year 3 of the programme undertake a 6-week block course in pain science and although the students had completed the course prior to sampling results demonstrate poorer scoring values than what would be expected after a teaching module of this kind. However, the focus in this course is not specific to LBP or managing pain in a clinical setting. Students in Year 4 and 5 are continually exposed to patients experiencing chronic pain and LBP in a teaching/training clinic and this may influence their attitudes and beliefs and explain the observed differences between the earlier and later year groups. Nevertheless, scoring values for Year 4 and 5 students indicate that although students hold more favourable attitudes and beliefs than students in the earlier stages of the programme, values are still not considered optimal for recovery promotion. The results may also suggest best practice guidelines for the management of LBP are not entirely followed.

**Comparison with other studies**

A recent study investigated practicing New Zealand osteopaths (n= 91) used the HC-PAIRS and the Back-PAQ amongst other tools to measure LBP attitudes and beliefs of its respondents (Rushworth, 2015). The study revealed mean scores for HC-PAIRS of 48.2 and for Back-PAQ of +2.3 (Rushworth, 2015). Interestingly, the mean Back-PAQ scores of Year 5 osteopathy students in the current study, are more favourable than the scores of osteopaths already in the profession as reported by Rushworth (2015). This was also true of the HC-PAIRS scores. An explanation for this difference could be the evolving nature of pain science in osteopathic education. Pain science has undergone major advances in the last decade and students are continually exposed to current research in this field. Unless practicing osteopaths undertake ongoing pain science education it is possible that their beliefs and attitudes may be reflective of what they learnt during their studies and no longer represent contemporary knowledge. Another similar study investigating New Zealand osteopathy students’ (n=80) attitudes and beliefs using the HC-PAIRS revealed comparable results to those in this current study (overall mean score=45.4) (Carrington, 2009). In addition, Carrington (2009) reported
practicing NZ osteopaths (n=162) demonstrated a mean score of 44.4 demonstrating that students’ scores were not significantly different from those already working in the profession in 2009.

**Gender**
No significant difference between male and female scoring values was observed in the Back-PAQ and the HC-PAIRS. This shows a similar trend to a previous study which also found no significant differences in scores based on gender within osteopathy students (Carrington, 2009).

**Themes**
When investigating themes in the Back-PAQ, the study found that certain themes scored better than others. The theme, ‘the need to protect the back’ scored lowest overall (mean score= -3.6). The negative score indicates this is an area where students’ attitudes and beliefs are less appropriate and therefore unhelpful in promoting optimal recovery outcomes. Items in this theme included “it is important to have strong muscles to support your back” as well as “good posture is important to your back”. Current research suggests that neither of these factors play a significant or relevant role in the continuation of non-specific chronic LBP (Christensen & Hartvigsen, 2008; O’Sullivan, Smith, Beales, & Straker, 2011; O’Sullivan, 2012; Roffey, Wai, Bishop, Kwon, & Dagenais, 2010). The concept that stability from back muscles or sitting postures and pain are correlated are also no longer considered to be accurate, however, O’Sullivan (2012) argues that this is still commonly advocated in practice. The results of this current study support O’Sullivan’s (2012) view and suggests that students may be still being taught predominately biomechanical or biomedical approaches for musculoskeletal pain within the curriculum from an early stage. The theme ‘the correlation between pain and injury’ scored significantly higher than other themes in the questionnaire (mean= 7.5). Research shows that pain can occur independent of tissue damage (Moseley, 2007; Zaki, Wager, Singer, Keysers & Gazzola, 2016) and this demonstrates that students have grasped this concept well. The results for the theme ‘activity participation whilst experiencing back pain’ revealed that Year 5 students scored significantly poorer than Year Year 3 and 4 students. This theme explores an individual’s belief system around activity participation and back pain. This includes beliefs that if activity or movement causes back pain then it should be avoided in future and overusing the back will wear it out. Best practice guidelines for acute low back pain state that practitioners should encourage return to normal daily exercise and duties as quickly as possible if a patient is experiencing low back pain.

56
These scores may indicate that students in their final year are advocating advice that goes against best practice guidelines during their clinical training.

**Internal consistency and convergent validity**

Internal consistency measures the homogeneity of the items in the questionnaire and a ‘good’ Cronbach’s alpha ($\alpha=0.77$) was observed in this study (Magalhães et al., 2011). Review of the literature indicates that only two previous studies have reported Cronbach’s alpha for the Back-PAQ scores in practitioners. Both Darlow et al. (2014) and Rushworth (2015) report acceptable internal consistency in their sample populations. Darlow et al (2014) reported $\alpha=0.70$ in a sample of New Zealanders randomly selected from the electoral role whereas Rushworth (2015) sampled registered and practicing osteopaths and reported $\alpha=0.91$.

The HC-PAIRS is considered to be psychometrically sound with good clinical utility and was used in this study to establish convergent validity (Streiner & Norman, 2014). The correlation between scores on the Back-PAQ and HC-PAIRS in this study (Pearson’s $r=-0.77$, $P<0.001$) support the convergent validity of the Back-PAQ. This is consistent with Rushworth (2015) who found a similar correlation.

**Strengths and limitations**

All questionnaires are subject to responder bias as there is no way to determine how truthful the response is, or how much thought the respondent has given to each item in the questionnaire. In addition, when using a Likert scale each respondent may read differently into what they perceive as ‘strongly agree’ versus ‘strongly disagree’ further highlighting the subjective nature of these types of questionnaires. Furthermore, the neutral option in a Likert Scale renders the question essentially redundant as it provides no information on the participants’ view in any one direction.

Given the size of the population, the response rate was high ensuring the attitudes and beliefs about back pain reported in this study were representative of NZ osteopathy students. Nevertheless, introducing a contrast group in this study would have allowed for direct comparison to other similar populations. For example, investigation into New Zealand physiotherapy students or even osteopathy students from Australia or the UK would allow for better insight where New Zealand osteopathy students fit in with other groups rather than relying on data from previous studies for comparison.
Further recommendations

A mixed method study comprising in-depth interviews of different groups identified from their scores on the Back-PAQ would allow for a deeper understanding on why students hold the attitudes and beliefs that they do. This may offer valuable insight and assist in areas of focus in pain education within the programme curriculum. Examining the course content and assessments applicable to pain science and its’ effect on scores would also be of benefit to assist programme curriculum changes. Based on the finding that students further along in the programme scored more favorably than Year 1 and 2 students, future studies could further investigate the efficacy of educational interventions in positively influencing unhelpful and inappropriate attitudes and beliefs in students. Lastly, further psychometric testing including test-retest reliability would help further establish the utility of the Back-PAQ.

Conclusion

Low back pain is a serious global health problem. There is ample evidence demonstrating practitioner attitudes and beliefs about the back and LBP are contributing factors to poor recovery outcomes in patients with LBP. This study showed that students in their final two years of the osteopathy programme scored significantly better than Year 1 and 2 students. Unfortunately, these scores still suggest a predominantly biomedical treatment orientation may be present in the earlier years of the osteopathy course. In addition, the study demonstrated that students neither strongly agreed nor disagreed in the notion that pain justifies disability. This uncertain treatment orientation may impact recovery promotion in patients with LBP resulting in iatrogenic disability. This information may be useful in guiding pain science curriculum within the osteopathy programme to ensure future practising osteopaths are equipped with the appropriate clinical information that aligns with best practice guidelines and also current thinking on this topic. Healthcare practitioners and healthcare students need to be aware of the association between the attitudes and beliefs they hold regarding LBP and the impact this can have on the clinical management of this condition and patient recovery. With this in mind, attention should be given to ensure practitioners are following best practice guidelines in their future care of low back pain patients. Secondly, the study also demonstrated the tool, The Back PAQ may be a useful instrument in measuring patient and practitioner beliefs about low back pain as it showed good internal consistency and acceptable convergent validity.
References


prioritisation-consultation


Section 3: Appendices
Appendix 1. Student Questionnaire on Back Pain

A survey of attitudes and underlying beliefs toward back pain amongst osteopath students: An evaluation of the psychometric tool Back-PAQ

Low back pain is a common condition that most of us are likely to experience at some stage in our life. This area of research is important as it may create awareness around the best approaches for students regarding patients with low back pain.

Who are the researchers?

My name is Hester Hilbink and I am currently in the final year of the Master of Osteopathy at Unitec.

My supervisors are Megan McEwen, Elizabeth Niven and Rob Moran who are health researchers and lecturers within the Faculty of Health and Social Sciences at Unitec, New Zealand.

What is involved in participating in this research?

The following questionnaire explores beliefs and attitudes on the back and back pain and will take approximately 10 minutes. The first section explores demographics (e.g. age and gender). The main part of the questionnaire presents you with a number of statements in which you need to select your answer on a continuum of strongly disagree to strongly agree. There are no right or wrong answers to the questions.

Responses are anonymous. The only persons who will have access to your responses will be you, my supervisors and I (the principal researcher). All information will be stored securely on a password secured computer and at Unitec for a minimum period of 5 years.

By clicking YES to consent in the box below you confirm that you have read this page and understand what is involved and are willing to complete the questionnaire.

This study has been approved by the Unitec Research Ethics Committee. If you have any complaints or reservations about the ethical conduct of this research, you may contact the Committee through the UREC Secretary (Ph: 09 815 4321 ext.7254). Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.

Thank you for your participation
### Appendix 2. Questionnaire

**Student Questionnaires About Back Pain**

Please answer all questions **#**

Mark your answers like this ✅

If you make a mistake, do this ✗

then tick the correct response

<table>
<thead>
<tr>
<th>Please rate each statement as</th>
<th>Completely disagree</th>
<th>Completely agree</th>
</tr>
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<tbody>
<tr>
<td>1 Low back pain patients can still be expected to fulfil work and family responsibilities despite pain</td>
<td>1 2 3 4 5 6 7</td>
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<tr>
<td>2 An increase in pain is an indicator that a low back pain patient should stop what they are doing until the pain decreases</td>
<td>1 2 3 4 5 6 7</td>
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<tr>
<td>3 Low back pain patients cannot go about their normal life activities when they are in pain</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
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<tr>
<td>4 If their pain would go away, low back pain patients would be every bit as active as they used to be</td>
<td>1 2 3 4 5 6 7</td>
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<tr>
<td>5 Low back pain patients should have the same benefits as the handicapped* because of their painful problem</td>
<td>1 2 3 4 5 6 7</td>
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<td>6 Low back pain patients owe it to themselves and those around them to perform their usual activities even when their pain is bad</td>
<td>1 2 3 4 5 6 7</td>
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<tr>
<td>7 Most people expect too much of low back pain patients, given their pain</td>
<td>1 2 3 4 5 6 7</td>
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<tr>
<td>8 Low back pain patients have to be careful not to do anything which might make their pain worse</td>
<td>1 2 3 4 5 6 7</td>
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<tr>
<td>9 As long as they are in pain, low back pain patients will never be able to live as well as they did before</td>
<td>1 2 3 4 5 6 7</td>
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<td>10 Low back pain patients have to accept that they are disabled persons, due to their pain</td>
<td>1 2 3 4 5 6 7</td>
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<td>11 There is no way that low back pain patients can return to do the things that they used to unless they first find a cure for their pain</td>
<td>1 2 3 4 5 6 7</td>
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<td>12 Even though their pain is always there, low back pain patients often don’t notice it at all when they are keeping themselves busy</td>
<td>1 2 3 4 5 6 7</td>
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<td>13 All of low back pain patients’ problems would be solved if their pain would go away</td>
<td>1 2 3 4 5 6 7</td>
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* We are aware that the term ‘handicapped’ is not liked by many people who have completed this questionnaire in the past but the research team are unfortunately unable to change this previously validated questionnaire as we may affect the results if we do so.

Student ID number: ________________________________
### THESE QUESTIONS ARE ABOUT YOUR OWN BACK

*Please rate each statement as*

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### THESE QUESTIONS ARE ABOUT LOOKING AFTER YOUR OWN BACK

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### THESE QUESTIONS ARE ABOUT BACK PAIN IN GENERAL

*Please rate each statement as*

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*Go to next page, question* 17
### THESE QUESTIONS ARE ABOUT BACK PAIN IN GENERAL

**Please rate each statement as:**

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<tr>
<td>30 When you have back pain, you can do things which increase your pain without harming the back</td>
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<td>31 Having back pain makes it difficult to enjoy life</td>
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<td>32 It is worse to have pain in your back than your arms or legs</td>
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<td>33 It is hard to understand what back pain is like if you have never had it yourself</td>
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### THESE QUESTIONS ARE ABOUT WHAT YOU SHOULD DO IF YOU HAVE BACK PAIN

**Please rate each statement as:**

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<tr>
<td>34 If your back hurts, you should take it easy until the pain goes away</td>
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<td>35 If you ignore back pain, you may cause damage to your back</td>
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<td>36 It is important to see a health professional when you have back pain</td>
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<td>37 To effectively treat back pain you need to know exactly what is wrong</td>
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<td>38 If you have back pain you should avoid exercise</td>
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<td>39 When you have back pain the risks of vigorous exercise outweigh the benefits</td>
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<td>40 If you have back pain you should try to stay active</td>
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</table>

### THESE QUESTIONS ARE ABOUT RECOVERING FROM BACK PAIN

**Please rate each statement as:**

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<tbody>
<tr>
<td>41 Most back pain settles quickly, as least enough to get on with normal activities</td>
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<tr>
<td>42 Worrying about your back can delay recovery from back pain</td>
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<td>43 Focussing on things other than your back helps you to recover from back pain</td>
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<tr>
<td>44 Expecting your back pain to get better helps you to recover from back pain</td>
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<td>45 Once you have had back pain there is always a weakness</td>
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<td>46 There is a high chance that an episode of back pain will not resolve</td>
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<td>47 Once you have a back problem, there is not a lot you can do about it</td>
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</tbody>
</table>

Student ID number ________________________________

[Go to next page, question A]
Appendix 3. Ethics Approval

Hester Hlibink
155c Okere Road
Okere Falls
Rotorua, RD 4

19.11.15

Dear Hester,

Your file number for this application: 2015-1078
Title: A survey of attitudes and underlying beliefs toward back pain among osteopath students: an evaluation of the psychometric tool Back-PAQ

Your application for ethics approval has been reviewed by the Unitec Research Ethics Committee (UREC) and has been approved for the following period:

Start date: 19.11.15
Finish date: 19.11.16

Please note that:

1. The above dates must be referred to on the information AND consent forms given to all participants.

2. You must inform UREC, in advance, of any ethically-relevant deviation in the project. This may require additional approval.

You may now commence your research according to the protocols approved by UREC.

We wish you every success with your project.

Yours sincerely,

[Signature]

Sara Donaghey
Deputy Chair, UREC

cc: Elizabeth Niven
Cynthia Almeida
Full name of author: Hester Hilbing

Full title of thesis/dissertation/research project ('the work'):
An investigation of attitudes and underlying beliefs toward low back pain among osteopathy students: An evaluation of the pyrexic network.

Practice Pathway: 

Degree: Master of Osteopathy

Year of presentation: 2017

Principal Supervisor: Megan McEwen

Associate Supervisor: Elizabeth Niven, Rob Moran

Permission to make open access
I agree to a digital copy of my final thesis/work being uploaded to the Unitec institutional repository and being made viewable worldwide.

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Copyright Compliance:
I confirm that I either used no substantial portions of third party copyright material, including charts, diagrams, graphs, photographs or maps in my thesis/work or I have obtained permission for such material to be made accessible worldwide via the Internet.

Signature of author: 

Date: 1.4.1.9.3.1.2.0.1.7

Unitec Institute of Technology
TE WHARE WANANGA O WAIRAKA
Declaration

Name of candidate:

This Thesis/Dissertation/Research Project entitled: An investigation of attitudes and underlying beliefs toward low back pain among osteopaths is submitted in partial fulfillment for the requirements for the Unitec degree of

Principal Supervisor: Megan McErwin
Associate Supervisor/s: Elizabeth Munro Rob Moran.

CANDIDATE'S DECLARATION

I confirm that:

- This Thesis/Dissertation/Research Project represents my own work;
- The contribution of supervisors and others to this work was consistent with the Unitec Regulations and Policies.
- Research for this work has been conducted in accordance with the Unitec Research Ethics Committee Policy and Procedures, and has fulfilled any requirements set for this project by the Unitec Research Ethics Committee.

Research Ethics Committee Approval Number:

Candidate Signature: [Signature] Date: 14/03/2017

Student number: 1400952