The effect of yoga as an adjunct to home-based exercise on pain, disability, and quality of life in people with chronic non-specific neck pain: A randomised controlled trial

Naomi Andrews

A research project submitted in partial fulfillment of the requirements for the degree of Master of Osteopathy, Unitec Institute of Technology, 2015
Declaration

Name of candidate: Naomi Andrews

This research project entitled The effect of yoga and adjunct home-based exercise on pain, disability, and quality of life in people with chronic non-specific neck pain: A randomised controlled trial is submitted in partial fulfillment for the requirements for the Unitec degree of Master of Osteopathy.

Candidate’s declaration
I confirm that:

• This research project represents my own work;
• 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: 2014-1043

Candidate signature: ………………………… Date: 18th February 2016

Student number: 1004101
Acknowledgements

I would like to thank my supervisor Dr. Catherine Bacon for all of her support and patience during this research project. Thank you to Dr. Alexandra Hart for reading and her expertise regarding yoga. Thank you to Robert Moran for being the voice of reason.

Special thanks to my research partner, Freya Scollay, and to all our participants for their willingness and time in the project.

Thank you to my friends and classmates for the huge amount of support and encouragement throughout my postgraduate years.

Finally and most importantly, very special thanks to my fiance Richard for all of your support over the past five years. Besto friendo.
## Contents

Declaration.................................................................................................................. 2  
Acknowledgements.................................................................................................... 3  
Contents..................................................................................................................... 4  
Introduction to Thesis................................................................................................. 7  
**Section 1: Literature Review**.................................................................................. 8  
Introduction................................................................................................................ 9  
Chronic Musculoskeletal Pain (CMSP)......................................................................... 10  
  - Definition and Causes.......................................................................................... 10  
  - Pain Behaviours and Psychosocial Risk Factors for CMSP............................... 10  
  - Chronic Pain Risk Screening.............................................................................. 12  
    - Yellow Flag screening questionnaire............................................................... 12  
    - Credibility and expectancy questionnaire (CEQ)............................................ 13  
Neck Pain...................................................................................................................... 15  
  - Classification and Epidemiology........................................................................ 15  
  - Patient Characteristics......................................................................................... 16  
  - Mechanical Sources and Causes...................................................................... 16  
  - Pain, Disability, and Health Outcome Measurements....................................... 17  
    - Neck pain intensity via Visual Analogue Scale (VAS)................................. 17  
    - Neck pain disability via Northwick Park Neck Pain Questionnaire (NPNPQ)......................................................................................................................... 18  
    - Health and well-being via 36-item Short Form (SF 36) questionnaire........... 19  
Clinical Management Guidelines............................................................................... 20  
Exercise for Chronic Non-specific Neck Pain (CNSNP).............................................. 20  
  - Clinical Prescription Intervention.................................................................... 20  
  - Exercise Intervention Effectiveness.................................................................... 21  
Compliance in Clinical Exercise Interventions.......................................................... 25  
Yoga.............................................................................................................................. 28  
  - Asana (Postures)............................................................................................... 28  
  - Pranayama (Breathing Exercises)....................................................................... 29  
Relaxation and Increased Body Awareness................................................................. 29
Prevalence of Yoga Participation and Characteristics of Yoga Users..............30
Yoga for Spinal Pain and Disability.................................................................30
  Low back pain (LBP)..................................................................................31
  Chronic non-specific neck pain (CNSNP) and disability............................33
  Health-related outcomes...........................................................................35
Conclusion........................................................................................................38
Research Question........................................................................................38
References........................................................................................................39

Section 2: Manuscript......................................................................................68
  1. Abstract....................................................................................................70
  2. Introduction.............................................................................................71
  3. Methods..................................................................................................72
     3.1. Study Design.....................................................................................72
     3.2. Study Sample and Eligibility Criteria..............................................73
     3.3. Randomisation and Data Collection.................................................73
     3.4. Interventions....................................................................................74
        3.4.1. Exercise.....................................................................................74
        3.4.2. Yoga........................................................................................74
     3.5. Outcome Measures.........................................................................75
        3.5.1. Neck pain intensity..................................................................75
        3.5.2. Neck pain disability.................................................................75
        3.5.3. Quality of Life (QoL).................................................................76
        3.5.4. Credibility and expectancy.........................................................76
        3.5.5. Yellow Flag questionnaire.........................................................76
     3.6. Statistical Data Analysis...................................................................77
  4. Results......................................................................................................78
     4.1. Participants.......................................................................................78
        Figure 1. CONSORT Participant Flow Chart......................................79
        Table 1. Baseline Sociodemographic Characteristics, Neck Pain
                Characteristics, and Treatment Expectancy.................................80
     4.2. Changes in Pain Intensity and Disability..........................................81
     4.3. Health Related Quality of Life (QoL).................................................81
     4.4. CEQ and Yellow Flag Correlations....................................................81
Figure 2. Pain and Disability Scores from Baseline to Week 12 for Both Groups

Table 2. Effects of Yoga and Home-Based Exercises on Health-related Quality of Life via the Short Form (SF 36) Questionnaire

5. Discussion

6. Conclusion

7. Addendums

7.1. Yoga Asana (Postures)

7.2. Home-Based Exercises

8. References

Section 3: Supplementary Material

Appendix A: Ethics Approval Letter

Appendix B: Participant Recruitment Poster

Appendix C: Social Media Participant Recruitment (Facebook Page Example)

Appendix D: Participant Screening Questions

Appendix E: Participant Information

Appendix F: Participant Consent Form

Appendix G: Visual Analogue Scale (VAS)

Appendix H: The Northwick Park Neck Pain Questionnaire (NPNPQ), And Scoring Instructions

Appendix I: Health And Well Being Short Form 36 Questionnaire (SF 36), And Scoring Instructions

Appendix J: Credibility And Expectancy Questionnaire (CEQ)

Appendix K: ACC Low Back Pain Questionnaire (Yellow Flags), And Scoring Instructions

Appendix L: Exercise Compliance Sheet

Appendix M: Complementary Therapies And Clinical Practice Author Information
Introduction to Thesis

Neck pain, which frequently progresses to chronic non-specific neck pain (CNSNP), is prevalent globally (Fejer, Kyvik, & Hartvigsen, 2006; Binder 2007; Hogg-Johnson et al., 2009). Prescription guidelines for healthcare practitioners include home-based exercises, for which there is moderate evidence of efficacy (Childs et al., 2008; Häkkinen, Kautiainen, Hannonen, & Ylinen, 2008; Bryans et al., 2014; Karlsson, Takala, Gerdle, & Larsson, 2014; Gross et al., 2015). Yoga has become increasingly popular as an intervention for musculoskeletal conditions and mental health issues (Ross, Friedmann, Bevans, & Thomas, 2013). Accordingly, research into the effect of yoga as an intervention for chronic musculoskeletal pain has become more abundant as yoga has gained in popularity (Posadzki, Ernst, Terry, & Soo Lee, 2011; Bussing, Ostermann, Ludtke, & Michalsen, 2012). To date, yoga studies specifically investigating benefits for CNSNP remain few, and currently there are no published studies where all groups in the cohort participate in a homogenous control (Michalsen, 2012; Cramer et al., 2013).

The aim of the randomised controlled trial (RCT), reported in this 90-credit Master of Osteopathy thesis, was to investigate if yoga as an adjunct to prescribed home-based exercises is beneficial for pain, disability, and health-related outcomes for CNSNP. This research project was run concurrently with another thesis research project investigating the effects of equipment Pilates as an adjunct to home-based exercises for chronic non-specific neck pain. The exercise only group was shared as the control group between the two studies. This thesis is arranged in three main sections: Section One is a literature review that outlines chronic musculoskeletal and neck pain, and explores prescribed exercise and yoga as management interventions. Section Two contains a manuscript formatted in the style for submission to the journal Complementary Therapies in Clinical Practice. Section Three contains appendices of material supplementary to the RCT performed.
Section 1: Literature Review
**Introduction**

Neck pain, and its subsequent disability, is a common musculoskeletal complaint, second only to low back pain (LBP) in terms of cost and prevalence (Fejer et al., 2006; Childs et al., 2011). It has been reported that over the course of a lifetime approximately 50% of individuals will experience a clinically important neck pain episode (Hoy, Protani, De, & Buchbinder, 2010; Cohen, 2015; Shahidi, Curran-Everett, & Maluf, 2015). In the majority of neck pain cases there is little evidence of specific pathology or cause, hence it is labelled non-specific neck pain (NSNP) (Mayou & Farmer, 2002). In a subset of people neck pain may not resolve quickly leading to chronic neck pain which is defined as pain lasting longer than three months. Chronic non-specific neck pain (CNSNP) has been found to have a negative influence on a person’s quality of life due to functional impairment, and chronic pain has been suggested to play a role in development of depression and psychological stress (McBeth, Macfarlane, & Silman, 2002; Haavisto et al., 2004; Nakao & Yano, 2006; Cramer et al., 2013). The high prevalence of CNSNP makes it a major public health concern in terms of overall wellbeing, cost of work absence, and medical expenses (Fejer et al., 2006).

Evidence from population-based surveys suggests that health-care providers commonly prescribe exercise for the management of CNSNP (Southerst et al., 2014). Prescribed exercises may take the form of home-based exercises, usually done with no supervision. Compliance to a regular home-based exercise prescription may be difficult for many people due to factors such as lack of self-discipline, technique comprehension, and time constraints. Attendance at group exercise classes may encourage higher compliance compared to a home-based exercise prescription. Group encouragement, scheduling ease, and instructor direction are all factors that may contribute to greater compliance. Current clinical intervention guidelines for CNSNP promote stretching and strengthening exercises for the neck and shoulders to reduce pain and disability (Childs et al., 2008; Bryans et al., 2014). Multiple trials have assessed home-based strengthening and stretching of the neck and shoulder muscles, with only moderate evidence for effectiveness (Häkkinen et al., 2008; Dusunceli, Ozturk, Atamaz, Hepguler, & Durmaz, 2009; Karlsson, Takala, Gerdle, & Larsson, 2014; Gross et al., 2015). Sufferers of CNSNP may seek out, or be referred to, complementary therapies as an adjunct to regular exercise. Yoga has been reported as one of the most commonly used complementary treatments for neck pain (Wolsko, Eisenberg, Davis, Kessler, & Phillips, 2003; Cramer et al., 2013). In the developed world yoga is becoming a popular
form of non-pharmacological therapy as a supplement or preferred treatment for the management of musculoskeletal-related physical and psychosocial symptoms (Ward, Stebbings, Sherman, Cherkin, & Baxter, 2014). Evidence from clinical research studies has demonstrated that yoga as an intervention for the management of pain and disability across a range of musculoskeletal is moderately effective. (Raub, 2002; Lipton, 2008). This growing body of literature recognises the importance of yoga as an intervention for spinal pain including CNSNP and LBP, and other musculoskeletal conditions. Therefore, the purpose of this literature review is to provide background to an investigation seeking to determine whether yoga classes as a therapy prescription are beneficial for pain, disability, and quality of life (QoL) outcomes affected by CNSNP compared to usual exercise interventions.

**Chronic Musculoskeletal Pain (CMSP)**

**Definition and Causes**

Chronic musculoskeletal pain (CMSP) is defined as pain that persists past the healing stage following an injury, typically lasting >12 weeks (Fryer, Alvizatos, & Lamaro, 2005; Apkarian, Baliki, & Geha, 2009). It can be highly debilitating, affecting mood, relationships, exercise routines, and workplace engagement (Goodman & Snyder, 2013). Causal factors leading to CMSP remain speculative. Pain can be the result of an unresolved injury, it may be associated with an underlying pathology or condition, or the cause may be unknown. If causality can be related to an unresolved injury this may help to guide the treatment and management plan. Conversely, applying the most appropriate treatment for CMSP can be difficult if the cause remains idiopathic (Turk & Melzack, 1992; Conn, 2005).

**Pain Behaviours and Psychosocial Risk Factors for CMSP**

CMSP is often associated with psychosocial risk factors, defined by The World Health Organisation (WHO) as factors pertaining to a person’s ability to deal effectively with the
demands of and challenges of everyday life (WHO, 1997). This ability involves the maintenance of a state of mental well-being, demonstrated through adaptive and positive behaviour while interacting with others (WHO, 1997). People experiencing CMSP may experience psychosocial problems including withdrawal from social situations, negative thoughts or feelings, and/or believe that they are highly disabled, sometimes perceiving that they are much more disabled than the level and intensity of pain they are suffering would indicate (Goodman & Snyder, 2013). Additionally, pain perception is a subjective experience dependant on past encounters with pain, the expectation of pain, and the individuals’ beliefs around pain (Loeser & Melzack, 1999; Bogduk, 2006). Psychosocial risk factors, as defined by WHO (1997), and subjective pain perception are both determinants that result in unique responses and pain behaviours. For some people pain-related fear and subsequent avoidance of movements appear to be essential features of the development of CMSP (Vlaeyen & Linton, 2000).

Due to the links between CMSP and psychosocial factors, it is not surprising that CMSP has been found to be more likely in individuals with a history of depression, anxiety, and catastrophisation (Gore, Sadosky, Stacey, Tai, & Leslie, 2012; Hilderink et al., 2012). Catastrophisation is defined as the tendency to focus on pain and negatively evaluate one's own ability to deal with pain (Keefe, Rumble, Scipio, Giordano, & Perri, 2004). These risk factors have all shown to exacerbate the burden of painful diseases (Geisser, Roth, Theisen, Robinson, & Riley, 2000; Bair, Robinson, Katon, & Kroenke, 2003). Eysenck’s (1997) cognitive theory of anxiety states that highly anxious individuals demonstrate hypervigilance, which refers to the propensity to attend to any stimuli being presented even when these are irrelevant. Pearce and Morley (1989) suggested that people with chronic pain are characterised by “selective attention towards cues that are thematically related to pain and its consequences” for example, environment and current concerns. All of these characteristics may be part of the foundation for perceived pain transitioning from acute to chronic pain and disability (Vlaeyen & Linton, 2000). Berna et al. (2010) studied the effects of sad and neutral cognitive mood inductions by applying a noxious heat stimulus to 20 healthy volunteers. Functional magnetic reasonance imaging was used to measure pain ratings, pain-specific cognitions, and central pain processing. When compared with the neutral mood induction, sad mood induction caused a higher degree of unpleasant pain and catastrophisation. This experiment illustrates that a positive or negative state of mood and cognition can influence pain perception at a neural level and suggests that interventions to modify these processes...
may be useful to reduce pain (Berna et al., 2010).

In a systematic review of psychological risk factors for spinal pain Linton (2000) reported a consistent relationship between depressed mood and increased risk of chronic pain and disability. People with high pain catastrophising scores over predict pain and are less open to new information to change pain behaviour (Crombez et al., 2002; Goubert et al., 2002). Undiagnosed depressive moods including anxiety in musculoskeletal patients may help to explain the high incidence of idiopathic CMSP states. Seemingly simple clinical presentations may develop into complex conditions which involve a range of psychological and social factors interacting with physical factors to cause chronic pain and functional disability (Cote, Cassidy & Carroll, 2003). The use of psychosocial risk factor questionnaires as screening tools may help clinicians to predict the likelihood of acute musculoskeletal pain patients developing into chronic musculoskeletal pain patients (Shahidi, Curran-Everett, & Maluf, 2015).

**Chronic Pain Risk Screening**

*Yellow Flag screening questionnaire.* An evidence-based understanding of the psychosocial risk factors associated with musculoskeletal pain becoming chronic has resulted in the development of clinical screening tools such as The Yellow Flag Screening Instrument (YFSI) (Grimshaw et al., 2004; Barosi, 2006; Grimmer-Somers, Prior, & Robertson, 2008). Patients with higher yellow flags scores exhibit psychosocial risk factors for the development of acute to chronic pain. They may seek more care from government-subsidised healthcare services whilst taking more time off work incurring higher personal and public cost, than those with lower yellow flags scores. Grimmer-Somers, Prior, & Robertson (2008) piloted a strategy, targeting the New Zealand population, for more effective management of patients with acute LBP who were claiming healthcare subsidies from The Accident Compensation Corporation, a government-funded insurance scheme that covers personal injury. The pilot sought to draw correlations between claimant’s YFSI scores, and healthcare length and cost including work absences. The pilot study design recommended the YFSI be completed on a claimant’s second visit to their general practitioner (GP) for acute LBP. If the patient had *at-risk* yellow flags scores (< 49 low risk; 50 — 89 some risk; 90 — 105 moderate to high risk;
>105 at-risk), and/or if their care necessitated more than five GP visits then they were referred to specialist pain management services including physiotherapy and psychology services. Compared to patients with an YFSI score of <50 all other patients scoring >50 were more likely to incur treatment costs in excess of the overall median cost per patient. These results imply that the inclusion of a psychosocial risk factor assessment tool in a clinical setting may help to earlier identify and manage patients at risk of becoming CMSP patients, leading to more effective interventions to reduce disability and associated healthcare costs (Vlaeyen & Linton, 2000).

**Credibility and expectancy questionnaire (CEQ).** Another strategy for identifying modifiable predictors for people with musculoskeletal pain patients becoming or remaining chronic is assessment of peoples beliefs about and expectations of the prescribed treatment intervention. It is well established that patients’ beliefs and expectations impact their health outcomes (Linton, Vlaeyen, & Ostelo, 2002; Pincus, Vogel, Burton, Santos, & Field, 2006; Demmelmaier, Asenlof, Lindberg, & Denison, 2010). Devilly and Borkovec (2000) developed the CEQ to measure both treatment credibility and expectancy for use in clinical outcome studies. Treatment credibility describes how “believable, convincing, and logical the treatment is to the patient”, and treatment expectancy refers to “improvements the patient believes will be achieved personally” (Smeets et al., 2008). Credibility questions are to be answered in terms of what the participant ‘thinks’ about the intervention, and expectancy is to be answered in terms of what the participant ‘feels’ about the intervention. The CEQ has demonstrated high internal consistency and good test-retest reliability (Devilly & Borkovec, 2000; Smeets et al., 2008). However, even though the CEQ includes an explanation that belief has two aspects to it – what one thinks will happen, and what one feels will happen – it also states that “sometimes these are similar and sometimes they are different” (Devilly & Borkovec, 2000). This statement is somewhat ambiguous, and could result in contrasting interpretations of what it means to complete the form with any difference between how one ‘feels’ and what one ‘thinks’. This lack of clarity may result in questions being interpreted differently between participants, bringing into question the external validity of the results.

Smeets et al. (2008) conducted a RCT using the CEQ on a sample of people with chronic LBP to examine the association between treatment credibility and expectancy, and participant characteristics and rehabilitation treatment outcomes. Several participant characteristics were significantly associated with a higher level of reported pre-treatment credibility including
female gender ($P < 0.05$), reporting less pain-related fear ($P < 0.01$), less catastrophising ($P < 0.05$), and more internal control of pain ($P < 0.01$). Furthermore, work status was significantly ($P < 0.05$) correlated with treatment credibility with participants reporting partial sick leave having the highest credibility score, followed by those working full time, and those without a job. Participants on full time sick leave or disability pension scored the lowest credibility scores, which may relate to the effects of psychosocial factors associated with chronic pain such as depressive mood. For pre-treatment expectancy, pain-related fear has been identified across a range of studies as the single statistically significant contributor accounting for 6.5% of its variance (Goossens, Vlaeyen, Hidding, Kole-Snijders, & Evers, 2005; Smeets et al., 2008).

Linde et al. (2007) pooled analysis from four RCTs of acupuncture for patients with headaches, chronic LBP, and osteoarthritis of the knee to investigate the influence of expectations on outcome. Participant credibility and expectancy were assessed at baseline and again after the third of eight sessions of acupuncture. All four trials reported a significant association between higher outcome expectations and better improvement, compared to participants with lower expectations. The adjusted odds ratio for a minimum 50% improvement amongst patients who considered acupuncture as highly effective therapy, compared to those who were more sceptical, was 1.67 (95% CI 1.20—2.32). For personal expectations and confidence after the third session, the odds ratios were 2.03 (95% CI 1.26—3.26) and 2.35 (95% CI 1.68—3.30), respectively. In a similar trial comparing acupuncture and massage for chronic LBP researchers also found that participants randomised to the treatment they preferred had more positive outcomes than those receiving the less desired treatment (Kalauokalani et al., 2001). These results may not be generalisable to the population at large since those who agreed to the trial were seeking relief from their pain and may have had more positive preconceived ideas about the benefits of acupuncture for pain thus why they signed up to the study. Nevertheless, the results presented in these studies support the research evidence on placebo analgesia showing that expectations can modify pain perception in the brain (Mayberg et al., 2002; Petrovic, Kalso, Petersson, & Ingvar, 2002; Wager et al., 2004).
Neck Pain

Classification and Epidemiology

Neck pain is perceived as arising from the cervical region, which is anatomically bounded superiorly by the superior nuchal line, inferiorly by the first thoracic vertebrae, and laterally between the left and right borders of the neck (International Association for the Study of Pain, 2012). The cervical spine is composed of seven vertebrae, ligaments, musculature, and nerves, which control and link the neck to the thoracic spine, upper back, shoulders, and head (Last & McMinn, 1994). Neck pain can be classified by duration (acute, <6 weeks; sub-acute, <12 weeks; chronic, >12 weeks), severity, etiology, and type (mechanical vs. neuropathic) (Cohen, 2015). Differentiating neuropathic from mechanical pain is an important clinical distinction as it affects and informs treatment decisions (Cohen, 2015). Previously published studies on the epidemiology of neck pain report prevalence spanning a wide range, which may, at least in part, result from considerable variance in study design. For example, some studies report point (current) prevalence, and some report period prevalence (over the last month, year, or lifetime). A systematic review of 91 research articles investigating non-specific neck pain reported a mean point prevalence of 7.6% (range 5.9 — 38.7%), and mean lifetime prevalence of 48.5% (range 14.2 — 71.0%) (Binder, 2007). This is compared to a review of 249 neck pain studies that reported a 12-month prevalence of pain ranging between 30 — 50%, and 12 month prevalence of activity-limiting pain between 1.7% — 11.5% (Hogg-Johnson et al., 2009). Additionally, the countries in which epidemiological data have been collected show distinct patterns of geographical distribution, predominantly North America, Scandinavia, Netherlands, and the United Kingdom. The research would be more relevant to the world population if a wider geographical range of neck pain prevalence studies existed. Fejer et al. (2006) conducted a systematic review of epidemiology studies across what the authors described as the ‘general population’. However, figures reported are only compiled from those countries that have conducted epidemiology studies, and the review was restricted to articles published only in English. Regardless of the exact percentage of neck pain in the world population, epidemiological studies do agree that neck pain is a common musculoskeletal problem and a major public health concern (Rekola, Keinänen-Kiukaanniemi, & Takala, 1993; Côté, Cassidy, & Carroll, 2003; Binder, 2007; Hogg-Johnson et al., 2009; Cohen, 2015).
Characteristics of People with Neck Pain

Neck pain prevalence data suggests incidence increases with age and there is a higher recorded occurrence amongst women compared to men (Cote, Cassidy, & Carroll, 2003; Fejer et al., 2006). Croft et al. (2001) reported neck pain incidence increased slightly from youth with age, peaking between 30 and 45 years. In addition, females were shown to have a 30% increased risk of 12 month incidence of neck pain compared to males, though confidence limits show that this difference was of borderline statistical significance. Higher prevalence amongst females may be due to women reporting more musculoskeletal problems than men by visiting healthcare services for neck pain more frequently than men (Rekola et al., 1993). LeResche (1999) hypothesised greater female engagement with these services is due to a range of factors including gender-specific biological, psychological, and socialisation processes, as well as differing exposure to occupational and social roles. Additionally, neck pain is more prevalent among lower socioeconomic status groups; those performing repetitive, static work or physically demanding work; those with previous neck trauma; and those suffering from comorbid conditions such as depression, LBP, and headache (Cote, Cassidy, & Carroll, 2003). A study by Schellingerhout et al. (2008) supported these findings reporting recurring predictors for recovery in patients with acute and CNSNP. Predictors included lower pain intensity at baseline for short term recovery within 3 months, and LBP and age for longer-term recovery of greater than 3 months.

Mechanical Sources and Causes of Neck Pain

NSNP commonly arises insidiously and is generally multifactorial in origin (Heintz & Hegedus, 2008). In an estimated 50 — 80% of neck pain cases the exact pathoanatomical cause cannot be definitively determined (Hush, Maher, & Refshauge, 2006). Once serious pathology such as cervical fracture or tumour, and neural compromise such as nerve root compression, has been ruled out patients are often described as having a non-specific mechanical neck disorder (Childs et al., 2008). ‘Non-specific’ and ‘mechanical’ are useful words to illustrate the point that there are often several tissues within the neck that can contribute to the overall clinical picture of neck pain (Apkarian, Baliki, & Geha, 2009). Innervate anatomical structures that serve as sources of peripheral nociception in the neck or
The cervical region can include ligaments, joints, intervertebral discs, nerve and blood vessels, and muscles including those that attach from the cervical vertebra and occiput to the scapula and 1st and 2nd ribs (Goodman & Snyder, 2007; Stone & Stone, 2012). Neck pain and subsequent disuse of neck muscles may cause muscle weakness, and functional changes in the muscle spindle receptors (sensory receptors that detect changes in muscle length). Loss of muscle strength and range of movement in the neck may impair proprioceptive acuity, creating compensation patterns that affect musculoskeletal movement beyond just the neck (Armstrong, McNair, & Taylor, 2008).

Specific physical risk factors such as poor posture, neck strain, and sporting or occupational activities may all contribute to NSNP (Binder, 2007). There is some evidence that occupational exposures to poor posture and ergonomic positioning may increase the risk of NSNP (Eltayeb, Staal, Hassan, & De Bie, 2009; Shahidi, Curran-Everett, & Maluf, 2015). Working with the neck in a protruded position for an extended period of time has been shown to be significantly associated with neck pain, and has been highlighted in neck pain research (Ariens, Bongers, Hoogendoorn, Van Der Wal, & Van Mechelen, 2002; Ortiz-Hernandez, Tamez-Gonzalez, Martinez-Alcantara, & Mendez-Ramirez, 2003). Conversely, a recent systematic review of only 7 studies aimed at gaining insights into risk factors for the development of NSNP in office workers, found only limited or conflicting evidence to support shared physical risk factors (Paksaichol, Janwantanakul, Purepong, Pensri, & Van Der Beek, 2012).

Pain, Disability, and Health Outcome Measurements

**Neck pain intensity via Visual Analogue Scale (VAS).** The VAS is a well known clinical practice and research tool for measuring pain intensity, and has a long history of use in medical outcome studies (Price, McGrath, Rafii, & Buckingham, 1983; Ylinen et al., 2003; Kersten, Kütükdeveci, & Tennant, 2012; Dimitriadis, Strimpakos, Kapreli, & Oldham, 2014). Respondents rate their present pain intensity by marking a point along a straight line, typically presented in horizontal format, at which one end is labeled ‘No pain’ and the other end is labeled ‘Worst possible pain’. A VAS is considered to reduce the confounding effect of variation between individual interpretations which can be made from the verbal graduations used in other rating scales. Additionally, a VAS enables a finer distinction between subjective
states of pain intensity (Kersten et al., 2012). One of the main weaknesses with the VAS scale is that it does not account for the subjective nature of pain individual to each patient. Patients may interpret pain measurement scales very differently so scores can vary widely (Farrar, Young, LaMoreaux, Werth, & Poole, 2001). Additionally, there is evidence that patients tend towards marking the beginning, middle, and end of measurement scales preferentially (Serlin, Mendoza, Nakamura, Edwards, & Cleeland, 1995). Ultimately though, the patient’s report must be accepted as a valid representation of their individual perception of pain (Farrar, Portenoy, Berlin, Kinman, & Strom, 2000).

For clinical trials of neck pain, there is some disagreement surrounding data analysis of the VAS. Some have argued that VAS measures do not qualify as interval variables and should thus be analysed as ranks using non-parametric approaches (Kersten et al., 2012). Others disagree, contending that parametric analysis is appropriate for at least some VAS because they have true ratio scale (and therefore also interval scale) properties, but that it is less appropriate for category scales or 11-point numerical rating scales (Price, Staud, & Robinson, 2012). Another controversy surrounding the use of VAS scores in clinical research is whether or not participants should have knowledge of their previous scores. Williamson and Hoggart (2005) argue that if the concern is to gauge a patients opinion of their pain at a particular point in time then blinding to previous pain scores is appropriate. However, Scott and Huskisson (1979) identified that some patient’s scores were not in agreement with other measures of their disease progress. Furthermore, given that repeated scores using the VAS can vary as much as 20% it may be appropriate to show the patient their score history, which may reduce variation and improve accuracy of further pain scores (Williamson & Hoggart, 2005).

**Neck pain disability via Northwick Park Neck Pain Questionnaire (NPNPQ).** The NPNPQ is a region-specific questionnaire that measures the impact of pain on the performance of common daily activities. It is a necessary tool for the evaluation of clinical progress over time, and between interventions. In a systematic review of scales for the measurement of functional outcome for neck pain the NPNPQ was compared to the Neck Disability Index (NDI), another widely used specific neck pain questionnaire (Vernon & Mior, 1992; Pietroben, Coeytaux, Carey, Richardson, & DeVellis, 2002). Both are based on the Oswestry Low Back Disability Questionnaire, a 10-item measure designed to assess pain-related limitations in activities of daily living, thus they are similar in format (Fairbank, Couper, Davies, & O’Brien, 1980; Vernon & Mior, 1994). The NDI is the most widely
validated among different patient populations. Therefore, the NDI has accumulated more evidence compared to the NPNPQ to show that its psychometric characteristics should remain stable in different settings. A notable difference between the NPNPQ and the NDI is the exclusion of a functional driving question from the NDI. This question was omitted to allow greater generalisability to non-driving European populations (Vernon & Mior, 1994). However, the exclusion of a functional driving question limits the application of the NDI to those populations with a high percentage of drivers, resulting in no assessment of one of their common daily activities. Consequently, it is important for researchers to consider how a scale might perform for the population they are targeting for recruitment.

**Health and well-being via 36-item Short Form (SF 36) questionnaire.** The Medical Outcomes Study SF 36 is a self-administered questionnaire that measures perception of health status, widely used in general population surveys and clinical trials (Ware, Jr, 2000). It was designed to assess the benefit of healthcare interventions for use in population studies (Hawker, Mian, Kendzerska, & French, 2011). The SF 36 measures positive and negative aspects of health on 8 multi-item dimensions, covering functional status, well-being, and overall evaluation of health. Reliability testing using internal consistency methods has shown reliability coefficients consistently exceed recommended standards for group level analysis (Ware, Kosinski, & Keller, 1996). Content validity has been assessed by systematically comparing the health concepts included, with those in other generic health surveys. The SF 36 includes 8 of the most frequently measured health concepts, however some argue that a major content weakness is the lack of a sleep dimension question as sleep disturbance is commonly associated with ill health (Hunt & McKenna, 1993). It has also been highlighted that the questionnaire has a greater focus on lower body function as 6 of 10 of the physical function scales pertain to lower body mobility (Carlesso, Walton, & MacDermid, 2012). Brazier et al. (1992) examined the test-retest reliability of the SF 36 questionnaire by resending 250 study participants the SF 36 questionnaire again at a 2-week interval. To overcome the issue of correlation coefficients not indicating the direction of association, the distribution of differences in scores was examined. Test and retest scores were assumed to be from the same distribution when differences have a mean of zero and 95% of the differences lie within the 95% confidence limits. For all dimensions 91—98% of cases lay within the 95% CI constructed for a normal distribution. From 75% responders the maximum mean difference in dimensions scores was 0 — 80 out of 100, which implies that a person with a test score of 70 might score 71 on restesting making test-retest reliability high (Brazier et al., 1992).
Clinical Management Guidelines

Best-practice clinical guidelines for neck pain patients presenting for physical therapy management have been produced based on research evidence, clinical experience, and consensus, to establish diagnosis and treatment modalities (Anderson-Peacock et al., 2005; Childs et al., 2008; Bryans et al., 2014). Such guidelines include recommendations regarding diagnosis, prognosis, intervention, and assessment of outcome. The goal when treating neck pain has been relief of pain, restoration of physical function, prevention of longer-term symptoms, and successful maintenance and/or reintegration of the patient into the workplace or society (Binder, 2007). Clinical guidelines for the management of CNSNP place emphasis on supporting and empowering patients to be active partners in the management of their condition, which include home-based exercise programs. Guidelines encourage patient education, self-management of control and coping strategies, and rapid return to activities (Waddell, McIntosh, Hutchinson, Feder, & Lewis, 1999; Jordan 2003; ARMA 2004; COST 2004).

Cook, Rodeghero, Cleland, & Mintken (2015) identified statistically significant predictors that have a high risk for poor prognosis for individuals suffering from CNSNP. High-risk predictors included longer duration of symptoms, surgical history, and greater disability at baseline. Statistically significant low risk predictors included younger age, shorter duration of symptoms, no surgical history, fewer comorbidities, and less functional disability at baseline. Schellingerhout et al. (2008) observed similar high-risk predictors for longer recovery in patients with CNSNP including co-existing LBP, and patients greater than 50 years of age.

Exercise for Chronic Non-specific Neck Pain (CNSNP)

Clinical Prescription Intervention

Several studies have reported an association between decreased strength and endurance capacity of the cervical muscles, namely the anterior cervical flexors, and neck pain (Chiu & Sing, 2002; Ylinen, Salo, Nykanen, Kautiainen, & Hakkinen, 2004). Prolonged avoidance of movement and activities, characteristic of CNSNP, may cause detrimental changes in the
musculoskeletal system including loss of strength and range of movement, and reduced muscle coordination and physical fitness (Vlaeyen & Linton, 2000). Clinical intervention prescription guidelines begin with gentle neck and shoulder stretching to increase active range of movement (ROM), gradually moving towards strengthening of the associated muscles including the cervical flexors (Childs et al., 2008; Bryans et al., 2014). Specific exercise treatment aims for CNSNP from various guidelines include muscle conditioning, exercise tolerance optimisation, and postural education (Evans, Bronfort, Nelson, & Goldsmith, 2002; Childs et al., 2008; Bryan et al., 2014).

**Exercise Intervention Effectiveness**

There have been several recent systematic reviews investigating and comparing the effectiveness of home-based exercise, different forms of exercise including stretching and strengthening, manual therapy treatments, and group exercise for NSNP (Miller et al., 2010; Tsakitzidis & Remmen, 2013; Southerst et al., 2013; Cheng, Su, Yen, Liu, & Cheng, 2015; Gross et al., 2015). These systematic reviews all report that moderate quality evidence suggests ‘small’ to ‘large’ beneficial effects of exercise on CNSNP immediately post-treatment and at short- to long-term follow up when combining the use of cervical and shoulder/scapulothoracic strengthening and stretching exercises (Häkkinen et al., 2008; Dusunceli et al., 2009; Karlsson et al., 2014). Despite the positive findings in favour of exercise from these systematic reviews, there appears to be a substantial range of study methodologies, and design weaknesses which make drawing solid conclusions difficult. Weaknesses of these studies include non-standardised methodology and reporting, including exclusion of exercise descriptions making reproducibility difficult in a clinical setting (Viljanen et al., 2003; Karlsson et al., 2012; Gross et al., 2015). Additionally, a large percentage of the participants recruited across studies are female, meaning applicability to male populations is more difficult to gauge, if the possibility of gender differences is considered (Viljanen et al., 2003; Ylinen et al., 2003; Zebis et al., 2011; Karlsson et al., 2014). The wide range in the magnitude of effect and quality of evidence reported across these systematic reviews implies that evidence for exercise for CNSNP is still inconclusive. Therefore, clinical recommendations are usually based upon expert opinion rather than high quality studies.
Greater homogeneity within exercise research trials may provide more conclusive outcomes when investigating pain and disability outcomes for CNSNP. For example, inclusion of homogenous subgroups of neck pain participants based on symptoms, and length of time experienced; and homogenous length, amount, and training intensity of exercise interventions. A Cochrane systematic review of research concerning the short and long term effect of exercise therapy on pain, disability, patient satisfaction, and QoL among NSNP patients found no high quality evidence from 28 trials that met the inclusion criteria (Gross et al., 2015). Miller et al. (2010) reviewed 17 RCTs that compared combined exercise and manual therapy interventions to other treatment modalities and no treatment controls, for pain, disability, and QoL outcomes for neck pain. Seven studies recruited participants with acute, subacute, and mixed duration neck pain, and 12 recruited participants with chronic neck pain. Additionally, Miller et al. (2010) and Southerst et al. (2014) included participants suffering from neck pain attributed to specific mechanisms not deemed as non-specific, for example whiplash associated disorder (WAD), cervicogenic headaches, and neck pain with radicular symptoms. This is in contrast to Gross et al. (2015) and Tsakitzidis & Remmen (2013) who provided more homogenous reviews, in this respect, by including only studies of participants with NSNP. However, both Gross et al. (2015) and Tsakitzidis & Remmen (2013) included participants suffering from NSNP across three timeframes - acute, subacute, and chronic. Though also including a range of timeframes, Miller et al. (2010) reported separate analyses and conclusions for chronic and acute neck conditions. Cheng et al. (2015) provided the most homogenous review by only including only studies that included CNSNP participants. Distinguishing subgroups within neck pain participants, for example acute, subacute, chronic, specific, and non-specific, may make it easier for manual therapists to interpret results and recommend and apply interventions that are appropriate for the specific neck pain sub group presenting. Furthermore, reviewing all of the subgroups as one group might hide divergent results between subgroups. Participants suffering from varying neck pain symptoms, and pain over lesser and greater time periods are likely to result in fundamentally different scores on pain, disability, and QoL questionnaires.

Both Miller et al. (2010) and Tsakitzidis & Remmen (2013) concluded strong and moderate evidence, respectively, of efficacy for a multimodal care approach including manual therapy, described as manipulation and/or mobilisation, plus exercise for improvements in pain, function, QoL, and patient satisfaction for chronic neck pain. Both studies failed to report a
list of specific exercises to be used in conjunction with manual therapy, which may have been helpful for healthcare practitioners by providing them with more easily applicable evidence-based recommendations.

Gross et al.’s (2015) review is reported in terms that are more clinically interpretable in that more specific exercise descriptions are included, for example, body region, muscle groups; and type of exercise, for example, stretching, strengthening, and aerobic. Overall, Gross et al. (2015) reported moderate quality of evidence favouring a multimodal strategy that included exercise and mobilisation/manipulation for pain, function, and general perceived effect in the short and long term for mechanical neck disorders. Cheng et al. (2015) concluded from six studies, of which two used the same cohort but assessed different items of therapeutic effectiveness, that exercise had greater benefit for pain, disability, and QoL outcomes compared to control groups. Short-term (10 to 12 weeks, 2 to 3 times per-week, 34 – 60-minute sessions) exercise interventions improved pain and neck mobility, and increased pressure pain threshold. Longer-term interventions (1 year, 3-times per-week, 60-minute sessions) reduced pain intensity and disability, enhanced neck muscular strength, and increased neck endurance during passive activity, and pressure pain threshold. Additionally, participants in longer-term interventions showed improved QoL compared to baseline scores.

Three RCTs featured an unsupervised or home-based exercise intervention arm (Häkkinen et al., 2008; Dusunceli, Ozturk, Atamaz, Hepguler, & Durmaz, 2009; Karlsson et al., 2014). All unsupervised programs were accompanied by written materials, and most provided at least one instructional session. Exercises varied across studies including craniocervical flexion, cervical range of motion (ROM), cervical isometric strengthening, cervical dynamic resistance strengthening, shoulder ROM or strengthening, and stretching. All three studies reported decreased pain and disability from strengthening and stretching exercises combined and alone. Additionally, one study found greater improvements to pain from strengthening exercises compared to stretching exercises, over a 12-month period. Conclusively, all three studies agree that consistent, specific neck and shoulder strengthening and stretching exercises, over a 12-month period are effective for NSNP. However, there is no apparent consensus on optimum exercise intensity, dosage, and frequency over a 12-month period.

Dusunceli et al. (2009) compared isometric and stretching exercises \( (n = 19) \), and neck stabilisation exercises \( (n = 19) \), as adjuncts to the use of physical therapy agents including ultrasound and transcutaneous electrical nerve stimulation \( (n = 17) \) for pain and disability
caused by NSNP. A mean decrease in VAS (0—10 scale) from baseline to week 4 was reported across all three groups in the first month, however VAS in the physical therapy agents control group increased from 1 to 12 months (mean 5.3—7.6) compared to baseline (mean 6.9). The strengthening group reported a greater pain decrease from baseline to 12 months (mean 6.7—3.6), compared to the isometric and stretching group (mean 6.4—5.5). The study concluded that a combination intervention of neck strengthening exercises plus physical therapy agents is more effective for pain and disability caused by neck pain, compared to neck strengthening exercises plus therapy agents, or therapy agents alone. These findings have a number of possible limitations. The exercise groups were only completing the exercises interventions from week 3 to 12 months, with no mention of continuation of the physical therapy agents after the initial three-weeks. This may indicate that any pain decreases observed from week 4 to 12 months can only be attributed to the exercises. The authors fail to report this weakness anywhere in the study. Furthermore, compliance is not reported making it difficult to determine if it affected the results between the exercise groups. Another potential weakness is the inclusion of two sub-groups of NSNP, subacute (6 – 12 weeks) and chronic.

Häkkinen et al. (2008) compared the effectiveness of a strength and stretching programme ($n = 48$) to stretching alone ($n = 51$) for pain, disability, muscle strength, and neck mobility caused by CNSNP over a 12-month period. No significant differences in improvement to pain and disability were reported between groups (strength and stretching mean pain decreased 37mm; stretching only mean pain decreased 32mm). However, improvements in disability were significant in both groups ($P<0.001$). Training adherence decreased over the 12-month period from the intended 3 sessions per week. According to participants’ training diaries, mean strength-training frequency was 2.1 (0.6) times per week in the first 2 months, and 1.1 (0.7) during months 3 to 12. Mean stretching frequency for the combined training group was very similar, 2.1 (0.7) for the first 2 months, and 1.3 (0.7) times per week during months 3 to 12. The stretching only group also reported a very similar mean compliance of 2.4 (0.8) in the first 2 months, and 1.4 (0.8) times per week in months 3 to 12. Most of the decreases in pain occurred during the first two months in both groups, which may be explained by the increased compliance during the first two months of the intervention. A strength of this study is the inclusion of participants with CNSNP only. Conversely, a potential limitation is that the entire cohort was female meaning the results cannot necessarily be applied to men.
Similarly, Karlsson et al. (2014) compared home-based only stretching ($n = 23$) to strengthening ($n = 34$) neck and shoulder exercises over 12 months for chronic neck pain in a female-only cohort. Pain and disability decreased in both groups over a 12-month period with no greater decreases seen in either group. The inclusion of specific descriptions of the strength exercises, is a strength of Karlsson et al.’s reporting, but there is no description of the stretching exercises and the reference provided does not further elucidate. Compliance to the interventions was low throughout the study, which, the researchers hypothesised, may have compromised the results.

**Compliance in Clinical Exercise Interventions**

Another general issue common to studies in the area of exercise interventions for musculoskeletal pain, including the neck, is that of compliance, including poor participant compliance, and inconsistent reporting and analysis of compliance. Compliance is defined as the extent to which a person’s behaviour corresponds with agreed recommendations from a healthcare provider; and non-compliance to exercise is a failure to follow a prescribed exercise intervention (Holden, Haywood, Potia, Gee, & McLean, 2014). Compliance to an efficacious intervention program enhances its effectiveness, and those who are compliant may be less likely to progress to recurrent, persistent, or disabling problems (Hayden, van Tulder, & Tomlinson, 2005; McLean, May, Klaber-Moffett, Sharp, & Gardiner, 2007). Non-compliance may negatively affect treatment outcome and duration, and may be responsible for non-significant research outcomes, including in relation to exercise interventions, the appearance that they that they are ineffective (Turk & Rudy, 1991; Salo et al., 2012).

Despite its importance to provide a true picture of the effect of an intervention, compliance to clinic-based exercise protocols is often around 50%, and is usually worse for unsupervised home-based exercise programs (Kolt & McEvoy, 2003; Forkan et al., 2006; Hardage et al., 2007; McLean, Klaber Moffett, Sharp, & Gardiner, 2013). A lack of cohort compliance may have affected the results in the Häkkinen et al. (2008) stretching versus strengthening and stretching comparison study, compromising the conclusions that can be drawn. The decrease in training adherence, seen in months 3 to 12 of the 12-month study, may be explained by the change of environment from supervised group-training sessions in the first two months to
unsupervised home-based exercises. Supervision may be an important factor in maintaining higher levels of compliance (Ylinen et al., 2003). Although, the stretching group only received one group session and their compliance was similar to the stretching and strengthening group. This might be explained by initial motivation by the study participants in the first two months of the study, which diminished as the study continued. The same theme of non-compliance was reported in the Karlsson et al. (2014) study, which reported low compliance from the start of the study that fell steadily over the 12-month intervention period. To look more closely at the effects of compliance on the results Karlsson et al. (2014) placed participants in two groups according to individual compliance. Compliance was defined as the completion of half of the intervention per-week for 8 unbroken weeks. Completers in both stretching and strengthening exercise groups showed similar improvements in neck pain and function from baseline to 4 to 6 months (89% and 79% respectively), and 12 months (53% and 55% respectively). Comparatively, the non-compliant participants reported much lower changes to pain and function in both stretching and strengthening exercise groups at 4 to 6 months (11% and 21% respectively), and 12 months (47% and 45% respectively).

A Cochrane systematic review assessed 42 trials to determine the effects of interventions to improve compliance to exercise and physical activity for people with CMSP (Jordan, Holden, Mason, & Foster, 2010). Exercise delivery methods included supervising exercise sessions, refresher sessions and audio or videotapes of the exercises to take home. Supervised or individualised exercises, and graded exercise activity starting with basic progressing to more challenging exercises, were found to be useful for improving exercise compliance. Overall, the review concluded there were no definitive strategies for improving exercise compliance in adults with musculoskeletal pain because the strategies implemented were inconsistent from study to study (Jordan et al., 2010).

Clinical trials of exercise for musculoskeletal pain often do not measure and/or report compliance making it difficult to compare the true efficacy of different interventions. A recent systematic analysis of 7 randomised home-based exercise studies for chronic neck pain found that only 4 of the studies reported on training compliance (Salo et al., 2012). All four studies reported that training compliance decreased considerably over time during the intervention (Taimela, Takala, Asklöf, Seppälä, & Parviainen, 2000; Bronfort et al., 2001; Viljanen et al., 2003; Ylinen et al., 2003). Furthermore, no gold standard measure of compliance exists which may better ensure more standardised reporting of compliance (Treuth, 2002).
Multiple analysis methods, including intention-to-treat (ITT) and per protocol (PP) analyses, may be utilised when analysing RCTs with high non-compliance. ITT analysis uses all the data collected, regardless of whether or not the participant completed the full intervention, which maintains the benefits of randomisation (Armijo-Olivo, Warren & Magee, 2009). ITT does not require adjustment for post-randomisation factors because it estimates the effect of assigned (baseline) treatment (Hernán, Hernández-Díaz, & Robins, 2013). Therefore, ITT analysis allows comparison of the effectiveness of the intervention offered, rather than the intervention received. This aims to reflect what might actually happen in clinical practice. PP analysis includes only the data from the participants who were compliant with their randomised intervention. ITT analysis is widely recommended as the accepted method, or 'gold standard', for analysing outcome data in RCT’s (Tilbrook et al., 2014). However, not all studies provide follow-up information regarding those participants who have withdrawn from the intervention. Failing to include these people may introduce bias, as those individuals may have been less likely to respond favorably to the intervention. Conversely, a major weakness with the ITT analysis model is that it may underestimate the treatment effect in those patients who have complied with the allocated intervention (Tilbrook et al., 2014). Unlike PP analysis, ITT analysis may therefore not answer the question about the potential for the intervention, as designed by the researchers for the hypothesis proposed, to be effective or not. A RCT of yoga for chronic LBP used ITT analysis to report the effect of 12 yoga classes ($n = 156$), in addition to usual GP care ($n = 157$), for LBP (Tilbrook et al., 2011). Full compliance was not achieved by 40% of the participants, therefore to control for any dilution of the effect of yoga due to non-compliance the authors produced a multiple method analysis study that included PP analysis. ITT analysis conducted on the fully compliant group (minimum 6 of 12 yoga sessions) estimated a slightly smaller mean change in self-reported disability scores ($−2.17, P < 0.001$ at 3-months, and $−1.57, P = 0.007$ at 12-months) compared to PP analysis ($−3.12, P < 0.001$) at 3-months, and $−2.11, P = 0.001$ at 12-months). The difference between PP and ITT analyses outcomes are statistically insignificant, however treatment effects for fully compliant participants were larger than those who upheld any compliance, which indicates that fully compliant participants had better intervention outcomes.
Yoga

Yoga is an ancient practice that originated in India approximately 4,000 years ago (Sivananda Yoga Vedanta Centre (SYVD), 2008). The word yoga derives from the Sanskrit word yug meaning to yoke, which refers to the yogic discipline of aligning the body and mind (Birdee et al., 2008). It is one of the oldest systems of personal development in the world encouraging the integrated development and balance of the body, mind, and spirit (Lidell, 2000). Yoga incorporates four main paths – Karma yoga, Bhakti yoga, Jnana yoga, and Raja yoga (Lidell, 2000). Karma yoga aims to purify the heart through selfless acts without thought of gain or reward; Bhakti yoga is the path of devotion through prayer, worship, and ritual, including chanting and singing; Jnana yoga uses knowledge of yogic philosophy to search for self-realisation; and Raja yoga is the discipline of physical and mental control (Lidell, 2000). Raja yoga incorporates eight limbs, or disciplines, to purify the body and mind, ultimately leading the yogi to Samadhi (enlightenment). Asana (postures) and Pranayama (breathing exercises) are two of these disciplines, which are the yogic paths most utilised in the West (Lidell, 2000). In isolation Asana and Pranayama have shown to provide great value in terms of psychophysical well-being (Hewitt, 1991; Smith, Hancock, Blake-Mortimer, & Eckert, 2007; Hartfiel, Havenhand, Khalsa, Clarke, & Krayar, 2011; Michaelson et al., 2012). Hatha yoga combines Asana, Pranayama, and relaxation (Lidell, 2000).

Asana (Postures)

One of Hatha yoga’s classical texts, the Hatha Yoga Pradipika (1915), describes Asana as a balanced programme of postures aimed at every muscle, nerve, gland, and organ in the body. Asana is considered to be characteristically distinct from Western systems of body culture because it is non-competitive, refreshing rather than fatiguing, can be performed by men and women of all ages, and aims to bring body, mind, and spirit into harmony and equilibrium (Hewitt, 1991). Asana are postures to be held combined with deep abdominal breathing using the diaphragm (Lidell, 2000).
**Pranayama (Breathing Exercises)**

Regulation of the breath during *Pranayama* and *Asana* is a central concept to Hatha yoga (Hewitt, 1991; Gilbert, 1999). According to yogic philosophy, breath is considered an outward manifestation of the energy that flows through the physical body (SYVC, 2008). The general principles of yogic breathing include abdominal breathing using the diaphragm; closed mouth nasal breathing; slower, longer inhalation and exhalation; and observation of the breath (Gilbert, 1999). By focusing on the breath the mind and body are connected, which serves to build a higher awareness of the practitioners physical self and keeps the mind in the present. *Pranayama* is the term used for specific breathing exercises, which include *Anuloma Viloma* (alternate nostril breathing) (Lidell, 2000). Relative performance in verbal (left hemisphere) tasks has been found to vary according to which nostril is dominant (Block, Arnott, Quigley, & Lynch, 1989; Shannahoff-Khalsa, 1991). Sympathetic nervous activity via heart rate has been shown to rise with right-nostril breathing; and emotional tone, or affectivity, was found to be more negative with left-nostril breathing (Schiff & Rump, 1995; Telles, Nagarathna, & Nagendra, 1995). Unilateral nostril breathing may manipulate sympathetic nervous system dominance to some degree allowing the yoga practitioner to calm and regulate their nervous system (Raghuraj & Telles, 2008).

**Relaxation and Increased Body Awareness**

Physical and mental relaxation is an essential part of the *Hatha* yoga practice. Relaxation is sought by concentrating on breathing steadily and rhythmically using the diaphragm (Lidell, 2000). The mental focus on the body and breath encouraged in yoga practice may help students to increase body awareness. Body awareness can be described as “the subjective, phenomenological aspect of proprioception and interoception that enters conscious awareness, modifiable by mental processes including attention, interpretation, appraisal, beliefs, memories, conditioning, and attitudes” (Mehling et al., 2011). Patients suffering from CMSP have described an increased awareness of body movements and posture after yoga practice (Michalsen et al., 2012). Dimensions of body awareness have been inversely correlated with psychological variable associated with chronic pain, such as catastrophising and anxiety (Daubenmier et al., 2012). Increased physical awareness may draw attention to compensatory
and ineffective movement patterns that can be worked on in yoga practice. This heightened body awareness may improve pain management, emotion regulation, and conscious relaxation of tense muscles, which may help prevent worsening of musculoskeletal pain through disadvantageous biomechanics and contribute to alleviation of mental stress (Sherman, Cherkin, Erro, Miglioretti, & Deyo, 2005).

**Prevalence of Yoga Participation and Characteristics of Yoga Users**

Yoga has become extremely popular on a global scale as a quasi-spiritual system of physical self-development, and as a holistic form of self-improvement (Alter, 2007). In 2012 the United States National Centre for Complementary and Integrative Health conducted a national health interview that found that of 21 million adults surveyed throughout America, 9.5% had used yoga to treat musculoskeletal complaints and mental health conditions. This was a substantial increase from 6.1% in 2007 and 5.1% in 2002 (Ross, Friedmann, Bevans, & Thomas, 2013). The same survey also reported that yoga users are more likely to be Caucasian, female, young, and college educated.

**Yoga for Spinal Pain and Disability**

Yoga intervention studies for LBP and CNSNP comprise similar limitations to the weaknesses present in exercise interventions, including small sample sizes, non-compliance, and insufficient study methodology and reporting. Additionally, heterogeneity of yoga interventions regarding the yoga tradition practiced, intervention frequency, length of the yoga sessions and overall intervention, may limit the interpretation of study results and affect the ability to draw solid conclusions from the body of research (Sherman et al., 2005; Williams et al., 2005; Cramer, Lauche, Haller, & Dobos, 2013). Lack of standardisation of the type of yoga being practiced, including differences in *Asana* and inclusion or exclusion of relaxation and *Pranayama*, across the studies reviewed makes study replication challenging. Reviews that only analyse studies that have used the same style of yoga would make it easier to draw more specific conclusions about the different yoga styles. Furthermore, when comparing a yoga class participant to a home-based exercise participant, the effect of instructor attention and social interaction with other students during classes may have an
effect on patient self-scoring in pain and disability questionnaires. Additionally, the literature reviewed did not include information discussing the possibility of adverse effects related to yoga. Certain postures are not recommended during pregnancy or menstruation, and some postures can overstretches muscles and joints leading to damage (Ernst, 2001). There are many different forms of yoga and some may be more suitable for those with chronic spinal pain than others. Careful consideration of the yoga form in question should be given before recommendations are given to spinal pain patients (Kirkwood, Rampes, Tuffrey, Richardson, & Pilkington, 2005).

Another consideration is whether or not exercise is a suitable intervention comparison to yoga. Selection of an appropriate control is important in intervention studies to allow researchers to isolate and test the purported active ingredient of the intervention whilst holding all other factors constant (Park et al., 2014). The use of a placebo control in drug studies is relatively straightforward but selection of a control condition is much more complex for physical activity interventions (Mohr et al., 2009). Park et al. (2014) carried out a systematic review of the control groups used by researchers in RCTs of yoga. They differentiated between passive and active controls, identifying 30 from 128 RCTs that used physical exercise as the control. Exercise was the most commonly used control intervention, and non-physical interventions included education, relaxation and meditation, psychotherapy/counseling, and medical interventions. Across the studies that compared yoga to exercise there was a distinct lack of discussion regarding the purported mechanism of effect of yoga, and why the control chosen was appropriate (Cramer et al., 2012; Michalsen et al., 2012; Sharan et al., 2014). However, both exercise and yoga have produced documented psychological and physical effects, which helps to validate a fair comparison between the two (Ross & Thomas, 2010).

**Low back pain (LBP).** LBP is the most common condition for which complementary therapies are used, and an estimated three million American adults have reported using yoga explicitly for LBP relief (Eisenberg et al., 1998; Saper et al., 2009). Cramer et al. (2013) reviewed 10 studies that investigated if yoga was efficacious for pain caused by chronic LBP. Meta-analyses showed strong evidence for short-term effects after yoga interventions on pain (mean SD - 0.48; 95% CI, - 0.65 to - 0.31; \( P < 0.01 \)), and back-specific disability (mean SD - 0.59; 95% CI, - 0.87 to - 0.30; \( P < 0.01 \)). At long-term follow-up there was moderate evidence for pain reduction (- 0.33; 95% CI, - 0.59 to - 0.07; \( P = 0.01 \)), and disability (- 0.35; 95% CI,
- 0.55 to - 0.15; \( P <0.01 \)). There was no evidence reported for either short- or long-term effects on health-related QoL. These results agree with two other reviews of yoga for pain and disability across a range of pain-associated conditions including LBP (Posadzki et al., 2011; Bussing et al., 2012). Both reviews reported that yoga reduced pain and pain-specific disability more than control interventions which included exercises, manual therapy treatment, standard care, self-care, and no intervention. Bussing et al. (2012) examined 16 studies, of which five delivered yoga classes in the Hatha style, six reported using other styles, and five did not report the style of yoga used in the intervention. Due to a lack of homogeneity in the styles of yoga taught across the studies analysed, it is difficult to draw conclusions about the effects of yoga generally. Cramer et al. (2012) found that the primary limitation of their review was the small total number of eligible RCTs available that included yoga interventions for pain and disability in adult populations. This limitation illustrates a gap in the research literature concerning studies that compare yoga to guideline-endorsed therapies, such as exercise.

Two RCTs comparing yoga and exercise for chronic LBP both reported greater reductions in disability, and pain in the yoga groups (Sherman et al., 2005; Tekur, Nagarathna, Chametcha, Hankey, & Nagendra, 2012). Sherman et al. (2005) compared yoga \((n = 36)\), exercise \((n = 35)\), and a self-care book \((n = 30)\) for disability caused by chronic LBP (Sherman et al., 2005). The Roland disability score (a 24-point Roland Disability Score questionnaire) decreased in all three groups from baseline to the conclusion of the interventions 12-weeks post. After adjustment for baseline values, the yoga group had greater improvements to disability than the exercise and self-care book group (yoga vs. book: mean difference, - 3.4 [95% CI, - 5.1 to - 1.6] \( P <0.001 \); yoga vs. exercise: - 1.8 [95% CI, - 3.5 to - 0.1] \( P = 0.034 \)). At 26-weeks back-related function in the yoga group was more improved compared to the self-care book group (- 3.6 [95% CI, - 5.4 to - 1.8] \( P <0.001 \)). The relative improvements between the yoga and exercise groups compared to the self-care book groups may be explained by motivation to attend the supervised yoga and exercise classes compared to the home-based book group. Class attendance was similar in the yoga (median class attendance = 9) and exercise (median class attendance = 8), and unreported in the book group. The style of yoga practiced, called Viniyoga, included Asana, Pranayama, and relaxation, making the results more externally valid as these three components are usually part of the types of yoga classes commonly available in the West (Kraftsow, 1999). Tekur et al. (2012) compared yoga \((n = 40)\) to exercise \((n = 40)\), reporting a 49% \( P <0.01, \text{ES} = 1.62 \) reduction to pain in the
yoga group compared to only 17.5% \( (P = 0.05, \text{ ES} = 0.67) \) in the exercise group. Additionally, depression decreased by 47% \( (P < 0.001, \text{ ES} = 0.96) \) in the yoga group, and 20% \( (P < 0.01, \text{ ES} = 0.59) \) in the exercise group. This study was only run over a seven-day period making the results only applicable to the very short-term benefits of yoga.

**Chronic non-specific neck pain (CNSNP) and disability.** Whilst research into yoga as an intervention for pain and disability is increasing there is still very limited research investigating yoga for CNSNP, and comparing yoga to exercise for CNSNP. Two recent RCTs compared the effects of yoga and home-based exercises for CNSNP (Cramer et al., 2012; Michaelson et al., 2012). Both trials reported a reduction in pain amongst the yoga groups compared to the home-based exercise groups. Both studies were robustly reported including flow-charts of participant activity, sociodemographic participant characteristics, form of yoga investigated, and compliance in both groups. Both studies failed to include descriptions of the yoga postures performed by the yoga intervention groups making study replication more difficult. A major flaw of both studies is the lack of a genuine control. The yoga groups were compared to exercise but there was no control held constant amongst the two intervention groups. The yoga group were instructed to perform home-based *Asana*, not the exercises given to the exercise groups.

Cramer et al. (2012) conducted a two-armed RCT comparing a nine-week Iyengar (a form of Hatha yoga) yoga intervention with a home-based exercise program. The yoga group \( (n = 25) \) attended a 90-minute yoga class once a week and practiced six basic yoga postures at home for 10-minutes daily. The exercise only group \( (n = 26) \) practiced home-based neck and shoulder strengthening and stretching exercises for 10-minutes daily. The yoga group had a greater decrease in pain intensity compared to the exercise group \( \text{between-group difference: } -13.9\text{mm; } 95\% \text{ CI, } -26.4 \text{ to } -1.4; P = 0.030 \). Functional disability decreased only in the yoga group \( \text{baseline mean ± SD: } 30.0 ± 10.0, \text{ week nine } 20.0 ± 9.8 \). Health-related outcome scores were statistically significantly reduced in the yoga group for bodily pain \( (P = 0.001) \), emotional role functioning \( (P = 0.005) \), and mental health \( (P = 0.027) \), compared to the exercise group. Greater changes to pain, disability, and health-related outcomes may have been due to the additional 90-minutes per week of extra time spent active by the yoga group compared to the exercise group, than to yoga being more beneficial than exercise. A more robust study design allowing greater comparability may have incorporated an additional 90-minutes of exercise for the exercise group each week. Another difficulty with establishing the
effect of yoga added to exercise therapy was that compliance to home-based exercises was greater in the exercise group when compared to compliance to the home-based yoga postures in the yoga group. Perhaps with comparable compliance, the observed beneficial effects of yoga compared to exercises might have been even greater. It is not clear if this increase in compliance balanced the lesser prescription duration and meant the time spent on the interventions between groups was equal. Pain at motion decreased in both groups after the intervention showing that the exercises focused on stretching and strengthening the neck and shoulder muscles may be equally suited as yoga to relieve pain during head movement. Difference in delivery may have contributed to compliance differences between the groups. Introducing the home-based yoga postures in class gave the students opportunity to learn them under the guidance of the instructor, which may have contributed to a greater sense of ownership and safety around the poses. Healthcare practitioners may explain and demonstrate prescribed exercises to a patient to ensure a greater chance of safe technique for when they are doing them at home. In comparison, the exercise group was given a manual, which included pictures of the seated neck and shoulder exercises. Furthermore, the yoga group received increased attention from their yoga instructor during the classes, and social support from the other students in the class, which may have enhanced the benefits the yoga participants felt and thus reported. It may also be pertinent to note that the yoga classes were instructed by a single certified yoga instructor who was additionally qualified as a physiotherapist experienced in treating chronic neck pain with Iyengar yoga. Further, the instructor was assisted by a psychologist experienced in Iyengar yoga and chronic pain patients who helped correct improper alignment and posture. Both the instructor and the psychologist thus has experience in applying Iyengar yoga to patients with chronic neck pain; both could be considered experts in the field. The experience of yoga teachers outside this research may not be at the same level of the teacher and assistant, whose expertise ensured the safety and relevance of the postures to CNSNP patients in this study. There is no prerequisite for yoga teachers to be additionally trained in manual therapy so the relevance of this study to general populations of yoga teachers that may have only completed a short training program with no previous knowledge of anatomy, physiology, and neck pain presentations is questionable.

Michaelson et al. (2012) randomised adults with CNSNP to nine, once-weekly Iyengar yoga classes \((n = 38)\), or to a home-based strengthening and mobility program \((n = 38)\) for the neck and shoulders. Additionally, the yoga participants were asked to practice selected yoga postures at home for 10 – 15-minutes two to three times per-week. The exercise group
received a standard self-care manual specifically addressing exercise and education for CNSNP. Home-based exercises included 12 seated exercises for the neck and shoulders with emphasis on muscle strengthening, stretching, joint mobility, and proper posture. The exercise group were encouraged to complete the program at least three times per week for 10 to 15 minutes. Clinically important between group differences (mean change) at one week postintervention included VAS at rest 23.8mm (95% CI -12.8 to 29.8), VAS at motion 21.5mm (95% CI 15.6 - 27.4), VAS bothersomeness 18.3mm (95% CI 12.6 - 24.0), NDI 5.7 (95% CI 4.2 - 7.3), SF36 - 7.6 (95% CI -9.3 to -5.5, and depression 10.2 (95% CI 7.3 -13.1), with all differences in favour of the yoga group. Both groups were advised to do the same amount of home-based exercise and home-based yoga per week, and so similarly to the Cramer et al. (2012) study, the extra 90-minutes of yoga received by the intervention group may explain the greater decreases in pain and disability. Allocating the same amount of intervention time to both groups would have achieved greater internal validity in this study. At the end of the study 68% of the yoga group participants rated the effectiveness of the intervention as good or very good, compared to 25% in the exercise group. Exploration of why the yoga participants’ satisfaction was 43% higher than the exercise group would have potentially been informative for identifying any themes that existed amongst the group.

**Health-related outcomes.** One of the beneficial outcomes of yogic breathing, relaxation, and mental concentration during *Asana* practice is to promote the parasympathetic nervous system. Extended exhalations, characteristic of correct yogic breathing, activate the vagus nerve (Sapolsky, 2004). Vagus nerve activity, called vagal tone, exerts a tonic, inhibitory control over the heart promoting the experience of rest and relaxation that is characteristic of yoga practice (Khalsa, 2004; Thayer, Hansen, Saus-Rose, & Johnsen, 2009). Four RCTs examined the effects of yoga on health-related outcomes including emotional well-being, and stress (Michalsen et al., 2005; Smith, Hancock, Blake-Mortimer, & Eckert, 2007; Cheema, Marshall, Chang, Colagiuri, & Machliss, 2011; Hartfiel, Havenhand, Khalsa, Clarke, & Krayaer, 2011). All four yoga interventions were conducted for 6 to 10 weeks, and included postures performed in conjunction with yogic breathing, and meditation and relaxation techniques. All four studies reported improvements psychological outcomes including state anxiety and stress. All four studies lacked an active comparison group except for Smith et al. (2007) who compared yoga to progressive muscle relaxation classes. The similar reduction to anxiety and stress seen between these two groups may be explained by the high similarities between yoga and progressive muscle relaxation classes.
Cheema et al. (2011), and Hartfiel et al. (2011) measured the effect of a yoga intervention, performed at the worksite, on emotional well-being and resilience to stress amongst office workers. Questionnaires evaluated job satisfaction, QoL, mood, and state and trait anxiety. Hartfiel et al. (2011) reported substantial improvements to emotional well-being and resilience to stress amongst 48 British University employees. This study was advertised and the participants put themselves forward for inclusion. A desire to practice yoga for the 6-week intervention may have created expectations to feel less stressed at the end of the 6-week intervention creating a bias in the outcomes. Cheema et al. (2011) reported no significant differences in any self-reported psychological outcomes following a 10-week once-weekly yoga intervention amongst 37 Australian University employees (yoga $n = 18$; no active intervention control $n = 19$). However, post-hoc analysis revealed that high adherers to the yoga classes did reduce their state anxiety levels ($P = 0.02$). Accordingly, low attendance may explain the lack of significant psychological change in the yoga group (11 of 17 participants attended $>70\%$ of the yoga classes). The reduction of state anxiety in those who more regularly attended the yoga classes highlights that yoga is a practice that requires practice. The optimal benefits that can be gained from yoga postures and learning to synchronise breath with the movements is something that is likely to take longer than 6 and 10 weeks respectively to master. Changes to state anxiety levels represent an improvement in the ability to manage and respond to stressors even after 10-weeks. Lack of change in the domains of QoL in the Cheema et al. (2011) study may be because the participants were already self-scoring relatively high in this area. Comparatively, QoL changes were significant in the Hartfiel et al. (2011) study. Discrepancies in changes to QoL may be due to climate differences in the opposing geographical locations of the studies affecting the mood of the participants. Integration of yoga into the workplace may provide a time effective, cost effective, convenient and practical method of abating the damaging effects of stress and inactivity. Yoga requires minimal space and minimal investment in equipment, and the potential benefits to health status, wellbeing, job satisfaction, and work-related productivity could be significant.

Michalsen et al. (2005) and Smith et al. (2007) examined the effects of a yoga intervention on mild to moderate levels of self-perceived stress. Michalsen et al. (2005) examined the effect of a 3-month yoga program on 24 self-referred female participants suffering from high-levels of self-perceived stress. Participants ($n = 16$) attended two yoga classes per-week and were
compared against a control group ($n = 8$) practicing no yoga. Vigour, fatigue, depression, anxiety, and well-being improved significantly in the yoga group. The length and amount of classes in this study would have enabled the time needed for the participants to learn the postures and related breathing to gain the benefits that they did. The authors did acknowledge that a weakness of this study is the subjective definition of stress and the allowance of subjects to self-rate their stress levels. However, the purpose of the study was to investigate any change to stress levels following yoga and if an individual perceives their stress levels have improved then the results still have validity. Smith et al. (2007) investigated the health benefits of yoga to reduce stress, anxiety and QoL by comparing yoga with relaxation techniques. Progressive muscle relaxation (PMR) involves successive tensing and relaxation of the body muscle groups from head to toe to achieve overall body relaxation. Over a period of 10 weeks participants attended either a PMR or yoga class. Stress levels at baseline were derived from a questionnaire with participants needing to be in a mild to moderate state of stress for inclusion. Both groups saw a reduction in stress and anxiety scores but yoga was found to be more effective illustrated by an improvement in mental health. Yoga induced stress reduction may reduce the risk of psychological emotional distress developing into stress disorders such as anxiety and depression.
Conclusion

Neck pain is a common condition affecting the general population (Cohen, 2015). It has been established that patient attitudes and perceptions affect the chronicity of musculoskeletal pain and disability (Vlaeyen & Linton, 2000). It is essential that people with CNSNP be offered multiple intervention options so individual psychosocial needs are considered to prevent or reduce CNSNP and associated disability. Current research provides moderate evidence for the effectiveness of yoga for CNSNP and disability, and improvements to QoL outcomes (Hartfiel et al., 2011; Michalsen et al., 2012; Cramer et al., 2013). This research allows healthcare practitioners to confidently provide evidence-based recommendations to people with CNSNP and chronic musculoskeletal pain, to begin or maintain their yoga practice to reduce pain and disability, and enhance QoL (Sherman et al., 2005; Tekur et al., 2012). More standardised methods of study design and reporting across yoga studies may provide more robust results, and ease of study replication in a clinical setting. There is no established consensus regarding optimum yoga class length and frequency, and yoga intervention time-period. Future research to determine such parameters may provide healthcare practitioners with evidence to suggest more detailed yoga management plans to patients.

Currently, there is limited research investigating if yoga is beneficial for CNSNP, and previous studies have failed to include an active control intervention across the entire study cohort (Michalsen et al., 2012; Cramer et al., 2013). Therefore, the researcher has designed what may be a more robust RCT by including the same active control across the cohort to investigate if yoga as an adjunct to clinically prescribed exercises is beneficial for CNSNP.

Research Question

The effect of yoga as an adjunct to home-based exercise on pain, disability, and quality of life in people with chronic non-specific neck pain: A randomised controlled trial.
References


Chiu, T.T., & Sing, K.L. (2002). Evaluation of cervical range of motion and isometric neck
muscle strength: Reliability and validity. *Clinical Rehabilitation, 16* (8), 851 – 858.


doi.org/10.1097/AJP.0b013e318251026c


and long-term back pain: A longitudinal study in the general population.


predicting exercise adherence in older adults after discharge from home health physical therapy. *Journal of Geriatric Physical Therapy, 30* (2), 69 – 78.


doi.org/10.1186/1471-2474-7-81


doi.org/10.1002/14651858.CD005956.pub2


Note to examiner: This manuscript has been prepared in accordance with the instructions for authors for *Complementary Therapies in Clinical Practice* [Appendix M]. Detailed information regarding the yoga and exercises interventions was considered to be important information for the thesis, but was too long for the requirements of this particular journal. Therefore this supplementary information is included as an addendum to the thesis manuscript. If the journal submission process allows submission of supplementary online material, then this information would be uploaded as supplementary files for review.
The effect of yoga and adjunct home-based exercise on pain, disability, and quality of life in people with chronic non-specific neck pain: A randomised controlled trial

Author: Naomi Andrews

Affiliation: Department of Osteopathy
Unitec New Zealand
Private Bag 92025
Auckland
New Zealand

Contact: naomandrewsytoga@gmail.com
1. Abstract

**Background:** Previous research has investigated whether yoga is beneficial for chronic non-specific neck pain (CNSNP), compared to home-based exercises that may be prescribed by manual therapists. **Aim:** The aim of this randomised controlled trial (RCT) was to determine the degree to which yoga classes are efficacious for treating CNSNP as an addition to prescribed home-based exercises, and the role of psychosocial factors in recovery. **Methods:** The yoga intervention group \((n = 13)\) were encouraged to attend twice-weekly, 60-minute yoga classes, and complete home-based exercises for the neck and shoulders for 10 minutes daily for 8 weeks, whilst the control group \((n = 11)\) completed the home-based exercises only. Outcomes, measured at baseline, weeks, 4, 9, and 12, included neck pain intensity via Visual Analogue Scale (VAS), and disability via Northwick Park Neck Pain Questionnaire (NPNPQ); and, secondary outcome measures included quality of life (QoL) scores via The Medical Outcomes Study Short Form 36 item (SF 36) questionnaire. Credibility and Expectancy Questionnaire (CEQ), and Yellow Flag questionnaire scores were analysed as correlates of change in outcomes. **Results:** Decreases in pain intensity and disability over the 8-week intervention period were seen in both the yoga plus home-based exercises group (baseline VAS BL: 5.4 ± 1.4 (mean ± SD), week 9: 3.6 ± 1.2; baseline NPNPQ BL: 36.1 ± 9.4, week 9: 17.7 ± 8.8), and home-based exercises only group (baseline VAS BL: 5.1 ± 1.9, week 9: 3.1 ± 2.0; baseline NPNPQ BL: 32.3 ± 12.9, week 9: 18.5 ± 9.7). No additional change in pain intensity or disability was found in the yoga group compared to the exercises only group. The yoga group demonstrated a more positive improvement in the SF 36 physical functioning health dimension \((P = 0.04; \text{median 25 point improvement})\) from baseline to week 9, compared to the exercises only group (median 10 point improvement). A significant correlation between baseline CEQ credibility and the change in SF 36 general health dimension at week 9 was demonstrated in both groups combined \((\rho = .72; P = 0.001)\), and in the yoga group alone \((\rho = 0.82; P = .007)\). Correlations between CEQ and pain and disability changes from baseline to week 9 were low and non-significant. Additionally, there were no significant differences in outcomes between Yellow Flag scores < 90, and \(\geq 90\). **Conclusion:** This RCT shows that yoga plus home-based exercises, and home-based exercises only, over an 8-week time period are both appropriate interventions to decrease pain and disability caused by CNSNP. Yoga plus home-based exercises may improve physical functioning QoL outcomes more than home-based exercises only. **Keywords:** physical rehabilitation; exercise therapy; chronic pain
1. Introduction

Neck pain is one of the most prevalent and costly musculoskeletal conditions in Western society (Cote, Cassidy, Carroll, & Kristman, 2004; Cohen, 2015). An estimated 67% of adults will experience neck pain over the course of their lifetime, with 15 - 20% of these becoming chronic (defined as >12 weeks) (Hoy, Protani, De, & Buchbinder, 2010; O’Riordan, Clifford, Van De Ven, & Nelson, 2014). Neck pain prevalence increases with age, and women are more likely to present with chronic neck pain (7% - 22%) compared to men (5% - 16%) (Côté, Cassidy, & Carroll, 2003; Goode, Freburger, & Carey, 2010). Additionally, chronic neck pain may be associated with psychosocial risk factors such as depression, anxiety, and pain-related fear and movement avoidance, all of which may delay healing and contribute to further chronicity (Vlaeyen & Linton, 2000). Increased pain and disability, use of healthcare services, work sick leave, and loss of lifestyle and wellness, are some of the costly outcomes of chronic neck pain (Fejer, Kyvik, & Hartvigsen, 2006).

Neck pain commonly arises insidiously and is often described as non-specific due to a lack of precise pathoanatomical cause (Hush, Maher, & Refshauge, 2006; Heintz & Hegedus, 2008). The tissues in the neck that can cause pain include muscles, ligaments, joints, intervertebral discs, and nerve and blood vessels (Goodman & Snyder, 2007). Neck pain and subsequent disuse of neck muscles may cause muscle weakness. Loss of muscle strength and range of movement in the neck may impair proprioceptive acuity and contribute to dysfunctional compensation patterns seen in patients with chronic non-specific neck pain (CNSNP) (Armstrong, McNair, & Taylor, 2008). Management guidelines for CNSNP include home-based exercises to promote mobility and strengthening for the neck and shoulders to reduce pain and disability (Childs et al., 2008; Bryans et al., 2014). However, home-based exercises for CNSNP have shown only moderate evidence of effectiveness (Andersen et al., 2013; Gross et al., 2015). Yoga, combining physical exercises with breath control and relaxation, is a popular, complementary choice of management for neck pain (Ross, Friedmann, Bevans, & Thomas, 2013).

Recent studies have recognised the usefulness of yoga as an intervention to reduce physiological and mental stress and anxiety, and pain and disability caused by chronic musculoskeletal pain conditions, such as osteoarthritis of the hands and low back pain (Garfinkel et al., 1994; Williams et al., 2009; Cheema et al., 2013; Friis & Sollers, 2013;
Sherman, Cherkin, Erro, Miglioretti, & Deyo, 2014). Randomised controlled trials (RCTs) specifically comparing yoga classes to home-based exercises for CNSNP are scarce. Cramer et al. (2012) and Michalsen et al. (2012) reported improvements in pain, disability, and QoL caused by CNSNP when weekly yoga classes plus home-based yoga practice were compared to home-based exercises only over an 8-week period, but neither study included the same control interventions in both groups. A thorough literature search has yielded no studies investigating yoga for CNSNP that have included a true control in the study design. This may not be such a clinically applicable comparison because healthcare practitioners may be more likely to want to recommend an intervention such as yoga as an adjunct to the specific rehabilitative exercises they already prescribe for CNSNP. Therefore, this RCT was designed with the same control intervention in both groups, to determine the degree to which yoga classes plus home-based exercises are efficacious for treating CNSNP compared to prescribed home-based exercises alone.

3. Methods

3.1. Study Design

This report is part of a larger study that compared the added effectiveness of equipment Pilates and yoga classes to the standard clinical rehabilitative approach of home-based exercises only for CNSNP. The study was designed as a two-armed RCT in which participants were randomised to one of three groups: Pilates plus home-based exercises, yoga plus home-based exercises, or home-based exercises only. Two separate researchers managed the yoga and Pilates groups independently. The home-based exercises only group data was shared as the control data for both the Pilates and yoga studies. The institutional ethics research committee approved the study (UREC Approval 2014 – 1043) [see Appendix A] which was registered with the Australia New Zealand Clinical Trials Registry (ANZCTR) ACTRN12614000841673.
3.2. Study Sample and Eligibility Criteria

Calculation of effect size using G*Power 3 determined that a sample size of 19 participants per group would be required to detect change effect sizes of 0.7, assuming a level of significance of 0.05 and statistical power of 80% (Faul, Erdfelder, Lang, & Buchner, 2007). To allow for any study withdrawals and non-compliance, an initial sample size of 20 per group was planned.

Participants were recruited from the local community using advertising posters [see Appendix B], and social media [see Appendix C]. Interested applicants were initially screened by telephone. If eligible they were emailed questions to confirm their eligibility [see Appendix D], and information detailing what participating in the study entailed [see Appendix E]. For inclusion, all participants were required to be aged between 18 and 60 years; have chronic non-specific neck pain on most days for at least the previous 12 weeks, with neck pain intensity of at least 40 mm on a 100 mm visual analogue scale (VAS) most days for the previous 12 weeks; and be literate in the English. Participants were excluded if they were experiencing chronic and/or acute neck pain due to a known specific cause such as disc protrusion, whiplash associated disorder, congenital deformity of the spine, spinal canal stenosis, neoplasm, inflammatory rheumatic disease, and active oncologic disease; if they were pregnant; had undergone invasive treatment of the spine in the previous 12 months; had a current ACC claim for neck pain of 90 days or less; were suffering from neurological symptoms determined by the presence of sensory abnormalities, weakness, or altered reflexes; had symptoms related to a motor vehicle accident or significant trauma that had occurred in the last 6 months; or had been practicing yoga (or Pilates) anytime in the 6 months prior to the study. All participants were permitted to continue their usual pain medication and physical therapy.

3.3. Randomisation and Data Collection

Block randomisation for the three arms (yoga + exercises; Pilates + exercises; and exercises only) was generated in advance of recruitment for the target sample size by an independent assessor not involved in participant recruitment, using the website www.randomization.org. Upon enrolment, the allocation was requested then emailed to the two principal researchers.
Participants were emailed their assigned group and invited to meet with one of the researchers to sign a written consent form [see Appendix F], and complete baseline questionnaires [see Appendices G, H, I, J, and K]. Additionally, participants were provided with a YouTube link to the home-based exercises [see Addendum 7.2.], to ensure they understood how to access and complete the exercises. The yoga group completed their subsequent weeks 4 and 9 questionnaires at the end of class in those weeks. In the case of class absence, for the exercise-only group after baseline collection, and for all other data collection time points questionnaires were sent via email or post.

3.4. Interventions

3.4.1. Exercise. All participants received a YouTube website link to four neck and shoulder exercises and one breathing exercise being demonstrated and verbally instructed. The exercises selected were based on intervention guidelines for manual therapists treating patients with CNSNP (Bryans et al., 2014; Childs et al., 2008). The exercises included diaphragmatic breathing training, gentle stretching to decrease muscle tension and increase joint range of movement in the cervical spine, and deep anterior neck flexor strengthening (see Addendum 7.2.). Participants were advised to complete all five exercises, estimated to take 5 to 10 minutes, daily for 8 weeks. Compliance sheets [see Appendix L] were provided, to be completed daily, and collected in monthly blocks at the week 4 and 9 data collection time points.

3.4.2. Yoga. The yoga group participated in twice-weekly, 60-minute Hatha yoga classes for 8 weeks. Yoga classes were conducted in a private Pilates studio and a community hall, with study participants included in commercial classes alongside other yoga students. A single Sivananda certified yoga instructor (also one of the principal researchers) taught the yoga classes, which were movement and dialogue led. The intervention was designed for participants with CNSNP and no previous knowledge of yoga. Every class drew from the same basic Hatha postures according to suitability for participants with CNSNP, to standardise the delivery of the yoga intervention (Sivananda Yoga Teachers’ Training Manual, 2000; Lidell, 2000). Class format included: initial Savasana (initial relaxation) (Lidell, 2000, p. 24), chanting, Pranayama (Lidell, 2000, p. 71), neck mobility exercises (Lidell, 2000, pg. 32), six rounds of Surya Namaskar (Sun Salutation) (Lidell, 2000, pg. 34 –
35), Malasana (yoga squat) (Lidell, 2000, p. 169), Savasana (relaxation) (Lidell, 2000, p. 24), double-leg raises (Lidell, 2000, p. 37), Pavanamuktasana (single-leg wind relieving pose) (Lidell, 2000, p. 36), Setubandhasana (bridge pose) (Lidell, 2000, pg. 44), Paschimottanasana (forward bend) (Lidell, 2000, p. 48), Bujangasana (cobra pose) (Lidell, 2000, p. 50), modified Salabhasana (locust pose) (Lidell, 2000, p. 52), Dhanurasana (bow pose) (Lidell, 2000, p. 54), and final Savasana (final relaxation) (Lidell, 2000, p. 26 – 27) [see Addendum 7.1.]. Final Savasana included a guided relaxation that involved a verbally instructed progressive muscle relaxation technique starting from the legs and ending at the head. Every class included instruction on breathing using the diaphragm, and diaphragmatic breathing was prompted throughout the classes (Lidell, 2000, p. 67). Some poses are considered to be counter poses to the one before or after, for example Matsyasana (fish pose) usually precedes Paschimottanasana (forward bend), however because the class was designed for participants with CNSNP who were mostly beginner yoga practitioners any poses that were considered inappropriate for people with neck pain problems were omitted. Sitting blocks were available as props to assist students to sit more comfortably in a cross-legged position, allowing them greater ease to sit with their spine in a neutral position. Sitting blocks were advised for Pranayama, and the neck mobility exercises (see Addendum 7.1. Figure 3. A – D). Participants were continually advised to provide feedback if they were experiencing any pain or discomfort, and if so were either advised to come out of the pose, limit their range to a range comfortable for them, or modifications were advised.

3.5. Outcome Measures

Scoring instructions were followed for each of the questionnaires [see Appendices G, H, I, J, and K].

3.5.1. Neck pain intensity. CNSNP was measured by respondents rating their present pain using VAS on a 100mm horizontal line marked ‘No pain’ at one end and ‘Pain as bad as it could possibly be’ at either end [Appendix G]. The VAS is a reliable and well used clinical tool to measure pain intensity (Price, Staud, & Robinson, 2012). Participants were not shown their previous VAS scores at subsequent data collection time points. Minimal clinically significant difference (MCID) was defined as a reduction of ≥8mm (0.8 cm) (Lauche, Langhorst, Dobos, & Cramer, 2013).
3.5.2. Neck pain disability. Disability caused by CNSNP was assessed via Northwick Park Neck Pain Questionnaire (NPNPQ), a region specific assessment of the impact of neck pain on the performance of common daily activities (Hoving, O’Leary, & Niere, 2002; Pietroben, Coeytaux, & Carey, 2002) [Appendix H]. NPNPQ was selected over the Neck Disability Index, another widely used specific neck pain questionnaire, due to its inclusion of a driving question. Many of the participants in the cohort reside in rural areas with no public transport making the driving question highly relevant. MCID was defined as a reduction of ≥25% (Sim et al., 2006).

3.5.3. Quality of Life (QoL). Perception of health status was assessed via Medical Outcomes Study Short Form 36 (SF 36) questionnaire, which evaluates positive and negative aspects of health on 8 multi-item dimensions covering a broad spectrum of physical and mental components of health (Magnus, Fredheim, & Petter, 2007; Metric, 2011; Ware, 2011) [Appendix I]. The 8 dimensions measure physical functioning, role limitations due to physical health, role limitations due to emotional problems, energy/fatigue, emotional well-being, social functioning, pain, and general health. Sub scales of the 8 dimensions are scored from 0 – 100; higher scores represent greater functionality and wellbeing. The SF 36 tool has shown high test – retest reliability (Brazier et al., 1992). MCID was defined as an increase of ≥20.5 (Lauche et al., 2013).

3.5.4. Credibility and expectancy. Participants’ perceived credibility of the study, and the outcomes they expected from the intervention they received, were assessed via Credibility and Expectancy Questionnaire (CEQ) (Devilly & Borkovec, 2000; Amentrano, 2011) [Appendix J]. It is well established that patients’ beliefs and expectations impact their health outcomes, thus the CEQ was developed to measure both credibility and expectancy in clinical outcome studies (Linton, Vlaeyen, & Ostelo, 2002; Ruud et al., 2006; Pincus, Vogel, Burton, Santos, & Field, 2006; Demmelmaier, Asenlof, & Lindberg, 2010).

3.5.5. Yellow Flag questionnaire. Participants completed the New Zealand Accident Compensation Corporation (ACC) low back pain screening questionnaire at baseline to assess psychosocial risk factors for on going chronicity of NSNP via Yellow Flag scores [Appendix K].
3.6. Statistical Data Analysis

All statistical analyses and descriptive statistics were performed using SPSS version 23 (IBM Corporation, New York). Variables were checked for assumptions of normality by examining z-scores for skewness and kurtosis and the results of Shapiro-Wilk and Kolmogorov-Smirnoff tests of changes in pre-to post-intervention outcome variables.

Participants were included in intention-to-treat (ITT) analysis if they had supplied a full data set. Target compliance to the yoga classes was set at 75%, 12 of 16 yoga classes over the 8 weeks, and any participants whose compliance was below this were excluded from an additional per-protocol (PP) analysis. The differences in changes to pain and disability between groups were determined by repeated measures analysis of variance (ANOVA) for VAS and NPNPQ, and non-parametric equivalents for SF 36 scores. CEQ and Yellow Flag scores were analysed for correlations with changes in primary outcomes. The level of statistical significance was set at $P < 0.05$. Magnitudes of effects were described according to Hopkins’ complete scales (Hopkins, 2002).
4. Results

4.1. Participants

A flow diagram of participant enrollment and analysis, satisfying part of the Consolidated Standards of Reporting Trials (CONSORT) checklist, is provided in Figure 1 (Begg et al., 1996). Ninety-seven participants were assessed for eligibility by email, phone, and social media messaging. Of these, 56 were excluded, mainly due to scheduling problems, minor neck pain, and neck pain due to specific pathologies. Forty-one participants (mean age 44 years; 35 females, 6 males) were randomised to Pilates plus home-based exercises ($n = 17$), yoga plus home-based exercises ($n = 13$), or home-based exercises only ($n = 11$). Five of the randomised yoga group participants withdrew; three cited scheduling problems as the reason. One of the two remaining participants withdrew after three yoga classes citing inappropriate travel time to the class location but was included in the yoga group ITT ($n = 9$) because a complete data set was collected. The remaining participant withdrew from the study after three yoga classes following LBP reported at his second yoga class and was not included in analysis due to insufficient data. One participant in the home-based exercises only group withdrew reporting worsening of neck pain symptoms following the exercises, and another exercise group participant withdrew immediately post-randomisation due to a family bereavement. Neither participant completed a full data set so they were excluded from all analyses. No further adverse events were reported by participants in both groups.

A majority of participants in both groups were participating in regular exercise before and during the interventions including horse-riding, walking, biking, dancing, and gym-based fitness training, at the time of randomisation to the study. Characteristics of the 10 yoga and 11 exercises only participants who began their intervention are shown in Table 1. The majority were employed, and all were at least high school educated. Most participants had previously used a variety of different treatment interventions, including osteopathy and physiotherapy, and had previously or were currently taking over the counter pain medication. Pain intensity at baseline was the same in both groups and pain frequency (days per week) was slightly higher in the yoga group compared to the exercises only group (Table 1.). Two yoga group participants were removed from the PP analysis due to low compliance (19% and 57% attendance), leaving a mean compliance of 83% amongst the remaining seven participants. Mean compliance to the home-based exercises was 69% amongst the yoga group, and 72% amongst the exercises only group ($n = 9$).
Assessed for eligibility \( (n = 97) \)

Excluded \( (n = 56) \)
- Not meeting inclusion criteria \( (n = 27) \)
- Other reasons \( (n = 29) \)

Randomized \( (n = 41) \)

Allocated to Pilates \( (n = 17) \)
- Received allocated intervention \( (n = 16) \)
  - Discontinued intervention \( (n = 1) \)
    - 1 adverse reaction: pain increased
- Did not receive any allocated intervention \( (n = 1) \)
  - Unrelated illness \( (n = 1) \)

Allocated to yoga \( (n = 13) \)
- Received allocated intervention \( (n = 10) \)
  - Discontinued intervention \( (n = 2) \)
    - 1 adverse reaction: low back pain
    - 1 scheduling problems
- Did not receive allocated intervention \( (n = 3) \)
  - Scheduling problems \( (n = 3) \)

Allocated to exercise only \( (n = 11) \)
- Received allocated intervention \( (n = 10) \)
  - Discontinued intervention \( (n = 1) \)
    - 1 symptom worsened
- Did not receive allocated intervention \( (n = 3) \)
  - Scheduling problems \( (n = 1) \)

Analysis

Pilates analysed \( (n = 15) \)

Yoga analysed \( (n = 9) \)
- Per protocol analysis \( (n = 8) \)

Exercise only analysed \( (n = 9) \)

**Figure 1.** CONSORT Participant Flow Chart (Moher, Schulz, & Altman, 2001).
Table 1. Baseline Sociodemographic Characteristics, Neck Pain Characteristics, and Treatment Expectancy

<table>
<thead>
<tr>
<th>Sociodemographic characteristics</th>
<th>Total (n = 21)</th>
<th>Yoga (n = 10)</th>
<th>Exercise (n = 11)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td>45.2 ± 10.2</td>
<td>39.7 ± 10.6</td>
<td>50.3 ± 6.9</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>18</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Male</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td><strong>BMI (kg/m2)</strong></td>
<td>26.7 ± 5.0</td>
<td>26.0 ± 2.3</td>
<td>27.5 ± 7.1</td>
</tr>
<tr>
<td><strong>Education (highest qualification)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>University degree</td>
<td>7</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Trade certificate or diploma</td>
<td>9</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>High school</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>Employment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-employed</td>
<td>6</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Employed</td>
<td>11</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Unemployed</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Day mainly spent</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seated</td>
<td>9</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Standing</td>
<td>10</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td><strong>Neck pain characteristics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Neck pain duration</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-5 years</td>
<td>7</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>6-10 years</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>&gt;10 years</td>
<td>9</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td><strong>Neck pain site</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neck</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bilateral</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Unilateral</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Neck and shoulders</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bilateral</td>
<td>8</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Unilateral</td>
<td>7</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td><strong>Pain radiation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occipital region</td>
<td>5</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Upper back</td>
<td>4</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Lower back</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Arms</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>VAS most days</strong></td>
<td>5.4 ± 1.2</td>
<td>5.4 ± 1.2</td>
<td>5.4 ± 1.4</td>
</tr>
<tr>
<td><strong>Days painful per week</strong></td>
<td>5.7 ± 1.4</td>
<td>6.5 ± 0.9</td>
<td>4.8 ± 1.3</td>
</tr>
<tr>
<td><strong>Analgesic medication used for neck pain</strong></td>
<td>13</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td><strong>Previous or current treatment(s)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Osteopathy</td>
<td>7</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Physiotherapy</td>
<td>11</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Chiropractic</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Acupuncture</td>
<td>4</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Massage</td>
<td>4</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td><strong>Psychosocial variables</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yellow Flags</td>
<td>88.6 ± 16.5</td>
<td>92.0 ± 14.6</td>
<td>85.9 ± 18.2</td>
</tr>
<tr>
<td>CEQ</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Credibility</td>
<td>22.2 ± 3.8</td>
<td>22.9 ± 3.6</td>
<td>21.5 ± 4.1</td>
</tr>
<tr>
<td>Expectancy</td>
<td>17.5 ± 4.7</td>
<td>17.3 ± 5.6</td>
<td>18.5 ± 3.9</td>
</tr>
</tbody>
</table>

Data show mean ± SD, and numbers are frequencies. Abbreviations: BMI (body mass index); VAS (visual analogue scale); CEQ (credibility and expectancy questionnaire).
4.2. Changes in Pain Intensity and Disability

Pain intensity ($P = 0.001$ for time effect) via VAS and disability ($P < 0.0001$ for time effect) via NPNPQ decreased throughout the trial, similarly for the yoga plus exercises (33% and 51% reductions for pain and disability respectively), and exercise group (39% and 43% reductions) (Figure 2). The interaction effect (changes in pain and disability between the two groups) did not attain statistical significance for either variable ($P = 0.9$ and 0.2 respectively). Removing the participants who did not comply with the protocol did not alter any of these results. Visual inspection of Figure 2 suggests a further decrease in pain intensity from week 9 to week 12 in the yoga group (VAS week 12: $3.2 \pm 2.3$ cm; mean ± SD), which did not occur in the exercises only group (VAS week 12: $3.3 \pm 1.9$ cm). A total of 13 of the 18 participants experienced a change reaching or exceeding MCID for both variables at weeks 9 and 12.

4.3. Health Related Quality of Life (QoL)

The yoga group demonstrated a significantly more positive improvement in the SF 36 physical functioning health dimension ($P = 0.04$; median 25 point improvement) from baseline to week 9, compared to the home-based exercises only group (median 10 point improvement) (Table 2.). Effect sizes for change in each group ranged from -0.06 (trivial) to -0.84 (moderate) (Hopkins, 2002). In both groups combined between 2 and 12 of the 18 participants experienced clinically significant changes over the eight SF 36 dimensions. Data in Table 2 also suggest that for the exercises only group, the general health dimension worsened from baseline to week 9, whereas conversely the yoga group general health dimension median improved. However, this difference was not statistically significant ($P = 0.2$).

4.4. CEQ and Yellow Flag Correlations

Correlation coefficients were examined to determine whether participant credibility and expectancy, and Yellow Flag scores at baseline affected pain, disability, and health-related QoL outcomes at weeks 9 and 12 across both groups. Parametric analysis showed no correlations between baseline CEQ or Yellow Flag scores, and changes to pain and disability at weeks 9 and 12. Non-parametric analysis showed a statistically significant correlation between baseline CEQ credibility and the SF 36 general health dimension at week 9 across
both groups ($\rho = 0.72; P = 0.001$), and in the yoga group alone ($\rho = 0.82; P = 0.007$). A trend was identified between CEQ expectancy and SF 36 general health at week 9 across both groups ($\rho = 0.45; P = 0.06$), and the yoga group alone ($\rho = 0.61; P = 0.08$). Correlation coefficients for the other seven SF 36 variables in the yoga group were large to very large, ranging from 0.4 to 0.9 with 80% over 0.6 (Hopkins, 2002), but did not obtain statistical significance. There were no significant differences in outcomes between Yellow Flag scores < 90, and ≥ 90.

Figure 2. Pain and Disability Scores from Baseline to Week 12 for Both Groups.

A. Visual Analog Scale (VAS). B. The Northwick Park Neck Pain Questionnaire (NPNPQ). For both groups combined, change over time was significant ($P = 0.001$ for VAS and $P < 0.0001$ for NPNPQ): a is different from b and both a and b are different from all other time points. Interaction between time and group did not obtain
statistical significance. Data are means with 95% CI error bars.
Table 2. Effects of Yoga and Home-Based Exercises on Health-related Quality of Life via the Short Form 36 (SF 36) Questionnaire

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Yoga (n = 9)</th>
<th>Exercise (n = 9)</th>
<th>Effect Size</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline</td>
<td>Week 9</td>
<td>Baseline</td>
<td>Week 9</td>
</tr>
<tr>
<td>Physical Functioning</td>
<td>70 [58-90]</td>
<td>95 [88-95]</td>
<td>85 [55-95]</td>
<td>95 [90-100]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical Role Functioning</td>
<td>75 [38-100]</td>
<td>100 [75-100]</td>
<td>75 [19-100]</td>
<td>100 [50-100]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotional Role Functioning</td>
<td>67 [17-100]</td>
<td>100 [83-100]</td>
<td>83 [33-100]</td>
<td>100 [42-100]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy/Fatigue</td>
<td>50 [38-65]</td>
<td>70 [68-80]</td>
<td>43 [29-51]</td>
<td>60 [45-75]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotional Well Being</td>
<td>80 [58-86]</td>
<td>80 [66-94]</td>
<td>64 [50-86]</td>
<td>76 [60-82]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Functioning</td>
<td>63 [50-88]</td>
<td>88 [69-100]</td>
<td>69 [47-100]</td>
<td>88 [69-100]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Health</td>
<td>70 [63-83]</td>
<td>80 [63-90]</td>
<td>53 [45-80]</td>
<td>50 [40-85]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*P value = significance of difference in change between groups at week 9 via non-parametric analyses.

* = P < 0.05

Abbreviations: LQ (lower quartile); UQ (upper quartile)
5. Discussion

The aim of this study was to provide evidence-based research to healthcare practitioners, and patients, for the efficaciousness of yoga as a management intervention for pain and disability caused by CNSNP. Almost three-quarters of participants across both groups reported clinically significant decreases in pain and disability following 8 weeks of yoga plus home-based exercises and home-based exercises alone, but there were no statistically significant differences in outcomes between groups. From week 9 to week 12, pain intensity continued to decrease in the yoga group but not in the home-based exercises group. The statistical significance of this continued improvement was not analysed, thus it may have been due to chance and unrelated to actual change. Even so, from this sustained improvement it appears that yoga practice benefits showed potential for having greater longer-term impact than home-based exercises.

QoL improvements from baseline to week 9 were significant in the yoga group, and both groups combined, only for the physical functioning dimension. However, median scores improved in six of eight of the dimensions across both groups. Moderate effect sizes for change observed here may indicate that for 8 weeks of yoga and exercise are beneficial for QoL outcomes related to CNSNP. The inability of the scores to attain statistical significance may be that the sample size was insufficient to detect change with certainty. It is also possible that lack of significant change across QoL outcomes may be attributable to the relatively high QoL baseline scores throughout this cohort. The majority of participants were educated and employed, and prosperous sociodemographic characteristics may have contributed to high QoL baseline scores. It is possible effects on QoL may be greater in those with poorer initial QoL scores.

A significant correlation was demonstrated between baseline credibility and SF 36 general health dimension at week 9 only; the same correlation was also present in the yoga group alone. A trend was identified between baseline expectancy and SF36 general health dimension at week 9 only across both groups, and the yoga group alone. The cohort filled out CEQ at baseline post-randomisation so knowledge of inclusion in the yoga group combined with personal knowledge of yoga, which is generally thought of as therapeutic, may have influenced the yoga group participants’ beliefs and expectations of the intervention (Pincus, Vogel, Burton, Santos, & Field, 2006; Demmelmaier, Asenlof, Lindberg, & Denison, 2010).
The primary pain and disability outcome results in the present study are in disagreement with two recent RCTs of a similar length investigating yoga as a comparison to home-based exercises for CNSNP (Michalsen et al., 2012; Cramer et al., 2013). Both studies reported a significant decrease in neck pain intensity in the yoga intervention groups ($P < 0.001$; $P = 0.030$, respectively), but this decrease was not observed in the control groups. Compared to the present study, both studies recruited significantly larger sample sizes, ($n = 77$; $n = 51$, respectively), and the greater statistical power enabled detection of smaller between-group differences in outcomes than those allowed for here. Nonetheless, no trend for group differences was evident here and it seems unlikely that relatively small additions to sample size would have affected the observed results. It is possible that greater time spent practicing yoga each week in the previous studies, 135 to 160 minutes per week compared to a total of 120 minutes per week in the current study, may have resulted in more positive pain outcomes in the yoga groups. Neither previous study design included the exercises with the yoga intervention, as the present study did, and this may have also resulted in greater between-group differences being observed.

QoL outcomes across previously reported yoga interventions for neck and low back pain vary between significant improvement in physical and mental composite scores, significant improvement individually amongst the eight dimensions, and nil significant improvement (Michalsen et al., 2012; Cheema et al., 2013; Cramer et al., 2013; Cramer, Lauche, Haller, & Dobos, 2013). Cramer et al. (2013) reported significant between-group differences in improvements in the yoga compared to control group for the SF 36 mental health component score ($P = 0.016$). Michalsen et al. (2012) reported significant between-group differences in improvements in the yoga compared to control group in the SF 36 physical health component score ($P = .003$). The current study failed to establish mental and physical component scores due to a failure to establish the correct SF 36 scoring protocol prior to participants' completing these questionnaires. There was no individual improvement to the general health dimension in the Cramer et al. (2013) study, as there was in the present study, and Michalsen et al. (2012) did not report individual dimension results. Other studies have also reported Hatha yoga can significantly improve QoL outcomes, however some of these studies have involved chronically diseased, emotionally distressed, and older aged cohorts, likely to have already been suffering substantial QoL impairments at baseline (Oken et al., 2004; Lavey et al., 2005; Moadel et al., 2007; Chen et al., 2009). Conversely, a recent meta-analysis reviewed 10 yoga interventions for chronic LBP including yoga versus exercise, reporting no evidence...
for either short \((P = 0.11)\) or long-term \((P = 0.13)\) effect on QoL outcomes (Cramer, Lauche, Haller, & Dobos, 2013).

The present study selected exercise as the control intervention to reflect conventional intervention management advice suggested by healthcare practitioners for CNSNP. The comparable pain and disability improvements demonstrated in the home-based exercise group are not remarkable considering the set of exercises included in the intervention were designed based on guidelines for the management of CNSNP (Childs et al., 2008; Bryans et al., 2014). In turn, these guidelines are based on research studies that have reported moderate evidence for the efficacy of neck and shoulder stretching and strengthening exercises for CNSNP and associated disability (Häkkinen, Kautiainen, Hannonen, & Ylinen, 2008; Dusunceli, Ozturk, Atamaz, Hepguler, & Durmaz, 2009; Gross et al., 2015). Additionally, the video footage of the home-based exercises provided to the entire cohort may have simulated more of a real-life class environment providing a form of teacher ‘supervision’ which may have promoted the high compliance to the home-based exercises demonstrated in both the yoga (mean exercise compliance = 69%) and exercise (mean compliance = 72%) groups contributing to comparable pain and disability scores. With hindsight, the inclusion of a video-based demonstration and verbal instruction possibly resulted in a model of good practice that was not a true reflection of clinically prescribed exercises, which are usually only instructed verbally in clinic, and sometimes accompanied with pictures. No other exercise or yoga study was found that included video footage of the exercise intervention. It may be that the exercises designed in this study, coupled with the use of video footage, were more robust than other studies investigating whether yoga is more beneficial than home-based exercises for CNSNP and low back pain (Sherman, Cherkin, Erro, Miglioretti, & Deyo, 2005; Michalsen et al., 2012; Tekur, Nagarathna, Chametcha, Hankey, & Nagendra, 2012; Cramer et al., 2013).

The present study has notable strengths including a rigorous randomisation procedure, use of recommended outcome measures, adequate participant compliance and follow-up, a homogenous control intervention, and suitable exercise and yoga interventions for CNSNP. These strengths provide the study with ecological validity, which is a determinant of how reflective the intervention is to the real-world environment of yoga classes (Schmuckler, 2001). The twice-weekly class frequency and 60-minute class duration reflects the practice characteristics of community yoga users, suggesting the potential feasibility of these interventions in a therapeutic setting (Ward, Stebbings, Sherman, Cherkin, & Baxter, 2014).
Furthermore, the type of yoga (*Hatha*) taught is a widely practiced and publicly available form of *Asana* and *Pranayama* based yoga, popular in the West. The classes, taught by a qualified yoga teacher, were designed for participants with CNSNP to practice safely without further aggravation to their neck pain, and the home-based exercises reflected management guidelines for CNSNP. The study participants were included in commercial yoga classes that were open to all levels including beginners. The inclusion of study participants in commercial classes helped control for any extra attention from the yoga instructor to study participants that may have negatively or positively affected their perception, of the effect of the yoga.

The choice of pain and disability as the primary outcomes of the study adds to the rigour of choosing exercise as the comparison to yoga because these outcomes can easily compared between the two interventions. The selection of appropriate primary outcome measures is important in intervention studies to allow the researchers to test the purported active ingredient of the intervention and hold all other factors constant (Park et al., 2014).

There is a lack of standardised recommendations for the methodology, content, and reporting of clinical yoga interventions for musculoskeletal conditions. This weakness is reflected in the heterogeneity of yoga research studies, and both impedes both the generalisation of study results and makes replication in a clinical setting difficult (Garfinkel, Schumacher, Husain, Levy, & Reshetar, 1994; Greendale, Huang, Karlamangla, Seeger, & Crawford, 2009; Cox et al., 2010; Ward et al., 2014). Recently, a Delphi survey aimed to address these issues by developing a list of recommendations of key components for the design and reporting of yoga interventions for musculoskeletal conditions (Verhagen et al., 1998; Ward, Stebbings, Sherman, Cherkin, & Baxter, 2014). According to these recommendations the methodology and reporting of this study is extremely strong, covering almost all of the themes defined including class and intervention duration; class frequency; appropriateness of yoga for the population defined; inclusion of *Asana*, *Pranayama*, and relaxation; qualified yoga instruction; outcome measures for pain, disability, and QoL; and CONSORT reporting of participants. Additionally, the reporting of compliance, and the supplementary inclusion of images of the Asana and home-based exercise descriptions and video link, adds to the robustness of this study by allowing healthcare practitioners the opportunity to replicate the interventions for their CNSNP patients.
There are several limitations in this study. The most significant weakness is the modest sample size, which failed to reach the required *a priori* target. Nonetheless, apart from correlational analyses, few non-significant findings appear to show any sort of trend. Changes in pain and disability between yoga plus exercises and exercises only groups were markedly similar. Additionally, in common with many previous studies, the cohort was mostly female, which may make it difficult to generalise the results to a mixed female and male gender population. Dominant recruitment of females here was not sought, so this gender bias may be due to a higher desire amongst women, compared to men, to report and thus manage chronic musculoskeletal pain (Rekola et al, 1993; LeResche, 1999). Another limitation may be that the study ran for 8 weeks, which may have not been enough time to allow for any additional benefit from the yoga classes compared to the home-based exercises. It can be hypothesised that 8 weeks is a short, thus more easily achievable period for participants to remain engaged in their home-based exercises. Compliance to the exercises may have decreased if the study was longer which may have then resulted in greater benefit of attending yoga classes. Being part of a community of yoga practitioners in classes, of which students are paying to attend, may enhance motivation to a yoga class, compared to home-based exercises.
6. Conclusion

The findings of this study indicate *Hatha* yoga classes plus daily home-based neck and shoulder strengthening and stretching exercises in combination, are a beneficial intervention to reduce pain and disability caused by CNSNP, if done regularly over a period of at least 8 weeks. Additionally, yoga as an adjunct to home-based exercises improves self-perception of physical functioning following 8 weeks of mostly consistent participation in weekly yoga classes. The high compliance to the group yoga classes (mean compliance = 82%) throughout the 8-week intervention period, provides a socialisation context which may provide extra psychological support for CNSNP patients who may be suffering from psychosocial risk factors related to chronic pain conditions (Hilderink et al., 2012; Goodman & Snyder, 2013). Such an intervention may enable chronic pain patients to recognise that they are able to be physically active, resulting in higher self-competence and self-awareness, which may contribute to higher QoL (Büssing, Michalsen, Khalsa, Telles, & Sherman, 2012). Future research, using a larger sample size, should identify and research separately the different subgroups of neck pain patients so healthcare practitioners can recommend more specific management protocols to neck pain subgroups who may benefit from different intervention considerations including yoga.
7. Supplementary Material

7.1. Yoga Asana (Postures)

N.B. These pictures are not intended to be 'perfect' reflections of these common Hatha poses. They are as the model's strength and flexibility allow. Further pictures and instructions can be found in the Sivananda (Lidell, 2000) references supplied (the school under which the study researcher/yoga teacher trained), plus B.K.S Iyengar's (1966) seminal text Light on Yoga (see refs.).

Figure 1. Initial Savasana (Initial relaxation) (Lidell, 2000, p. 24). Supine, eyes closed, breathing diaphragmatically for two minutes.

Figure 2. Pranayama-Anuloma Viloma (alternate nostril breathing, perform 6 rounds). (Lidell, 2000, p. 71). Participants were advised to use a sitting block if needed, to allow the spine to be in a neutral position.

A. Seated, close off right nostril breath in through left nostril to a count of 4
Figure 2. B. Close off both nostrils, retain breath for 16 counts

Figure 2. C. Breath out through left nostril to a count of 8.
Figure 3. Neck mobility exercises in Sukasana (easy sitting position) x 5 (Lidell, 2000, p. 32). Participants were advised to use a sitting block if needed, to allow the spine to be in a neutral position; and to only perform these movements in a range that did not aggravate their neck pain or cause discomfort. A. Cervical spine flexion.

Figure 3. B. Cervical spine extension. Neutral into extension, back to neutral.

Figure 3. C. Cervical spine rotation, L and R.
Figure 3. D. Cervical spine side bending, L and R.

Figure 4. Surya Namaskar (Sun Salutation) 12 movements performed in succession; right side then repeat left side equals one round. Perform 6 rounds. (Lidell, 2000, p. 34 – 35).
A. Standing position, weight evenly distributed through feet, lengthen spine towards ceiling, inhale, exhale bring hands together.
Figure 4. B. Inhale stretch arms up, and slightly lean back.

Figure 4. C. Exhale bend forward to Pada Hastasana, head and hands to feet. Option to bend both knees if any knee or lower back issues.
Figure 4. D. Inhale, hands to mat stretch right leg back into Anjaneyasana (low lunge), hands on mat, eyes to ceiling. Flexed knee stacked over ankle so alignment ensures no extra pressure on flexed knee.

Figure 4. E. Retain breath, take left leg back in to Utthita Chaturanga Dandasana (high plank position), shoulders stacked over wrists, gaze at top of mat. Option to bring both knees to mat if strength does not allow.
Figure 4. F. Exhale, head, chest, and forehead to mat, hips up, and toes tucked under, and tuck elbows into sides.

Figure 4. G. Release feet and hips, legs pressed together, feet pressed into mat, inhale chest up, eyes up, in to Bhujangasana (cobra pose). Shoulders down towards hip, elbows tucked into sides, and belly button on mat to protect lower back.
Figure 4. H. Exhale, tuck toes under, press hand into mat, raise hips straighten legs, body into an inverted V shape, *Adho Mukha Svanasana* (downward dog). Head relaxed, no tension in neck.

Figure 4. I. Inhale, step forward right foot in to *Anjaneyasana* (low lunge).
**Figure 4. J.** Exhale, step forward left foot in to *Pada Hastasana* (head to feet pose).

**Figure 4. K.** Inhale, both arms up, and slightly back.
Figure 4. L. Exhale return starting position.

Figure 5. Malasana (yoga squat) (Lidell, 2000, p. 169).
Both feet either side of mat, squat down with hands in prayer, five breathes. For those who could not keep heels on floor blocks were provide to wedge under heels to allow ease in this posture.
Figure 6. *Savasana (relaxation)* (Lidell, 2000, p. 24).
Supine, eyes closed, breathing diaphragmatically for two minutes.

Figure 7. *Double-leg raises* (Lidell, 2000, p. 37).
Inhale raise both legs up, exhale lower legs, press lower spine in to mat to make sure using abdominal muscles and protecting lower back. Neck in neutral position on mat. Repeat 10 x.
Figure 8. *Pavanamuktasana* (single-leg wind relieving pose) (Lidell, 2000, p.36). Flex knee draw into armpit, gently increase compression with each exhale. Hold 5 breathes. Repeat left side. Neck in neutral position on mat.

Figure 9. *Setubandhasana* (bridge pose) (Lidell, 2000, p. 44). Supine, both knees flexed, palms pressing into mat, inhale lift hips up, shift shoulder blades closer to each other, neck in neutral position. Hold 5 breathes. To exit position come up on to toes, roll down from neck to tailbone.
Figure 10. *Paschimostasana* (forward bend) (Lidell, 2000, p. 48). Seated, legs extended, inhale both arms up, exhale bend forward, inhale lengthen spine, exhale stretch chest and head forward towards feet. Hold 10 breathes.

Figure 11. *Bujangasana* (cobra pose) (Lidell, 2000, p. 50). Prone, legs together, inner thighs pressing towards one another, fingertips in line with shoulders, inhale gently press into palms lift chest and head up, shoulders down towards hips, and elbows tucked in to sides. Hold 5 breathes.
Figure 12. Modified *Salabhasana* (locust pose) (Lidell, 2000, p. 52).
Prone, both arms stretched out 45°, inhale lift head, chest, arms, and legs up towards ceiling. Hold 5 breaths.

Figure 13. *Dhanurasana* (bow pose) (Lidell, 2000, p. 54).
Prone, flex knees, stretch both arms back to grab ankles (or feet depending on flexibility), inhale lift head and chest, and kick feet up into hands. Hold 5 breaths.
Figure 14. Final *Savasana* (final relaxation) (Lidell, 2000, p. 26 – 27).
Supine, eyes closed, breathing abdominally. Verbally guided relaxation, followed by five-minutes of Savasana, in silence.
## 7.2. Home-Based Prescribed Exercises

<table>
<thead>
<tr>
<th>No.</th>
<th>Exercise</th>
<th>Video instruction/Description</th>
<th>Repetitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td><strong>Diaphragmatic/Abdominal breathing</strong></td>
<td>• Lying supine, knees flexed&lt;br&gt;• One hand on stomach, one hand on chest&lt;br&gt;• Mouth closed, inhale through nose abdomen rises, exhale abdomen draws in</td>
<td>• 10 breathes&lt;br&gt;• Continue with following exercises</td>
</tr>
<tr>
<td>2.</td>
<td><strong>Deep neck flexor strengthening</strong></td>
<td>• Lying supine, knees flexed, arms down by sides&lt;br&gt;• Tuck chin to throat&lt;br&gt;• Inhale, lift head up off floor approx. 1 cm, and look at top of knees&lt;br&gt;• Exhale, release head down</td>
<td>• 10</td>
</tr>
<tr>
<td>3.</td>
<td><strong>Neck and shoulder muscle stretching</strong></td>
<td>• Lying supine, knees flexed, arms down by sides&lt;br&gt;• Inhale, shrug both shoulders up towards ears&lt;br&gt;• Exhale, slide both shoulders and arms down towards hips, tuck chin to chest&lt;br&gt;• Inhale, rotate head to right keeping chin gently tucked in, exhale as return to center.&lt;br&gt;• Repeat left</td>
<td>• 10</td>
</tr>
<tr>
<td>4.</td>
<td><strong>Neck and shoulder muscle stretching</strong></td>
<td>• Lying supine, knees flexed&lt;br&gt;• Both arms in flexion, pretend gripping a ball between hands, squeeze armpits down by sides, press scapulae into floor&lt;br&gt;• Inhale, then exhale, and squeeze imaginary ball between hands, dropping scapulae further down towards hips</td>
<td>• 10</td>
</tr>
<tr>
<td>5.</td>
<td><strong>Thoracic extension and chest opening</strong></td>
<td>• Lying supine with a large rolled up towel placed at length of thoracic spine (upper and mid back)&lt;br&gt;• Arms 45°, chin gently tucked.&lt;br&gt;• Breathing abdominally (refer no. 1.)</td>
<td>• 5 minutes at end of session</td>
</tr>
</tbody>
</table>

**Link to exercise YouTube video**
[https://www.youtube.com/watch?v=HJMW8qHi1aU&index=1&list=PLRypDvaCGG6UWIos7yo2JP9fTZ2XQC4x](https://www.youtube.com/watch?v=HJMW8qHi1aU&index=1&list=PLRypDvaCGG6UWIos7yo2JP9fTZ2XQC4x)
8. References


doi.org/10.1016/j.ctim.2014.08.008


Section 3: Appendices
Appendix A: Ethics Approval Letter
Naomi Andrews and Freya Scollay
c/o: 280c Motutara Rd
Muriwai
Auckland 0881

24.7.14

Dear Naomi and Freya,

Your file number for this application: 2014-1043
Title: The effects of equipment Pilates and yoga as adjuncts to home-based exercises for chronic non-specific neck pain.

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: 4.7.14
Finish date: 4.7.15

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.

3. Organisational consent/s must be cited and approved by your primary reader prior to any organisations or corporations participating in your research. You may only conduct research with organisations for which you have consent.

You may now commence your research according to the protocols approved by UREC. We wish you every success with your project.

Yours sincerely,

Gillian Whalley
Deputy Chair, UREC

cc: Catherine Bacon
Cynthia Almeida
Appendix B: Participant Recruitment Poster
Join the Master of Osteopathy Pilates & Yoga Neck Pain Study

Freya Scollay and Naomi Andrews - both Master of Osteopathy students at Unitec and qualified Pilates and yoga instructors - are researching the effects of Pilates and yoga on chronic neck pain.

The study will be conducted from Kumeu for a duration of 8 weeks. If you are randomised into the Pilates or Yoga group you will be asked to attend 2 classes per week from a flexible timetable. All participants will be asked to undertake home-based exercises.

To confirm your eligibility to take part in the study email unitecneckpainstudy@gmail.com

Find out more at www.facebook.com/neckpainsudy
Appendix C: Social Media Participant Recruitment
(Facebook Page Example)
PAIN IN THE NECK? We are still seeking volunteers for our yoga and Pilates neck pain study

Too much time spent in front of the computer? Driving all day? Is stress affecting your neck?

If you have been suffering with neck pain for longer than 3 months and you are between 18 - 65 years this might be the study for you.

Two Unitec Master of Osteopathy students are conducting a study to see if yoga, and equipment Pilates can help relieve neck pain in conjunction with home-based rehabilitative exercises.

The study may involve attending 2 yoga or Pilate’s classes per-week for 8 weeks in Kumeu.

For more information about this study and to see if you meet the inclusion criteria please email Freya and Naomi at symmetryinmotionnz@gmail.com or text 027 866 2500.

https://www.facebook.com/neckpainlessstudy/?fref=photo (link to page)
Appendix D: Participant Screening Questions
Date:
Volunteer name:
DOB:
Gender: Weight: Height:
Mobile: Email:

Highest educational qualification:
Occupation status:
Is your day mainly spent seated, standing, or a mixture?

Duration of neck pain (from your first memory of it):
Exact site of neck pain (e.g. left and right neck and shoulders, left neck only etc.):
On average how painful is your neck most days on a scale of 1 to 10 (1 being best, 10 being worst)?
How many days out of 7 is your neck painful?

Current medication (including painkillers for your neck pain):
Previous medication:
Current treatment (e.g. osteopath, chiropractor, physio, alternative therapies etc.):
Previous treatment:

Current exercise (If you are not currently exercising please skip to the next section)
Please state the exercise activities you are currently engaging in:
How many days out of 7 do you exercise?
On a scale of 1 to 10 (1 being the least, 10 being the most) what intensity do you exercise at?
If not currently exercising which type (s) of exercise have you engaged in the past?
How many days out of 7 did you exercise?
Please state the month and year you last engaged in regular exercise:

Have you ever practiced yoga or Pilates?
If so, please state the month and year you last engaged in yoga or Pilates:
OFFICE ONLY
Randomization date & group:
Intervention start date:
Appendix E: Participant Information
The effect of yoga and Pilates as an adjunct to prescribed home-based exercises for chronic non-specific neck pain

You are invited to participate in our research investigation. Please read carefully through this information sheet before you make a decision about volunteering.

Principal Researchers

Naomi Andrews and Freya Scollay, both Bachelor of Applied Science (Human Biology) graduates. Naomi and Freya are currently fourth year students of the Master of Osteopathy Programme at Unitec New Zealand. Additionally Freya is a qualified Pilates instructor, and Naomi is a qualified yoga instructor.

Our Purpose

This study aims to determine if yoga and Pilates are effective for chronic non-specific neck pain, when completed as an extra activity along with exercises that are often prescribed by a manual therapist, compared to prescribed exercises only. We also hope to find out whether your prior expectations about the effectiveness of yoga or Pilates or other psychosocial factors may determine the outcome.

Chronic neck pain is defined as pain that has been present for at least 12 weeks since onset (Merskey & Bogduk, 1994). It is often associated with varying degrees of disability that can affect a person’s quality of life, and may come about from specific conditions such as fracture, disc compression, or neurological compromise. However, for the majority of cases of neck pain a specific cause cannot be identified, and as such pain is classed as non-specific.

There are a wide range of treatments for chronic neck disorders ranging from pain management and manual therapy, to neck-specific strengthening exercises, and educational advice. Exercise is a common choice for the management of chronic neck pain, and participation in yoga and Pilates for musculoskeletal complaints including neck pain has grown substantially in the last 10 to 20 years. By participating in this study you will help us to determine whether yoga and Pilates coupled with prescribed exercise is effective at reducing pain and disability, and increasing well-being, for people suffering from chronic non-specific neck pain.

Who may participate?
We are looking for adults aged 18 to 60 years who suffer from chronic neck pain that has lasted for at least 12 weeks. You must experience pain of mild-moderate severity (at least 3 out of 10 on a numeric pain scale) most days. You must be able to read, speak, and comprehend the English language.

Unfortunately, you will be ineligible to take part in the study if:

- Your symptoms are related to a motor vehicle accident or significant trauma that has occurred in the last 6 months.
- You have undergone neck or invasive spinal surgery in the previous 12 months.
- You have any diagnosis or signs of serious pathology such as fracture, inflammatory disorders, or infection.
- There are any signs of neurological symptoms determined by the presence of sensory abnormalities, weakness, or altered reflexes.
- You suffer from chronic and/or acute neck pain due to specific causes – disc protrusion, whiplash, congenital deformity of the spine, spinal canal stenosis, neoplasm, inflammatory rheumatic disease, and active oncologic disease.
- You are pregnant, or attempting to fall pregnant.
- You have been practicing equipment Pilates or yoga in the six months prior to the study.
- You have a current ACC claim for your neck pain of 90 days or less.

Please feel free to contact the principal researchers if you have any questions regarding your eligibility.

**What will happen in the study?**

If you meet the inclusion criteria of the study and are willing to participate you will be asked via an online survey to complete a medical questionnaire that provides information about your neck pain. These examinations will determine your eligibility to take part in the study. Once eligibility is confirmed, you will be randomly allocated to one of three groups – yoga, Pilates, or home-based prescribed exercise. The 60-minute yoga and Pilates classes will take place twice a week for 8 weeks (a total of 16 classes). All of the participants will be asked to complete just 5-10 minutes per day of prescribed exercises at home, for 8 weeks. Details of timetabling of the yoga and Pilates classes will be advised to those in these groups, and we will allow a two-week window for confirmation of availability for the class dates and times proposed.

Once timetabling has been confirmed you will be invited, along with your allocated group, to meet the researchers at our designated Pilates and yoga studio, based in Kumeu, North-West Auckland. At this meeting the researchers will go through with you in detail the requirements of whichever group you have been assigned to. Every participant will be shown in detail how to do the home-based prescribed exercises correctly and safely. At this meeting you will be required to fill out five brief questionnaires so the researchers can establish your pain, well-being, disability, and psychosocial factors that may affect study outcomes. This initial session will take approximately 60 - 80 minutes.
At the end of the Week 4 and Week 9 you will be required to complete the same questionnaires that were carried out during your first meeting with the researchers. There will also be a follow up at Week 12 and Week 24, following the completion of the 8-week study, where you will be required to complete the same measures as Week 4. This data will provide us with some longer-term information.

**What we do with the data and results, and how we protect your privacy.**

Personal information is collected and stored under the guidelines provided by the Privacy Act 1993 and the Health Information Privacy Code 1994. Your name will be recorded on the written consent form, your health questionnaire, and on the online VAS, NPQ, SF-36, CEQ, and ACC Yellow Flag questionnaires. In all other instances of information collection your identity will remain confidential and you will be allocated an identification number. If the information you provide is reported or published, this will be done in a way that does not identify you as its source. All the data recorded and collected will be stored in a secure manner and access to it will be limited to the principal researcher, the research supervisors, and yourself. If you wish to access your confidential data you may do so at any time, with your allocated identification number.

**Discomforts/risks and benefits**

Any aggravation you may experience from the yoga, Pilates, or prescribed exercises should be immediately discussed with the researchers.

**Your voluntary participation**

The decision to participate in this study is totally voluntary. If at any time you feel uncomfortable with any Yoga or Pilates postures or exercises during the course of the study, you may inform the researchers so they can provide you with assistance to change the posture or exercise to better suit your physical needs. You may leave the study at any time, and any data collected from your involvement in the study may be withdrawn up until 1 week following your final assessment.

Your participation in this study will help to provide further research into the management of neck pain through exercise, yoga, and Pilates. It will provide a valuable addition to the ongoing research surrounding the effectiveness of yoga and Pilates for musculoskeletal complaints.

Please contact us if you require further information about this study.

Naomi Andrews and Freya Scollay
Phone: Naomi: 0220894139/ Freya: 0278662500

Email: symmetryinmotionnz@gmail.com

Principal supervisor: Catherine Bacon
Phone: 0800 267 836 (Clinic41 Student Osteopathy clinic)
Email: cbacon@unitec.ac.nz

Ethics approval number: 2014 – 1043 Study start date: 7 July 2014 Study finish date: 7 July 2015
Appendix F: Participant Consent Form
The effect of equipment Pilates/yoga as an adjunct to prescribed home-based exercises for chronic non-specific neck pain.

This form is to ensure that you understand the requirements of your participation and that you are aware of your rights. Please read carefully through the points below. If you understand and agree with the points then please sign at the bottom of the page. If you have any questions at all please ask the researcher before signing this form.

- I have had the research project explained to me and I have read and understood the information sheet given to me.

- I understand that my inclusion in this study is entirely voluntary.

- I understand that I may leave the study at any time, and any data collected from your involvement in the study may be withdrawn up until 1 week following your final assessment.

- I understand that if at any time during the course of the study I feel uncomfortable with any yoga or Pilates postures or exercises I may inform the researchers so they can provide me with assistance to change the posture or exercise to better suit my physical needs.

- I understand that everything I say and the information I provide will be collected in accordance with the Health Information Privacy Code 1994 and kept confidential and in accordance with the Privacy Act 1993. I understand that the only persons who will have access to my information will be the researchers and relevant clinical staff.

- I understand that all the information I give will be stored securely on a computer at Unitec for a period of 5 years.

- I understand that I can see the finished research document.

- I have had time to consider the information provided, to ask questions, and to seek any guidance.

- I give my consent to be a part of this project.
Participant Name: ……………………………………. Date: ……………………………

Participant Signature: …………………………….. Date: ……………………………

Principal Researcher: ………………………………… Date: ……………………………

UREC REGISTRATION NUMBER: 2014 - 1043

This study has been approved by the UNITEC Research Ethics Committee from 7 July 2014 to 7 July 2015. 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. 6162). Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.
Appendix G: Visual Analogue Scale (VAS)
Visual Analog Scale (VAS)*

No pain

Pain as bad as it could possibly be

*A 10-cm baseline is recommended for VAS scales.

Visual Analog Scale

NO ________________________________ WORST
PAIN ________________________________ PAIN

Directions: Ask the patient to indicate on the line where the pain is in relation to the two extremes. Measure from the left hand side to the mark.

Appendix H: The Northwick Park Neck Pain (NPNPQ) Questionnaire, And Scoring Instructions
The Northwick Park Neck Pain Questionnaire

Overview: The Northwick Park Neck Pain Questionnaire was developed to measure neck pain and the consequent patient disability. It is relatively simple to use and provides an objective measure for monitoring symptoms over time. It was developed at Northwick Park Hospital in Middlesex England.

Parameters:
(1) neck pain intensity
(2) neck pain and sleeping
(3) pins and needles or numbness in the arms at night
(4) duration of symptoms
(5) carrying
(6) reading and watching television
(7) working and/or housework
(8) social activities
(9) driving
(10) comparison of current state with the last time the questionnaire was completed

Instructions:
The questionnaire has been designed to give us information as to how your NECK PAIN has affected your ability to manage in everyday life. Please answer every question and mark in each section ONLY THE ONE BOX which applies to you. We realize you may consider that two of the statements in any one section relates to you but PLEASE JUST MARK THE BOX WHICH MOST CLOSELY DESCRIBES YOUR PROBLEM.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Status</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>neck pain intensity</td>
<td>I have no pain at the moment.</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>The pain is mild at the moment.</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>The pain is moderate at the moment.</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>The pain is severe at the moment.</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>The pain is the worst imaginable at the moment.</td>
<td>4</td>
</tr>
<tr>
<td>neck pain and sleeping</td>
<td>My sleep is never disturbed by pain.</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>My sleep is occasionally disturbed by pain.</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>My sleep is regularly disturbed by pain.</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Because of pain I have less than 5 hours</td>
<td>3</td>
</tr>
<tr>
<td>Sleep in total.</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>----------------</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>Because of pain I have less than 2 hours of sleep in total.</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>pins and needles or numbness in the arms at night</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>I have no pins and needles or numbness at night.</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>I have occasional pins and needles or numbness at night.</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>My sleep is regularly disturbed by pins and needles or numbness.</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Because of pins and needles I have less than 5 hours sleep in total.</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Because of pins and needles or numbness I have less than 2 hours of sleep in total.</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>duration of symptoms</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>My neck and arms feel normal all day.</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>I have symptoms in my neck or arms on waking which last less than 1 hour.</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Symptoms are present on and off for a total period of 1-4 hours.</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Symptoms are present on and off for a total of more than 4 hours.</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Symptoms are present continuously all day.</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>carrying</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>I can carry heavy objects without extra pain.</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>I can carry heavy objects but they give me extra pain.</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Pain prevents me from carrying heavy objects but I can manage medium weight objects.</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>I can only lift light weight objects.</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>I cannot lift anything at all.</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>reading and watching TV</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>I can do this as long as I wish with no problems.</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>I can do this as long as I wish if I'm in a suitable position.</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>I can do this as long as I wish but it causes extra pain.</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Pain causes me to stop doing this sooner than I would like.</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Pain prevents me from doing this at all.</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>working/housework</td>
<td>I can do my usual work without extra pain.</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>I can do my usual work but it gives me extra pain.</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Pain prevents me from doing my usual work for more than half the usual time.</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Pain prevents me from doing my usual work for more than a quarter of the usual time.</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Pain prevents me from working at all.</td>
<td>4</td>
</tr>
<tr>
<td>social activities</td>
<td>My social life is normal and causes me no extra pain.</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>My social life is normal but increases the degree of pain.</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Pain has restricted my social life but I am still able to go out.</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Pain has restricted my social life to the home.</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>I have no social life because of pain.</td>
<td>4</td>
</tr>
<tr>
<td>driving (see below)</td>
<td>I can drive whenever necessary without discomfort.</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>I can drive whenever necessary but with discomfort</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Neck pain or stiffness limits my driving occasionally.</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Neck pain or stiffness limits my driving frequently.</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>I cannot drive at all due to neck symptoms.</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Status compared with the last time you answered this questionnaire</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>your neck pain</td>
<td>much better</td>
</tr>
<tr>
<td>slightly better</td>
<td>the same</td>
</tr>
<tr>
<td>slightly worse</td>
<td>much worse</td>
</tr>
</tbody>
</table>
where:
  • The question on driving is omitted if the patient did not drive a car when in good health.

neck pain score = \text{SUM(points for the first 9 questions)}

If the all 9 questions are answered then

NPQ percentage = \frac{\text{neck pain score}}{36} \times 100\%

If only the first 8 questions are answered then

NPQ percentage = \frac{\text{neck pain score}}{32} \times 100\%

Interpretation:
  • minimum score: 0
  • maximum score: 36 if all 9 questions answered 32 if only the first 8
  • The percentages range from 0 to 100%.
  • The higher the percentage the greater the disability.

Performance:
  • The questionnaire has good short term repeatability and internal consistency.

References:
Appendix I: Health And Well Being Short Form 36 Questionnaire (SF-36), And Scoring Instructions
1. In general, would you say your health is:

<table>
<thead>
<tr>
<th>Response</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>1</td>
</tr>
<tr>
<td>Very good</td>
<td>2</td>
</tr>
<tr>
<td>Good</td>
<td>3</td>
</tr>
<tr>
<td>Fair</td>
<td>4</td>
</tr>
<tr>
<td>Poor</td>
<td>5</td>
</tr>
</tbody>
</table>

2. **Compared to one year ago**, how would you rate your health in general **now**?

<table>
<thead>
<tr>
<th>Response</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Much better now than one year ago</td>
<td>1</td>
</tr>
<tr>
<td>Somewhat better now than one year ago</td>
<td>2</td>
</tr>
<tr>
<td>About the same</td>
<td>3</td>
</tr>
<tr>
<td>Somewhat worse now than one year ago</td>
<td>4</td>
</tr>
<tr>
<td>Much worse now than one year ago</td>
<td>5</td>
</tr>
</tbody>
</table>
3. Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports

4. Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf

5. Lifting or carrying groceries

6. Climbing several flights of stairs

7. Climbing one flight of stairs

8. Bending, kneeling, or stooping

9. Walking more than a mile

10. Walking several blocks

11. Walking one block

12. Bathing or dressing yourself

During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

(Circle One Number on Each Line)

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>13. Cut down the amount of time you spent on work or other activities</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>14. Accomplished less than you would like</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>15. Were limited in the kind of work or other activities</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>16. Had difficulty performing the work or other activities (for example,</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>
During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

(Circle One Number on Each Line)

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

17. Cut down the amount of time you spent on work or other activities

18. Accomplished less than you would like

19. Didn’t do work or other activities as carefully as usual

20. During the past 4 weeks, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbors, or groups?

(Circle One Number)

Not at all 1
Slightly 2
Moderately 3
Quite a bit 4
Extremely 5

21. How much bodily pain have you had during the past 4 weeks?

(Circle One Number)

None 1
Very mild 2
Mild 3
Moderate 4
Severe 5
Very severe 6
22. During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?

(Circle One Number)
Not at all 1
A little bit 2
Moderately 3
Quite a bit 4
Extremely 5

These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling.

How much of the time during the past 4 weeks . . .

(Circle One Number on Each Line)

<table>
<thead>
<tr>
<th>Question</th>
<th>All of the Time</th>
<th>Most of the Time</th>
<th>A Good Bit of the Time</th>
<th>Some of the Time</th>
<th>A Little of the Time</th>
<th>None of the Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>23. Did you feel full of pep?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>24. Have you been a very nervous person?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>25. Have you felt so down in the dumps that nothing could cheer you up?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>26. Have you felt calm and peaceful?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>27. Did you have a lot of energy?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>28. Have you felt downhearted and blue?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>29. Did you feel worn out?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>30. Have you been a happy</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>
person?

31. Did you feel tired?  
   1  2  3  4  5  6

32. During the **past 4 weeks**, how much of the time has your **physical health** or **emotional problems** interfered with your social activities (like visiting with friends, relatives, etc.)?  

**CIRCLE ONE NUMBER**

All of the time 1
Most of the time 2
Some of the time 3
A little of the time 4
None of the time 5

How TRUE or FALSE is **each** of the following statements for you.

**CIRCLE ONE NUMBER ON EACH LINE**

<table>
<thead>
<tr>
<th>Statement</th>
<th>Mostly True</th>
<th>Don’t Know</th>
<th>Mostly False</th>
<th>Definitely False</th>
</tr>
</thead>
<tbody>
<tr>
<td>33. I seem to get sick a little easier than other people</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>34. I am as healthy as anybody I know</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>35. I expect my health to get worse</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>36. My health is excellent</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

**ABOUT**

149
## How to Score the Rand SF-36 Questionnaire

### STEP 1: SCORING QUESTIONS

<table>
<thead>
<tr>
<th>QUESTION NUMBER</th>
<th>ORIGINAL RESPONSE</th>
<th>RECORDED VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 2, 20, 22, 34, 36</td>
<td>1</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>3, 4, 5, 6, 7, 8, 9, 10, 11, 12</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>100</td>
</tr>
<tr>
<td>13, 14, 15, 16, 17, 18, 19</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>100</td>
</tr>
<tr>
<td>21, 23, 26, 27, 30</td>
<td>1</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>24, 25, 28, 29, 31</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>100</td>
</tr>
<tr>
<td>32, 33, 35</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>100</td>
</tr>
</tbody>
</table>
Appendix J: Credibility And Expectancy Questionnaire (CEQ)
Therapy Evaluation Form

We would like you to indicate below how much you believe, right now, that the therapy you are receiving will help to improve your lifestyle / functioning. Belief usually has two aspects to it: (1) what one thinks will happen and (2) what one feels will happen. Sometimes these are similar; sometimes they are different. Please answer the questions below. In the first set, answer in terms of what you think. In the second set answer in terms of what you really and truly feel. We do not want your course convenors to ever see these ratings, so please keep the sheet covered when you are done.

Set I
1. At this point, how logical does the course offered to you seem?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>not at all logical</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>somewhat logical</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>very logical</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. At this point, how successfully do you think this course will be in raising the quality of your functioning?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>not at all useful</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>somewhat useful</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>very useful</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. How confident would you be in recommending this course to a friend who experiences similar problems?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>none at all confident</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>somewhat confident</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>very confident</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. By the end of the course, how much improvement in your functioning do you think will occur?

<table>
<thead>
<tr>
<th></th>
<th>0%</th>
<th>10%</th>
<th>20%</th>
<th>30%</th>
<th>40%</th>
<th>50%</th>
<th>60%</th>
<th>70%</th>
<th>80%</th>
<th>90%</th>
<th>100%</th>
</tr>
</thead>
</table>

Set II
For this set, close your eyes for a few moments, and try to identify what you really feel about the course and its likely success. Then answer the following questions.

1. At this point, how much do you really feel that the course will help you to improve your functioning?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>not at all much</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>somewhat much</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>very much</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. By the end of the course, how much improvement in your functioning do you really feel will occur?

<table>
<thead>
<tr>
<th></th>
<th>0%</th>
<th>10%</th>
<th>20%</th>
<th>30%</th>
<th>40%</th>
<th>50%</th>
<th>60%</th>
<th>70%</th>
<th>80%</th>
<th>90%</th>
<th>100%</th>
</tr>
</thead>
</table>
Appendix K: ACC Low Back Pain Questionnaire (Yellow Flags), And Scoring Instructions
Acute Low Back Pain Screening Questionnaire
Linton & Halldén, 1996

**Today’s date**: / /  
**ACC Claim Number**: 

**Name**: 
**Address**: 

**Telephone**  
**Home ( )**: 
**Work ( )**:  

**Job Title**:  
**Occupation**: 
**Date stopped work this episode**: / /  

These questions and statements apply if you have aches or pains, such as back, shoulder or neck pain. Please read and answer each question carefully. Do not take too long to answer the questions. However, it is important that you answer every question. There is always a response for your particular situation.

1. **What year were you born?**

2. **Are you**  
   - [ ] male  
   - [ ] female

3. **Were you born in New Zealand?**  
   - [ ] yes  
   - [ ] no

4. **Where do you have pain? Place a ✓ for all the appropriate sites.**  
   - [ ] neck  
   - [ ] shoulders  
   - [ ] upper back  
   - [ ] lower back  
   - [ ] leg

5. **How many days of work have you missed because of pain during the past 18 months? Tick ✓ one.**  
   - [ ] 0 days  
   - [ ] 1-2 days  
   - [ ] 3-7 days  
   - [ ] 8-14 days  
   - [ ] 15-30 days  
   - [ ] 1 month  
   - [ ] 2 months  
   - [ ] 3-6 months  
   - [ ] 6-12 months  
   - [ ] over 1 year

6. **How long have you had your current pain problem? Tick ✓ one.**  
   - [ ] 0 days  
   - [ ] 1-2 days  
   - [ ] 3-7 days  
   - [ ] 8-14 days  
   - [ ] 15-30 days  
   - [ ] 1 month  
   - [ ] 2 months  
   - [ ] 3-6 months  
   - [ ] 6-12 months  
   - [ ] over 1 year

7. **Is your work heavy or monotonous? Circle the best alternative.**  
   - [ ] 1  
   - [ ] 2  
   - [ ] 3  
   - [ ] 4  
   - [ ] 5  
   - [ ] 6  
   - [ ] 7  
   - [ ] 8  
   - [ ] 9  
   - [ ] 10  
   - [ ] Not at all  
   - [ ] Extremely

8. **How would you rate the pain that you have had during the past week? Circle one.**  
   - [ ] 1  
   - [ ] 2  
   - [ ] 3  
   - [ ] 4  
   - [ ] 5  
   - [ ] 6  
   - [ ] 7  
   - [ ] 8  
   - [ ] 9  
   - [ ] 10  
   - [ ] No pain  
   - [ ] Pain as bad as it could be

9. **In the past 3 months, on average, how bad was your pain? Circle one.**  
   - [ ] 1  
   - [ ] 2  
   - [ ] 3  
   - [ ] 4  
   - [ ] 5  
   - [ ] 6  
   - [ ] 7  
   - [ ] 8  
   - [ ] 9  
   - [ ] 10  
   - [ ] No pain  
   - [ ] Pain as bad as it could be

10. **How often would you say that you have experienced pain episodes, on average, during the past 3 months? Circle one.**  
    - [ ] 1  
    - [ ] 2  
    - [ ] 3  
    - [ ] 4  
    - [ ] 5  
    - [ ] 6  
    - [ ] 7  
    - [ ] 8  
    - [ ] 9  
    - [ ] 10  
    - [ ] Never  
    - [ ] Always

11. **Based on all the things you do to cope, or deal with your pain, on an average day, how much are you able to decrease it? Circle one.**  
    - [ ] 1  
    - [ ] 2  
    - [ ] 3  
    - [ ] 4  
    - [ ] 5  
    - [ ] 6  
    - [ ] 7  
    - [ ] 8  
    - [ ] 9  
    - [ ] 10  
    - [ ] Can’t decrease  
    - [ ] Can decrease it completely
<table>
<thead>
<tr>
<th>Question</th>
<th>Circle One</th>
<th>Scale 1-10</th>
</tr>
</thead>
<tbody>
<tr>
<td>12. How tense or anxious have you felt in the past week? Circle one.</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
<tr>
<td>&lt; Absolutely calm and relaxed</td>
<td>As tense as I've ever felt</td>
<td></td>
</tr>
<tr>
<td>13. How much have you been bothered by feeling depressed in the past week? Circle one.</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
<tr>
<td>&lt; Not at all</td>
<td>Extremely</td>
<td></td>
</tr>
<tr>
<td>14. In your view, how large is the risk that your current pain may become persistent? Circle one.</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
<td>10 - X</td>
</tr>
<tr>
<td>&lt; No risk</td>
<td>Very large risk</td>
<td></td>
</tr>
<tr>
<td>15. In your estimation, what are the chances that you will be working in 6 months? Circle one.</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
<td>10 - X</td>
</tr>
<tr>
<td>&lt; No chance</td>
<td>Very large chance</td>
<td></td>
</tr>
<tr>
<td>16. If you take into consideration your work routines, management, salary, promotion possibilities and work mates, how satisfied are you with your job? Circle one.</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
<td>10 - X</td>
</tr>
<tr>
<td>&lt; Not at all satisfied</td>
<td>Completely satisfied</td>
<td></td>
</tr>
</tbody>
</table>

Here are some of the things which other people have told us about their back pain. For each statement please circle one number from 0 to 10 to say how much physical activities, such as bending, lifting, walking or driving would affect your back.

<table>
<thead>
<tr>
<th>Question</th>
<th>Circle One</th>
<th>Scale 1-10</th>
</tr>
</thead>
<tbody>
<tr>
<td>17. Physical activities make my pain worse. Circle one.</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
<tr>
<td>&lt; Completely disagree</td>
<td>Completely agree</td>
<td></td>
</tr>
<tr>
<td>18. An increase in pain is an indication that I should stop what I am doing until the pain decreases. Circle one.</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
<td>10 - X</td>
</tr>
<tr>
<td>&lt; Completely disagree</td>
<td>Completely agree</td>
<td></td>
</tr>
<tr>
<td>19. I should not do my normal work with my present pain. Circle one.</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
<tr>
<td>&lt; Completely disagree</td>
<td>Completely agree</td>
<td></td>
</tr>
</tbody>
</table>

Here is a list of five activities. Please circle the one number that best describes your current ability to participate in each of these activities.

<table>
<thead>
<tr>
<th>Question</th>
<th>Circle One</th>
<th>Scale 1-10</th>
</tr>
</thead>
<tbody>
<tr>
<td>20. I can do light work for an hour. Circle one.</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
<td>10 - X</td>
</tr>
<tr>
<td>&lt; Can't do it because of pain problem</td>
<td>Can do it without pain being a problem</td>
<td></td>
</tr>
<tr>
<td>21. I can walk for an hour. Circle one.</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
<td>10 - X</td>
</tr>
<tr>
<td>&lt; Can't do it because of pain problem</td>
<td>Can do it without pain being a problem</td>
<td></td>
</tr>
<tr>
<td>22. I can do ordinary household chores. Circle one.</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
<td>10 - X</td>
</tr>
<tr>
<td>&lt; Can't do it because of pain problem</td>
<td>Can do it without pain being a problem</td>
<td></td>
</tr>
<tr>
<td>23. I can go shopping. Circle one.</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
<td>10 - X</td>
</tr>
<tr>
<td>&lt; Can't do it because of pain problem</td>
<td>Can do it without pain being a problem</td>
<td></td>
</tr>
<tr>
<td>24. I can sleep at night. Circle one.</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
<td>10 - X</td>
</tr>
<tr>
<td>&lt; Can't do it because of pain problem</td>
<td>Can do it without pain being a problem</td>
<td></td>
</tr>
</tbody>
</table>
**Scoring Instructions – Acute Low Back Pain Screening Questionnaire**  
(LINTON & HALLIDEN, 1996)

- For question 4, count the number of pain sites and multiply by 2.
- For questions 6, 7, 8, 9, 10, 12, 13, 14, 17, 18 and 19 the score is the number that has been ticked or circled.
- For questions 11, 15, 16, 20, 21, 22, 23 and 24 the score is 10 minus the number that has been ticked or circled.
- Write the score in the shaded box beside each item — Questions 4 to 24.
- Add them up and write the sum in the box provided — this is the total score.

Note: The scoring method is built into the questionnaire.

**Interpretation of Scores – Acute Pain Screening Questionnaire**

**Questionnaire scores greater than 105 indicate that the patient is at risk.**
This score produces:

- 75% correct identification of those not needing modification to ongoing management
- 86% correct identification of those who will have between 1 and 30 days off work
- 83% correct identification of those who will have more than 30 days off work.

**The use of this questionnaire**

A prospective study is underway to determine the validity of the cut-off score of 105 in New Zealand using a local sample. Information regarding any amendment to this scoring system will be provided as soon as it becomes available.
Appendix L: Exercise Compliance Sheet
<table>
<thead>
<tr>
<th>Exercise</th>
<th>Breathing</th>
<th>Neck Extension</th>
<th>Extension with Rotation</th>
<th>Extension with Shoulder Drop</th>
<th>Upper Back Towel Stretch</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tuesday</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wednesday</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thursday</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Friday</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saturday</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sunday</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please tick the box if you have completed the exercise, OR ‘x’ if you didn’t complete it. If you have any comments please type into the notes column. Comments may be: exercise was more painful, less painful, you feel like you can move more, exercise is getting boring, your find the exercise effective.

<table>
<thead>
<tr>
<th>Exercise</th>
<th>Breathing</th>
<th>Neck Extension</th>
<th>Extension with Rotation</th>
<th>Extension with Shoulder Drop</th>
<th>Upper Back Towel Stretch</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tuesday</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wednesday</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thursday</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Friday</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saturday</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sunday</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Use the YouTube link to prompt you through these exercises. 10 x breathing; 10 x each exercise; lay supine on the towel for as long as your schedule allows, breath and relax 😊
Appendix M: Complementary Therapies And Clinical Practice Author Information
**Description**

**Abstracting and Indexing**

**Editorial Board**

**Guide for Authors**

**DESCRIPTION**

**AUTHOR INFORMATION PACK**

**ISSN:** 1744-3881

*Complementary Therapies in Clinical Practice* is an internationally refereed journal published to meet the broad ranging needs of the healthcare profession in the effective and professional integration of *complementary therapies* within *clinical practice*.

*Complementary Therapies in Clinical Practice* aims to provide rigorous peer reviewed papers addressing research, implementation of complementary therapies (CTs) in the clinical setting, legal and ethical concerns, evaluative accounts of therapy in practice, philosophical analysis of emergent social trends in CTs, excellence in clinical judgement, best practice, problem management, therapy
information, policy development and management of change in order to promote safe and efficacious clinical practice.

Complementary Therapies in Clinical Practice welcomes and considers accounts of reflective practice.

It will be of interest to all members of the healthcare profession including nurses, midwives, pharmacists, hospital doctors, general practitioners, physiotherapists, social scientists, psychologists, CTs researchers, practitioners of CTs, educationalists, managers, patients and individuals interested in CTs.

The Editor of Complementary Therapies in Clinical Practice invites authors to submit articles on all aspects of individual therapies, international news, book reviews, multimedia reports and correspondence.

ABSTRACTING AND INDEXING

ASSIA  Ovid  Medline/Index Medicus EBSCOhost  PubMed  Scopus

EDITORIAL BOARD

Editor-in-Chief

D. Rankin-Box, Macclesfield, Cheshire, UK

AUTHOR INFORMATION

PACK 15 Jan 2016

www.elsevier.com/locate/ctcp  1

Associate Editors


International Advisory Board

P. Brown, Cardiff, Wales, UK  S. Chong, Potts Point, New South Wales,
GUIDE FOR AUTHORS

Your Paper Your Way

We now differentiate between the requirements for new and revised submissions. You may choose to submit your manuscript as a single Word or PDF file to be used in the refereeing process. Only when your paper is at the revision stage, will you be requested to put your paper in to a 'correct format' for acceptance and provide the items required for the publication of your article.

To find out more, please visit the Preparation section below.

The Editor of Complementary Therapies in Clinical Practice invites authors to submit articles on all aspects of individual therapies, international news, book reviews, multimedia reports and correspondence.

As a service to the community, this journal makes available online the accepted manuscripts as soon as possible after acceptance. At this stage, the author's accepted manuscript (in both full-text and PDF) is given a Digital Object Identifier (DOI) and is fully citable, and searchable by title, author(s) name and the full-text. The article also carries a disclaimer noting that it is an unedited manuscript which has not yet been copyedited, typeset or proofread. When the
fully copyedited version is ready for publication, it simply replaces the author accepted manuscript version.

Page charges
This journal has no page charges.

BEFORE YOU BEGIN

Ethics in publishing
For information on Ethics in publishing and Ethical guidelines for journal publication see https://www.elsevier.com/publishingethics and https://www.elsevier.com/journal-authors/ethics.

Human and animal rights
If the work involves the use of human subjects, the author should ensure that the work described has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for experiments involving humans, http://www.wma.net/en/30publications/10policies/b3/index.html; Uniform Requirements for manuscripts submitted to Biomedical journals, http://www.icmje.org. Authors should include a statement in the manuscript that informed consent was obtained for experimentation with human subjects. The privacy rights of human subjects must always be observed.

All animal experiments should be carried out in accordance with the U.K. Animals (Scientific Procedures) Act, 1986 and associated guidelines, EU Directive 2010/63/EU for animal experiments, or the National Institutes of Health guide for the care and use of Laboratory animals (NIH Publications No. 8023, revised 1978) and the authors should clearly indicate in the manuscript that such guidelines have been followed. **All animal studies need to ensure they comply with the ARRIVE guidelines.** More information can be found at http://www.nc3rs.org.uk/page.asp?id=1357.

Conflict of interest
All authors must disclose any financial and personal relationships with other people or organizations that could inappropriately influence (bias) their work. Examples of potential conflicts of interest include employment, consultancies, stock ownership, honoraria, paid expert testimony, patent applications/registrations, and grants or
other funding. If there are no conflicts of interest then please state this: 'Conflicts of interest: none'. See also https://www.elsevier.com/conflictsofinterest. Further information and an example of a Conflict of Interest form can be found at: http://service.elsevier.com/app/answers/detail/a_id/286/supporthub/publishing.

**Submission declaration and verification**

Submission of an article implies that the work described has not been published previously (except in the form of an abstract or as part of a published lecture or academic thesis or as an electronic preprint, see https://www.elsevier.com/sharingpolicy), that it is not under consideration for publication elsewhere, that its publication is approved by all authors and tacitly or explicitly by the responsible authorities where the work was carried out, and that, if accepted, it will not be published elsewhere in the same form, in English or in any other language, including electronically without the written consent of the copyright-holder. To verify originality, your article may be checked by the originality detection service CrossCheck https://www.elsevier.com/editors/plagdetect.

AUTHOR INFORMATION PACK 15 Jan 2016
www.elsevier.com/locate/ctcp  3

**Contributors**

Each author is required to declare his or her individual contribution to the article: all authors must have materially participated in the research and/or article preparation, so roles for all authors should be described. The statement that all authors have approved the final article should be true and included in the disclosure.

**Authorship**

All authors should have made substantial contributions to all of the following: (1) the conception and design of the study, or acquisition of data, or analysis and interpretation of data, (2) drafting the article or revising it critically for important intellectual content, (3) final approval of the version to be submitted.

**Clinical trial results**

In line with the position of the International Committee of Medical
Journal Editors, the journal will not consider results posted in the same clinical trials registry in which primary registration resides to be prior publication if the results posted are presented in the form of a brief structured (less than 500 words) abstract or table. However, divulging results in other circumstances (e.g., investors' meetings) is discouraged and may jeopardise consideration of the manuscript. Authors should fully disclose all posting in registries of results of the same or closely related work.

**Reporting clinical trials**

Randomized controlled trials should be presented according to the CONSORT guidelines. At manuscript submission, authors must provide the CONSORT checklist accompanied by a flow diagram that illustrates the progress of patients through the trial, including recruitment, enrollment, randomization, withdrawal and completion, and a detailed description of the randomization procedure. The CONSORT checklist and template flow diagram can be found on [http://www.consort-statement.org](http://www.consort-statement.org).

**Registration of clinical trials**

Registration in a public trials registry is a condition for publication of clinical trials in this journal in accordance with International Committee of Medical Journal Editors (ICMJE, [http://www.icmje.org](http://www.icmje.org)) recommendations. Trials must register at or before the onset of patient enrolment. The clinical trial registration number should be included at the end of the abstract of the article. A clinical trial is defined as any research study that prospectively assigns human participants or groups of humans to one or more health-related interventions to evaluate the effects of health outcomes. Health-related interventions include any intervention used to modify a biomedical or health-related outcome (for example drugs, surgical procedures, devices, behavioural treatments, dietary interventions, and process-of-care changes). Health outcomes include any biomedical or health-related measures obtained in patients or participants, including pharmacokinetic measures and adverse events. Purely observational studies (those in which the assignment of the medical intervention is not at the discretion of the investigator) will not require registration.

**Copyright**

Upon acceptance of an article, authors will be asked to complete a 'Journal Publishing Agreement' (for more information on this and
As an author you (or your employer or institution) have certain rights to reuse your work. For more information see https://www.elsevier.com/copyright.

**Role of the funding source**

You are requested to identify who provided financial support for the conduct of the research and/or preparation of the article and to briefly describe the role of the sponsor(s), if any, in study design; in the collection, analysis and interpretation of data; in the writing of the report; and in the decision to submit the article for publication. If the funding source(s) had no such involvement then this should be stated.

**Funding body agreements and policies**

Elsevier has established a number of agreements with funding
bodies which allow authors to comply with their funder’s open access policies. Some authors may also be reimbursed for associated publication fees. To learn more about existing agreements please visit https://www.elsevier.com/fundingbodies.

After acceptance, open access papers will be published under a noncommercial license. For authors requiring a commercial CC BY license, you can apply after your manuscript is accepted for publication.

**Open access**

This journal offers authors a choice in publishing their research:

**Open access**

- Articles are freely available to both subscribers and the wider public with permitted reuse
- An open access publication fee is payable by authors or on their behalf e.g. by their research funder or institution
- **Subscription**
- Articles are made available to subscribers as well as developing countries and patient groups through our universal access programs (https://www.elsevier.com/access).
- No open access publication fee payable by authors.

Regardless of how you choose to publish your article, the journal will apply the same peer review criteria and acceptance standards.

For open access articles, permitted third party (re)use is defined by the following Creative Commons user licenses:

*Creative Commons Attribution-NonCommercial-NoDerivs (CC BY-NC-ND)*

For non-commercial purposes, lets others distribute and copy the article, and to include in a collective work (such as an anthology), as long as they credit the author(s) and provided they do not alter or modify the article.

The open access publication fee for this journal is **USD 2500**, excluding taxes. Learn more about Elsevier’s pricing policy: http://www.elsevier.com/openaccesspricing.

**Green open access**

Authors can share their research in a variety of different ways and
Elsevier has a number of green open access options available. We recommend authors see our green open access page for further information (http://elsevier.com/greenopenaccess). Authors can also self-archive their manuscripts immediately and enable public access from their institution's repository after an embargo period. This is the version that has been accepted for publication and which typically includes author-incorporated changes suggested during submission, peer review and in editor-author communications.

Embargo period: For subscription articles, an appropriate amount of time is needed for journals to deliver value to subscribing customers before an article becomes freely available to the public. This is the embargo period and it begins from the date the article is formally published online in its final and fully citable form.

This journal has an embargo period of 12 months.

**Language (usage and editing services)**

Please write your text in good English (American or British usage is accepted, but not a mixture of these). Authors who feel their English language manuscript may require editing to eliminate possible grammatical or spelling errors and to conform to correct scientific

AUTHOR INFORMATION PACK 15 Jan 2016
www.elsevier.com/locate/ctcp

English may wish to use the English Language Editing service available from Elsevier's WebShop (http://webshop.elsevier.com/languageediting/) or visit our customer support site (http://support.elsevier.com) for more information.

**Submission**

Our online submission system guides you stepwise through the process of entering your article details and uploading your files. The system converts your article files to a single PDF file used in the peer-review process. Editable files (e.g., Word, LaTeX) are required to typeset your article for final publication. All correspondence, including notification of the Editor's decision and requests for revision, is sent by e-mail.

*Submit your article*

Please submit your article via

**Referees**

Please submit the names and institutional e-mail addresses of several potential referees. For more details, visit our Support site. Note that the editor retains the sole right to decide whether or not the suggested reviewers are used.

**PREPARATION**

**NEW SUBMISSIONS**

Submission to this journal proceeds totally online and you will be guided stepwise through the creation and uploading of your files. The system automatically converts your files to a single PDF file, which is used in the peer-review process. As part of the Your Paper Your Way service, you may choose to submit your manuscript as a single file to be used in the refereeing process. This can be a PDF file or a Word document, in any format or lay-out that can be used by referees to evaluate your manuscript. It should contain high enough quality figures for refereeing. If you prefer to do so, you may still provide all or some of the source files at the initial submission. Please note that individual figure files larger than 10 MB must be uploaded separately.

**References**

There are no strict requirements on reference formatting at submission. References can be in any style or format as long as the style is consistent. Where applicable, author(s) name(s), journal title/book title, chapter title/article title, year of publication, volume number/book chapter and the pagination must be present. Use of DOI is highly encouraged. The reference style used by the journal will be applied to the accepted article by Elsevier at the proof stage. Note that missing data will be highlighted at proof stage for the author to correct.

**Formatting requirements**

There are no strict formatting requirements but all manuscripts must contain the essential elements needed to convey your manuscript, for example Abstract, Keywords, Introduction, Materials and Methods, Results, Conclusions, Artwork and Tables with Captions. If your article includes any Videos and/or other
Supplementary material, this should be included in your initial submission for peer review purposes.

Divide the article into clearly defined sections.

*Figures and tables embedded in text*

Please ensure the figures and the tables included in the single file are placed next to the relevant text in the manuscript, rather than at the bottom or the top of the file.

**REVISED SUBMISSIONS**

*Use of word processing software*

Regardless of the file format of the original submission, at revision you must provide us with an editable file of the entire article. Keep the layout of the text as simple as possible. Most formatting codes will be removed and replaced on processing the article. The electronic text should be prepared in a way very similar to that of conventional manuscripts (see also the Guide to Publishing with Elsevier: [https://www.elsevier.com/guidepublication](https://www.elsevier.com/guidepublication)). See also the section on Electronic artwork.

To avoid unnecessary errors you are strongly advised to use the 'spell-check' and 'grammar-check' functions of your word processor.

**Article structure**

*AUTHOR INFORMATION PACK 15 Jan 2016*  
www.elsevier.com/locate/ctcp  6

---

*Subdivision - numbered sections*

Divide your article into clearly defined and numbered sections. Subsections should be numbered 1.1 (then 1.1.1, 1.1.2, ...), 1.2, etc. (the abstract is not included in section numbering). Use this numbering also for internal cross-referencing: do not just refer to 'the text'. Any subsection may be given a brief heading. Each heading should appear on its own separate line.

**Introduction**

State the objectives of the work and provide an adequate background, avoiding a detailed literature survey or a summary of the results.
Material and methods

Provide sufficient detail to allow the work to be reproduced. Methods already published should be indicated by a reference: only relevant modifications should be described.

Theory/calculation

A Theory section should extend, not repeat, the background to the article already dealt with in the Introduction and lay the foundation for further work. In contrast, a Calculation section represents a practical development from a theoretical basis.

Results

Results should be clear and concise.

Discussion

This should explore the significance of the results of the work, not repeat them. A combined Results and Discussion section is often appropriate. Avoid extensive citations and discussion of published literature.

Conclusions

The main conclusions of the study may be presented in a short Conclusions section, which may stand alone or form a subsection of a Discussion or Results and Discussion section.

Appendices

If there is more than one appendix, they should be identified as A, B, etc. Formulae and equations in appendices should be given separate numbering: Eq. (A.1), Eq. (A.2), etc.; in a subsequent appendix, Eq. (B.1) and so on. Similarly for tables and figures: Table A.1; Fig. A.1, etc.

Authors are encouraged to provide a short biography for each contributor. These should not exceed 75 words per person, and may each be accompanied by a small photograph.

Essential title page information

• Title. Concise and informative. Titles are often used in information-retrieval systems. Avoid abbreviations and formulae where possible.  • Author names and affiliations. Please clearly
indicate the given name(s) and family name(s) of each author and check that all names are accurately spelled. Present the authors' affiliation addresses (where the actual work was done) below the names. Indicate all affiliations with a lower-case superscript letter immediately after the author's name and in front of the appropriate address. Provide the full postal address of each affiliation, including the country name and, if available, the e-mail address of each author.

- **Corresponding author.** Clearly indicate who will handle correspondence at all stages of refereeing and publication, also post-publication. **Ensure that the e-mail address is given and that contact details are kept up to date by the corresponding author.**

- **Present/permanent address.** If an author has moved since the work described in the article was done, or was visiting at the time, a 'Present address' (or 'Permanent address') may be indicated as a footnote to that author's name. The address at which the author actually did the work must be retained as the main, affiliation address. Superscript Arabic numerals are used for such footnotes.

**Abstract**

A concise and factual abstract is required. The abstract should state briefly the purpose of the research, the principal results and major conclusions. An abstract is often presented separately from the article, so it must be able to stand alone. For this reason, References should be avoided, but if essential, then cite the author(s) and year(s). Also, non-standard or uncommon abbreviations should be avoided, but if essential they must be defined at their first mention in the abstract itself.

**Keywords**

Immediately after the abstract, provide a maximum of 6 keywords, using American spelling and avoiding general and plural terms and multiple concepts (avoid, for example, 'and', 'of'). Be sparing with abbreviations: only abbreviations firmly established in the field may be eligible. These keywords will be used for indexing purposes.

**Acknowledgements**
Collate acknowledgements in a separate section at the end of the article before the references and do not, therefore, include them on the title page, as a footnote to the title or otherwise. List here those individuals who provided help during the research (e.g., providing language help, writing assistance or proof reading the article, etc.).

**Units**

Follow internationally accepted rules and conventions: use the international system of units (SI). If other units are mentioned, please give their equivalent in SI.

**Math formulae**

Please submit math equations as editable text and not as images. Present simple formulae in line with normal text where possible and use the solidus (/) instead of a horizontal line for small fractional terms, e.g., X/Y. In principle, variables are to be presented in italics. Powers of e are often more conveniently denoted by exp. Number consecutively any equations that have to be displayed separately from the text (if referred to explicitly in the text).

**Footnotes**

Footnotes should be used sparingly. Number them consecutively throughout the article. Many word processors build footnotes into the text, and this feature may be used. Should this not be the case, indicate the position of footnotes in the text and present the footnotes themselves separately at the end of the article.

**Artwork**

**Electronic artwork  General points**  • Make sure you use uniform lettering and sizing of your original artwork.  • Preferred fonts: Arial (or Helvetica), Times New Roman (or Times), Symbol, Courier.  • Number the illustrations according to their sequence in the text.  • Use a logical naming convention for your artwork files.  • Indicate per figure if it is a single, 1.5 or 2-column fitting image.  • For Word submissions only, you may still provide figures and their captions, and tables within a single file at the revision stage.  • Please note that individual figure files larger than 10 MB must be provided in separate source files. A detailed guide on electronic artwork is available on our website: https://www.elsevier.com/artworkinstructions.  You are urged to visit this site; some excerpts from the detailed information
are given here. **Formats** Regardless of the application used, when your electronic artwork is finalized, please 'save as' or convert the images to one of the following formats (note the resolution requirements for line drawings, halftones, and line/halftone combinations given below): EPS (or PDF): Vector drawings. Embed the font or save the text as 'graphics'. TIFF (or JPG): Color or grayscale photographs (halftones): always use a minimum of 300 dpi. TIFF (or JPG): Bitmapped line drawings: use a minimum of 1000 dpi. TIFF (or JPG): Combinations bitmapped line/half-tone (color or grayscale): a minimum of 500 dpi is required. **Please do not:**  • Supply files that are optimized for screen use (e.g., GIF, BMP, PICT, WPG); the resolution is too low. • Supply files that are too low in resolution. • Submit graphics that are disproportionately large for the content.

**Color artwork**

Please make sure that artwork files are in an acceptable format (TIFF (or JPEG), EPS (or PDF), or MS Office files) and with the correct resolution. If, together with your accepted article, you submit usable color figures then Elsevier will ensure, at no additional charge, that these figures will appear in color online (e.g., ScienceDirect and other sites) regardless of whether or not these illustrations are reproduced in color in the printed version. **For color reproduction in print, you will receive**

AUTHOR INFORMATION PACK 15 Jan 2016
www.elsevier.com/locate/ctcp

**information regarding the costs from Elsevier after receipt of your accepted article.** Please indicate your preference for color: in print or online only. For further information on the preparation of electronic artwork, please see https://www.elsevier.com/artworkinstructions.

**Illustration services**

Elsevier's WebShop (http://webshop.elsevier.com/illustrationservices) offers Illustration Services to authors preparing to submit a manuscript but concerned about the quality of the images accompanying their article. Elsevier's expert illustrators can produce scientific, technical and medical-style images, as well as a full range of charts, tables and graphs. Image 'polishing' is also available, where our illustrators
take your image(s) and improve them to a professional standard. Please visit the website to find out more.

**Figure captions**

Ensure that each illustration has a caption. A caption should comprise a brief title (**not** on the figure itself) and a description of the illustration. Keep text in the illustrations themselves to a minimum but explain all symbols and abbreviations used.

**Tables**

Please submit tables as editable text and not as images. Tables can be placed either next to the relevant text in the article, or on separate page(s) at the end. Number tables consecutively in accordance with their appearance in the text and place any table notes below the table body. Be sparing in the use of tables and ensure that the data presented in them do not duplicate results described elsewhere in the article. Please avoid using vertical rules.

**References**

**Citation in text**

Please ensure that every reference cited in the text is also present in the reference list (and vice versa). Any references cited in the abstract must be given in full. Unpublished results and personal communications are not recommended in the reference list, but may be mentioned in the text. If these references are included in the reference list they should follow the standard reference style of the journal and should include a substitution of the publication date with either 'Unpublished results' or 'Personal communication'. Citation of a reference as 'in press' implies that the item has been accepted for publication.

**Reference links**

Increased discoverability of research and high quality peer review are ensured by online links to the sources cited. In order to allow us to create links to abstracting and indexing services, such as Scopus, CrossRef and PubMed, please ensure that data provided in the references are correct. Please note that incorrect surnames, journal/book titles, publication year and pagination may prevent link creation. When copying references, please be careful as they may already contain errors. Use of the DOI is encouraged.
Web references

As a minimum, the full URL should be given and the date when the reference was last accessed. Any further information, if known (DOI, author names, dates, reference to a source publication, etc.), should also be given. Web references can be listed separately (e.g., after the reference list) under a different heading if desired, or can be included in the reference list.

References in a special issue

Please ensure that the words 'this issue' are added to any references in the list (and any citations in the text) to other articles in the same Special Issue.

Reference management software

Most Elsevier journals have their reference template available in many of the most popular reference management software products. These include all products that support Citation Style Language styles (http://citationstyles.org), such as Mendeley (http://www.mendeley.com/features/reference-manager) and Zotero (https://www.zotero.org/), as well as EndNote (http://endnote.com/downloads/styles). Using the word processor plug-ins from these products, authors only need to select the appropriate journal template when preparing their article, after which citations and bibliographies will be automatically formatted in the journal's style. If no template is yet available for this journal, please follow the format of the sample references and citations as shown in this Guide.

Users of Mendeley Desktop can easily install the reference style for this journal by clicking the following link:

AUTHOR INFORMATION PACK 15 Jan 2016
www.elsevier.com/locate/ctcp


When preparing your manuscript, you will then be able to select this style using the Mendeley plug-ins for Microsoft Word or LibreOffice.

Reference formatting

There are no strict requirements on reference formatting at
submission. References can be in any style or format as long as the style is consistent. Where applicable, author(s) name(s), journal title/book title, chapter title/article title, year of publication, volume number/book chapter and the pagination must be present. Use of DOI is highly encouraged. The reference style used by the journal will be applied to the accepted article by Elsevier at the proof stage. Note that missing data will be highlighted at proof stage for the author to correct. If you do wish to format the references yourself they should be arranged according to the following examples:


Video data

Elsevier accepts video material and animation sequences to support and enhance your scientific research. Authors who have video or animation files that they wish to submit with their article are strongly encouraged to include links to these within the body of the article. This can be done in the same way as a figure or table by referring to the video or animation content and noting in the body text where it should be placed. All submitted files should be properly labeled so that they directly relate to the video file's content. In order to ensure that your video or animation material is directly usable, please provide the files in one of our recommended file formats with a preferred maximum size of 150 MB. Video and animation files supplied will be published online in the electronic version of your article in Elsevier Web products, including ScienceDirect: http://www.sciencedirect.com. Please supply 'stills' with your files: you can choose any frame from the video or animation or make a separate image. These will be used instead of
standard icons and will personalize the link to your video data. For more detailed instructions please visit our video instruction pages at https://www.elsevier.com/artworkinstructions. Note: since video and animation cannot be embedded in the print version of the journal, please provide text for both the electronic and the print version for the portions of the article that refer to this content.

**AudioSlides**

The journal encourages authors to create an AudioSlides presentation with their published article. AudioSlides are brief, webinar-style presentations that are shown next to the online article on ScienceDirect. This gives authors the opportunity to summarize their research in their own words and to help readers understand what the paper is about. More information and examples are available at https://www.elsevier.com/audioslides. Authors of this journal will automatically receive an invitation e-mail to create an AudioSlides presentation after acceptance of their paper.

**Supplementary material**

Supplementary material can support and enhance your scientific research. Supplementary files offer the author additional possibilities to publish supporting applications, high-resolution images, background datasets, sound clips and more. Please note that such items are published online exactly as they are submitted; there is no typesetting involved (supplementary data supplied as an Excel file or as a PowerPoint slide will appear as such online). Please submit the material together with the article and supply a concise and descriptive caption for each file. If you wish to make any changes to supplementary data during any stage of the process, then please make sure to provide an updated file, and do not annotate any corrections on a previous version. Please also make sure to switch off the 'Track Changes' option in any Microsoft Office files as these will appear in the published supplementary file(s). For more detailed instructions please visit our artwork instruction pages at https://www.elsevier.com/artworkinstructions.

**Submission checklist**
The following list will be useful during the final checking of an article prior to sending it to the journal for review. Please consult this Guide for Authors for further details of any item. **Ensure that the following items are present:** One author has been designated as the corresponding author with contact details:

- E-mail address
- Full postal address

All necessary files have been uploaded, and contain:

- Keywords
- All figure captions
- All tables (including title, description, footnotes)

Further considerations:

- Manuscript has been 'spell-checked' and 'grammar-checked'
- All references mentioned in the Reference list are cited in the text, and vice versa
- Permission has been obtained for use of copyrighted material from other sources (including the Internet)

Printed version of figures (if applicable) in color or black-and-white

- Indicate clearly whether or not color or black-and-white in print is required.

For any further information please visit our customer support site at [http://support.elsevier.com](http://support.elsevier.com).

**AFTER ACCEPTANCE**

**Use of the Digital Object Identifier**

The Digital Object Identifier (DOI) may be used to cite and link to electronic documents. The DOI consists of a unique alpha-numeric character string which is assigned to a document by the publisher upon the initial electronic publication. The assigned DOI never changes. Therefore, it is an ideal medium for citing a document, particularly 'Articles in press' because they have not yet received their full bibliographic information. Example of a correctly given DOI (in URL format; here an article in the journal *Physics Letters B*):

[http://dx.doi.org/10.1016/j.physletb.2010.09.059](http://dx.doi.org/10.1016/j.physletb.2010.09.059)

When you use a DOI to create links to documents on the web, the DOIs are guaranteed never to change.

**Online proof correction**

Corresponding authors will receive an e-mail with a link to our online proofing system, allowing annotation and correction of proofs online. The environment is similar to MS Word: in addition to editing text, you can also comment on figures/tables and answer questions from the Copy Editor. Web-based proofing provides a faster and less error-prone process by allowing you to directly type your
corrections, eliminating the potential introduction of errors.

If preferred, you can still choose to annotate and upload your edits on the PDF version. All instructions for proofing will be given in the e-mail we send to authors, including alternative methods to the online version and PDF. We will do everything possible to get your article published quickly and accurately. Please use this proof only for checking the typesetting, editing, completeness and correctness of the text, tables and figures. Significant changes to the article as accepted for publication will only be considered at this stage with permission from the Editor. It is important to ensure that all corrections are sent back to us in one communication. Please check carefully before replying, as inclusion of any subsequent corrections cannot be guaranteed. Proofreading is solely your responsibility.

**Offprints**

The corresponding author, at no cost, will be provided with a personalized link providing 50 days free access to the final published version of the article on ScienceDirect. This link can also be used for sharing via email and social networks. For an extra charge, paper offprints can be ordered via the offprint order form which is sent once the article is accepted for publication. Both corresponding and co-authors may order offprints at any time via Elsevier's WebShop (http://webshop.elsevier.com/myarticleservices/offprints). Authors requiring printed copies of multiple articles may use Elsevier WebShop's 'Create Your Own Book' service to collate multiple articles within a single cover (http://webshop.elsevier.com/myarticleservices/booklets).

AUTHOR INFORMATION PACK 15 Jan 2016
www.elsevier.com/locate/ctcp 11

**AUTHOR INQUIRIES**

You can track your submitted article at https://www.elsevier.com(track-submission). You can track your accepted article at https://www.elsevier.com(trackarticle). You are also welcome to contact Customer Support via http://support.elsevier.com.

© Copyright 2014 Elsevier | http://www.elsevier.com

AUTHOR INFORMATION PACK 15 Jan 2016
www.elsevier.com/locate/ctcp 12
Full name of author: Naomi Andrews

Full title of thesis/dissertation/research project: The effect of yoga and adjunct home-based exercise on pain, disability, and quality of life in people with chronic nonspecific neck pain: A randomised controlled trial

Department of Osteopathy

Degree: Master of Osteopathy Year of presentation: 2016

EITHER:

(1) I agree to my thesis/dissertation/research project being lodged in the Unitec Library (including being available for inter-library loan), provided that due acknowledgement of its use is made. I consent to copies being made in accordance with the Copyright Act 1994.

and

I agree that a digital copy may be kept by the Library and uploaded to the institutional repository and be viewable worldwide.

Signature of author: Naomi Andrews

Date: 18th February, 2016