Concurrent validity of the Afrikaans versions of the Neck Disability Index Questionnaire and the Quadruple Visual Analogue Scale

By

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This work is submitted in partial compliance with the requirements for the Master's Degree in Technology: Chiropractic at the Durban University of Technology

I, Stephanus Christoffel Jacobs le Roux, do declare that this dissertation is representative of my own work in both conception and execution

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Dedication

“For I know the plans I have for you,” declares the Lord, “plans to prosper you and not to harm you, plans to give you hope and a future”. Jeremiah 29:11 (NIV)

First and foremost I would like to dedicate this work to my Lord and Saviour, Jesus Christ. He has blessed me abundantly and has been a constant source of strength and guidance through difficult times in my life.

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Abstract

Background: Neck pain is a condition that is becoming more common throughout the world and most people can expect to experience some degree of neck pain sometime during their life. There is a need for early diagnosis and follow-up of neck pain to assess a patient's level of self-rated disability due to the escalating disability burden and compensation costs associated with neck pain. For this reason, disability questionnaires are increasingly used for clinical assessment and as an outcome measurement for the treatment of neck pain. Translation and cross-cultural adaptation of disability questionnaires have thus become increasingly necessary when dealing with different cultural groups.

Methods: This is a quantitative validity and reliability assessment study comparing the English versions of the Neck Disability Index (NDI) and the Quadruple Visual Analogue Scale (QVAS) to their translated Afrikaans counterparts. The first step was to translate the questionnaires into Afrikaans. The translated questionnaires were then scrutinised and critiqued by an Expert group, who are fluent in both the Afrikaans and English languages, and back translated to English in order or establish their face validity. A small pilot study was conducted with the original and translated versions of the questionnaires to establish their content validity.

The translated and original versions of the NDI and QVAS were given to a study group to complete with a suitable time delay between the completions of the questionnaires. The results from the study group were statistically analysed to establish concurrent validity and reliability.

Results: There were 50 participants each completing one English NDI and QVAS and one Afrikaans NDI and QVAS. The results indicate high reliability for both the Afrikaans NDI ($\alpha = 0.900$) and QVAS ($\alpha = 0.883$). The Afrikaans NDI and QVAS are deemed reliable compared to their English counterparts.

The results indicated a significant level of concurrent validity for both the NDI and the QVAS.

Both the Afrikaans versions of the NDI and QVAS were deemed reliable and concurrent validity was established. The NDI and QVAS were successfully translated and the Afrikaans versions can now be used in the Afrikaans population as viable alternatives to the English NDI and QVAS.

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NDI: Neck Disability Index

QVAS: Quadruple Visual Analogue Scale

NP: Neck Pain

Chapter One

Introduction

1.1 Introduction

Cervical spine pain is broadly defined as pain located between the occiput and the third thoracic vertebra (Côté *et al.* 1998), which according to Slabbert (2010) can present as either acute or chronic pain. Acute pain according to Ally (2006) is pain that is experienced as severe symptoms over a short course of one to four days or less than six months. Chronic pain is pain that has been present for over six months (Ally 2006).

According to Côté *et al.* (2004) and Hoy *et al.* (2010) the annual incidence of neck pain (NP) in the general population is between 10.4% and 21.3%, of which 0.6% will develop disabling NP. Fejer *et al.* (2006) did a comprehensive systematic critical review of 56 papers for the prevalence of NP in the world population. They found that the lifetime prevalence of the adult population (18-84 years of age) for NP ranged from 14.2% to 71% (mean 48.5%).

A study conducted by Drew (1995) in South Africa, found that 54.4% of patients presenting to the Technikon-Natal Chiropractic Day Clinic and 57.4% of patients presenting to private practices complained of NP. This is higher than the 25.6% of patients with NP noted by Mahomed (2007) in a demographic study conducted in South Africa for patients seeking the medical assistance of private chiropractors.

There is a high level of continued interest in NP research due to the escalating disability burden and compensation costs associated with NP (Côté *et al.* 2003). Due to the effect that NP has on a person's activities of daily living, the increased treatment cost and a decrease in work capacity, there is a need for early diagnosis and follow-up of NP to assess a patient's level of self-rated disability (Kesiktas *et al.* 2012).

There are several questionnaires that measure disability due to NP and its effect on the patient (Yeomans 2000). The most common being the "Neck Disability Index" (NDI) (Vernon 2008), which measures disability; and the "Quadruple Visual Analogue Scale" (QVAS) (Yeomans 2000), which measures pain. However, a review of related literature revealed, that there is to date no culturally specific validated assessment tool to measure the degree of disability caused by NP in the Afrikaans-speaking population. These measurement tools can provide accurate information to the health-care sector.

This result of this study can be used as a foundation for information on the prevalence or incidence of NP in the Afrikaans-speaking population when used in additional research studies or when used as a measurement tool by health-care professionals.

1.2 Aims and Objectives

The aim of the study was to determine the validity of the translated versions of the NDI and QVAS. Therefore the objectives of this study can be outlined as follows:

1. Translating the NDI and the QVAS into Afrikaans.
2. Determining the face validity of the translated versions by analysis and critique through the use of an Expert group.
3. Determining the content validity, the translated versions and the original versions of the NDI and the QVAS will be presented to five, pilot study participants to analyse and critique the Afrikaans translated versions.
4. Determining the concurrent validity of the translated versions of the questionnaires.
5. Determining the internal reliability of the translated versions of the questionnaires.

1.3 Rationale

Afrikaans is the third most common language in South Africa (either as a first or second language) (South Africa: fast facts 2012), which equates to 6.8 million people (with 75.8% of the Coloured population and 60.8% of the White population falling into this bracket). The largest proportion of the Afrikaans speaking community resides in the Northern Cape (53.8%) followed by the Western Cape (49.7%) (Statistics South Africa 2011). Afrikaans (as a home language) is ranked third (13.5%), with IsiXhosa (16%) second and IsiZulu (22.7%) first.

In the Afrikaans-speaking population, according to the researcher's best knowledge, there is to date no culturally specific validated assessment tool to measure the degree of disability caused by NP. Walker *et al.* (2006) indicate that reporting of information is significantly different between population groups if a culturally and language adapted questionnaire is not utilised to document this information. This casts doubt on the accuracy of current information related to NP and its related disability in the Afrikaans-speaking population and highlights the need for culturally and language adapted questionnaires to be developed.

According to Scollen and Wong Scollen (1995), language is ambiguous by nature and the construct validity of questionnaires developed in a western culture is questionable when used in another culture, even if these questionnaires are translated accurately.

This study provides the means for researchers to gather information on the prevalence and incidence of NP in the Afrikaans-speaking population and also provides the measurement tools for acquiring accurate information for the health-care sector.

1.4 Limitations

The study assumed that the data on the information sheet was accurate and represented the exact reality of the participants at the time of completion of the questionnaires.

1.5 Benefits

This research will contribute to providing the necessary measurement tools that will be socially and culturally accepted, by producing a culturally-specific and language adapted NDI and QVAS. These measurement tools will assist in providing more precise information to the health-care practitioner regarding their patient's degree of NP and disability for Afrikaans-speaking patients or individuals. This is potentially one-third of the South African population which includes 76% of the Coloured population, 61% of the White population and collectively 21% of the Black and Indian population (Statistics South Africa 2011). It will enable health-care professionals (including chiropractors, orthopaedic surgeons and other professionals), researchers, medical aids, government departments and businesses to more accurately measure the degree of pain (QVAS) and disability (NDI) experienced by the Afrikaans-speaking population. This could help individual patients to be properly assessed or managed and provide accurate indications of pain and disability. For the individual health-care professional, it will be beneficial to properly understand the patient's condition, measure progress and direct resources and interventions appropriately.

Afrikaans-speaking populations or where populations are mixed will benefit from the translated version of the NDI and QVAS. These benefits will come from the choice that researchers and health-care professionals will have in providing Afrikaans patients with Afrikaans versions, e.g. it can help a company that is investigating disability amongst its staff, demographics on sports injuries, motor vehicle accidents and IOD claims. These institutions will then be able to measure the level of disability at the start (directly after the injury or accident) and subsequent progress more accurately.

1.6 Conclusion

The layout of the dissertation will be as follows. Chapter two comprises the choice of questionnaires, translation of questionnaires and a discussion about pain versus disability. Chapter three follows detailing the methodology of this particular study, with the results obtained through this methodology presented in chapter four. Discussion of the results achieved in respect of a literature comparison is presented in chapter five in order to contextualise the findings. Chapter six will contains the summary of the study findings and the recommendations that the research makes in respect of future studies in this field or related fields.

Chapter Two

Literature Review

2.1 Introduction

In this chapter, the basic anatomy of the neck, neck pain and the causes of neck pain will be discussed as well as the impact and effect it has on the community and especially the South African and Afrikaans-speaking population. This chapter will also discuss translations of questionnaires and questionnaires as research tools.

2.2 Basic Anatomy of the Neck

The broad definition of cervical spine pain is pain that is located between the occiput and the third thoracic vertebra (Côté *et al.* 1998 and Rezai *et al.* 2009).

The important structures of the cervical area include the following:

- The osseous structures (vertebrae) of the cervical spine
- The intervertebral discs
- Ligaments of the cervical spine
- The spinal cord and nerves
- The muscles of the cervical area

The skeletal portion of the neck consists of the seven cervical vertebrae (C1 - C7) (Moore and Dalley 2010). These vertebrae are smallest of the movable vertebrae and are characterised by a foramen in each transverse proses (Standring 2008).

The intervertebral discs separate and bind the vertebrae together as they provide strong attachments between the vertebral bodies. The discs act as shock absorbers for axial forces. It is important to note that there is no intervertebral disc between C1 and C2 vertebra. The discs consist of an outer fibrous portion called the annulus fibrosis and a central gelatinous mass called the nucleus pulposus. The nucleus pulposus is capable of herniation or protruding through the annulus fibrosis and can cause irritation or compression of the adjacent tissues and nerves (Moore and Dalley 2010, Standring 2008).

There are two main ligaments that connect and cover the anterolateral and posterior aspects of the vertebral bodies and intervertebral discs. These are called the anterior longitudinal and posterior longitudinal ligaments. Other ligaments include the transverse ligament of the C1 vertebra and the alar ligaments. The transverse ligament holds the dens of the C2 vertebra against the anterior arch of C1 vertebra by forming a posterior socket wall for the dens. The alar ligaments attach the skull to the C1 vertebra

and checks rotation of the occiput on C1 vertebra (Moore and Dalley 2010, Standring 2008).

The spinal cord is a cylindrical structure that is located in the vertebral canal and starts as a continuation of the caudal part of the brainstem. It is the major reflex centre and conduction pathway between the body and the brain. The spinal cord is enlarged in the cervical region and this enlargement extends from C4 to T1 spinal segments. This area gives rise to the ventral rami of the spinal nerves that form the brachial plexus of nerves which provides sensation and stimulation to the muscles of the neck and upper limbs turned (Moore and Dalley 2010, Standring 2008).

Supporting and moving the head and neck requires a high degree of finely coordinated muscle balance (Ally 2006). The muscles of the back and neck are grouped into 3 groups:

- Superficial and intermediate group which are part of the extrinsic back muscles. These 2 groups of muscles produce and control limb and respiratory movement.
- The deep group of muscles that include the true or intrinsic back and neck muscles. This group of muscles act specifically on the vertebral column producing movement and maintaining posture. (Moore and Dalley 2010, Standring 2008)

2.3 Types and Causes of Neck Pain

NP can be divided into four categories, namely mechanical and non-mechanical (non-specific) pain, inflammatory pain and radicular pain. The causes for NP vary greatly, but can be attributed to trauma, injury, degeneration, referred pain, cancer and other disease processes.

- Mechanical Pain:

  This type of pain often has an acute onset. Mechanical pain excludes pain resulting from neoplasia, fracture or inflammatory arthropathy, or that is referred from anatomical sites outside the spine. In most cases there is no clearly demonstrable underlying pathology (Boon *et al.* 2006, Endean *et al.* 2011). Various risk factors such as physical activities that stress the spine and psychological attributes such as low mood and tendency to somatise. (Endean *et al.* 2011) Typically there is an association with movement patterns or asymmetrical restriction of neck movements and a history of awkward posture or trauma. This type of pain is generally relieved by rest. (Boon *et al.* 2006).

Specific conditions include degenerative diseases such as cervical spondylosis and metabolic diseases such as osteoporosis which can result in neck pain (Boon *et al.* 2006).

- Non-Mechanical (no-specific) Pain:

  This type of pain varies little in intensity or with activity and is usual of a constant nature. Pathologies, trauma or degenerative conditions are normally the cause of non-mechanical pain (Sherman 2009). The pain is often poorly localised when arising from the neck structures. When pain arises from the upper cervical segments it may radiate to the occiput, temple and face and when arising from the lower cervical segments it may radiate to the scapula, shoulder, arm or chest wall (Boon *et al.* 2006). Specific injuries such as a whiplash Injury occurs during hyperextension of the neck and can severely stretch or tear the anterior longitudinal ligament. A big cause of these injuries happens through automobile collisions when the vehicle is rear-ended and hyperextension of the cervical area occurs. Hyperflexion injuries of the cervical area may also occur due to the head snapping forward onto the chest (Moore and Dalley 2010). Other bone and joint conditions include neoplastic disorders such as multiple myelomas (Boon *et al.* 2006).

- Inflammatory Pain:

  Inflammatory pain normally has a more gradual onset, occurs axially and symmetrical and involves many segments. This type of pain has an association with inactivity and morning stiffness and improves with activity. It remains a significant problem in elderly individuals and include diseases such cervical spondylitis and rheumatoid arthritis (Boon *et al.* 2006).

- Radicular Pain:

  Radicular pain is severe, sharp and lancinating in nature and may radiate down the shoulder, arm and hand (Moore and Dalley 2010). It may arise as a result of compression of the nerve roots by osteophyte formation or intervertebral disc herniation or protrusion. Most disc herniations affect the C6 disc, thus compressing the C7 nerve root (Boon *et al.* 2006). Cervical disc herniation or protrusion may occur through degenerative changes to the intervertebral disc which results in pressure on the nerve roots and resulting in NP, referred pain or both. Trauma can cause forcible hyperflexion of the cervical area which can rupture the intervertebral disc causing compression of the nerve roots and

associated referred pain. The most common movements that cause this intervertebral disc herniation are forcible downward, twisting pressure on the cervical spine (Moore and Dalley 2010).

2.4 Epidemiology of Neck Pain

NP is a condition that is becoming more common throughout the world (Hoy *et al.* 2010) and according to Haldeman *et al.* (2009) most people can expect to experience a degree of NP sometime during their life. NP is usually first experienced during childhood or in the adolescent years and will run an episodic course over an individual's lifetime (Hoy *et al.* 2010).

The 1-year international incidence of NP ranges from 10.4% and 21.3% (Hoy *et al.* 2010) with a greatest incidence of NP in office workers (6-month incidence of 44.4%) and health-care workers (12-month incidence of between 10% and 19%) (Côté *et al.* 2008).

The 12-month prevalence of NP in the general population ranges between 0.4% and 86.8% (Hoy *et al.* 2010, Côté *et al.* 2003, Haldeman *et al.* 2009 and Hogg-Johnson *et al.* 2008). Higher prevalence have been noted in woman, low socioeconomic status groups, urban areas compared to rural areas, individuals who perform repetitive, static or physically demanding work, people with previous neck trauma as well as individuals who suffer from comorbid conditions such as depression, low back pain and headaches (Hoy *et al.* 2010).

There are numerous modifiable and non-modifiable risk factors related to NP which indicates that NP has a multifactorial aetiology. Demographic and socio-economic factors have shown that people aged 35 to 49 years of age shows the highest incidence of NP (Hogg-Johnson *et al.* 2008) with NP being more common in females than males (Côté *et al.* 2003). There is evidence to strongly link NP with other health problems such as musculoskeletal conditions, headaches and psychological conditions such as depression, anxiety and mental distress (Hogg-Johnson *et al.* 2008, Hoy *et al.* 2010 and Côté *et al*. 2003). Other risk factors include the smoking, sedentary work positions, repetitive and precision work (Haldeman *et al.* 2009).

The prognosis for NP is multifactorial and between 50% and 85% for 1 to 5 years after the initial complaint. Youth, optimism, and coping mechanisms have shown to be associated with a better prognosis. A poorer prognosis was associated with poor health, prior NP episodes, poor psychological health, stress, and the inability to deal with NP without becoming frustrated or angry (Haldeman *et al*. 2009).

2.5 Effects of Neck Pain and Disability on the Economy

Côté *et al.* (2008) and Slabbert (2010) state that NP has a number of implications which include: absenteeism, presenteeism, disability, loss of work hours and decreased productivity. Kleinman *et al.* (2014) published a retrospective study where they analysed the economic burden of a neuropathic component of neck and back pain. The study by Kleinman *et al.* (2014) found that nociceptive back or NP with a neuropathic component has a significantly greater health-related cost, more absent days and lower annual productivity than people who have no back or neck pain. This means that there is a high level of continued interest in NP research due to the escalating disability burden and compensation costs associated with NP (Côté *et al.* 2003). Between 1999 and 2008, the mean inflation adjusted annual expenditures on medical care for patients in the United States increased by 95% (from $487 to $950) (Davis 2012).

Due to the increased treatment cost there is a need for early diagnosis and follow-up of NP to assess a patient's level of self-rated disability (Kesiktas *et al.* 2012).

2.6 Neck Pain and Disability in the Afrikaans Population

In South Africa 71.58% of the population fall between the ages of 21 and 86 years of age (Central Intelligence Agency 2013). Afrikaans is spoken by a 13.5% of people in South Africa (South Africa: fast facts 2012). 3 442 164 of the Coloured population, 2 710 461 of the White population, 602 166 of the Black population and 58 700 of the Indian population speaks Afrikaans. Slabbert (2010) did a study on the prevalence of NP in the White population in the greater Durban area and found that 45% of White South Africans suffer from NP. Similarly, Muchna (2011) did a similar study on the Indian population and found that the prevalence of NP was 36.83%. No statistics exists for the Black and Coloured populations in South Africa. The studies done by Slabbert and Muchna suggest that a large proportion of Afrikaans speaking individuals are suffering from NP. There is a need to provide for the requirements of this population group as there is currently no language and culturally specific research tool to access the information required to allow for improved health care (Hough 2010).

2.7 Reliability and Validity of questionnaires

Questionnaires are the most commonly used research design in health services research (Fox *et al.* 2009). Most questionnaire's objective in research is to obtain relevant information in most reliable and valid manner (Boynton *et al.* 2004). Therefore the

validation of questionnaire forms an important aspect of research methodology and the validity of the outcomes.

Reliability and validity are two different aspects of an acceptable research questionnaire (Golafshani 2003). It is important for a researcher to understand the differences between these two aspects. The reliability of a questionnaire stem from the quality of the questionnaire (Kimberlin and Winterstein 2008). Validity arises from the internal and external consistency and relevance of the questionnaire (Kimberlin and Winterstein 2008). In other words reliability of a questionnaire refers to the quality of the tool while validity refers to the process used to employ the tool in use, i.e. the process used to conduct the questionnaire.

There are several aspects involved in the reliability and validity of questionnaires. Some analytic measurements for reliability and validity will be discussed in Chapter 3.

2.7.1 Reliability

Mokkink *et al.* (2010) define reliability as the extent to which scores for patients who have not changed are the same for repeated measurement under several conditions. Examples that Mokkink *et al.* (2010) provide include using different sets of items from the same questionnaires (internal consistency); over time (test-retest); by different persons on the same occasion (inter-rater) or by the same persons on different occasions (inter-rater).

2.7.1.1 Internal Reliability or Consistency

This refers to the interrelatedness among the items in a questionnaire and is conveyed by Cronbach's Alpha (Schellingerhout *et al.* 2011 and Mokkink *et al.* 2010).

2.7.1.2 Measurement Error

Mokkink (2010) defines the definition of measurement error as, "The systematic and random error of a patient's score that is not attributed to true changes in the construct to be measured." According to Schellingerhout *et al.* (2011) this measurement of error can be converted to the smallest detectable change and that any changes exceeding the smallest detectable change can be considered as change beyond measurement error.

2.7.2 Validity

Validity determines whether the research truly measures that which it was intended to measure or how truthful the research results are (Golafshani 2003).

2.7.2.1 Face Validity

Face validity refers to the degree to which the questionnaire actually looks as though it is an adequate reflection of the construct to be measured (Mokkink *et al.* 2010).

2.7.2.2 Content Validity

Content validity refers to the degree in which the content of a questionnaire is an acceptable reflection of the construct to be measured (Mokkink *et al*. 2010). The content validity is evaluated by judging the relevance and the comprehensiveness of the items (Mokkink *et al*. 2010).

2.7.2.3 Concurrent Validity

Concurrent validity is indicated by how well the items on translated or culturally adapted questionnaires are performing against the performance of the items of the original version of the questionnaires (Schellingerhout *et al.* 2012).

2.8 Translation and cross-cultural adaptation of questionnaires

Cook *et al.* (2006) found that instead of creating a new questionnaire, translating a questionnaire allows comparisons of different populations. It also allows researchers to examine functional status across a wide spectrum of people and allows information to be exchanged across cultural and linguistic barriers.

Walker *et al.* (2006) indicated that reporting of information is significantly different between population groups if a culturally and language adapted questionnaire is not utilised to document this information. According to Scollen and Wong Scollen (1995), language is ambiguous by nature and the validity of questionnaires developed in a western culture is questionable when used in another culture, even if these questionnaires are translated accurately. Furthermore, Chia-Ting and Parham (2002) found that translating material from one language to another is a process that is impeded by linguistic and cultural differences. These factors make exporting of measurement tools from one cultural group to another, susceptible to translation problems.

Auchter and Stansfield (1997) identified some problems with translating an assessment instrument from English to another language, thus there was a need for some modifications to the source text before translation. These modifications might be due to the target language not having equivalent words to the source language as well as variations in grammar and syntax (Chia-Ting and Parham 2002).

Both the English and Afrikaans languages are classified as modern Germanic languages (König and Van der Auwera 1999). Afrikaans originates from the 17th century Dutch that was brought to South Africa in 1652 by Dutch settlers (Niesler *et al.* 2005). The development of Afrikaans incorporated lexical and syntactical elements from numerous languages, including English (Niesler *et al.* 2005) and there is a relative linguistic proximity to English (Kwintessential 2013). This makes translating an assessment instrument from English to Afrikaans suitable due to the common origin of the languages and the side by side development of these languages in South Africa. According to Harkness *et al.* (1998), within countries with more than one official language, questionnaires for the different linguistic populations are usually produced from one questionnaire.

In email communication in 2015 with Dr Howard Vernon, the developer of the NDI, he indicated that there are internationally accepted rules and procedures for translation and cross-cultural adaptation of questionnaires set forth by Schellingerhout *et al.* (2011). These rules and procedures are summarised as follows:

- A forward translation should be completed by an expert in the target language.
- After the forward translation, the translated version of the questionnaire should be critiqued and analysed by an Expert group to establish the face validity of the translated questionnaire.
- It is also required that an independent language expert back translates the questionnaire to the original language.
- After taking into consideration any alterations that have been made to the translated questionnaire by the Expert group and back translation, it is presented to a small pilot study group in order for the content validity to be established.
- The final version of the translated questionnaire is then established and tested on the target population.
- Statistical measurements finally determine the internal reliability and concurrent validity of the translated questionnaire.

2.9 The Neck Disability Index (NDI)

Vernon (2008) states in the history of the NDI that before 1991, there was no instrument available to assess the self-rated disability of patients with NP. After it was established that there was a need to evaluate the activities of daily living on patients with disabling NP (Chan Ci En *et al.* 2009), the NDI was developed and modelled on the Oswestry Low Back Pain Index and the Roland-Morris Low Back Pain Questionnaire (Vernon 2008). The NDI is designed specifically to measure activity limitations due to NP and disability (Cook *et al.* 2006). The NDI is a one-dimensional questionnaire, suggesting that the scale measures a single construct (Cook *et al.* 2006).

Vernon (2008) further indicates that the NDI is the oldest and most popular tool for the self-reporting of disability due to NP. Its internal psychometric properties have been established in numerous cultural groups with NP and thus it is "highly reliable, strongly internally consistent, and with a 1-factor structure for physical disability" (Vernon 2008). "It has strong and well-documented convergent and divergent validity with other instruments used in the evaluation of patients and subjects with neck pain" (Vernon 2008). Since its development in 1991, the NDI has been successfully translated into 22 languages, used in 300 publications, is endorsed for use for numerous clinical guidelines and has been used in 52 surgical trails (Vernon 2008).

The NDI has been translated in French (Wlodyka-Demaille 2002), Greek (Trouli 2008), Thai (Uthaikhup 2011), Turkish (Aslan 2008), Korean (Lee 2006), Iranian (Mousavi 2007), Finnish (Salo 2010), Chinese (Wu 2010), Dutch (Jorritsma 2010), Brazilian Portuguese (Cook 2006), and Spanish (Ortega 2010). The NDI shows excellent reliability and concurrent validity in translations done from English to Thai ($\alpha = 0.85$), Turkish ($\alpha = 0.89$), Korean ($\alpha = 0.96$), Iranian ($\alpha = 0.88$), Greek ($\alpha = 0.85$), Finnish ($\alpha = 0.85$) and Chinese ($\alpha = 0.89$).

The NDI consists of 10 sections (Appendix E2) namely "Pain Intensity", "Personal Care", "Lifting", "Reading", "Headaches", "Concentration", "Work", "Driving", "Sleeping" and "Recreation". Each section consists of 6 questions where the participant is required to select only one option from the list of questions. Each section is scored from 0 to 5, with a total score for all sections out of 50 (Vernon and Mior 1991). The scoring interpretation is as follows: 0-4 = no disability; 5-14 = mild disability; 15-24 = moderate disability; 25-34 = severe disability; >34 = complete disability (Vernon 2008).

Multiple studies (Ally 2006 and Cook *et al.* 2006) had concerns with Section 8 of the NDI. Research by Ally (2006), Cook *et al.* (2006) and Wu (2010) indicated that it is possible that the inability to "drive" or a decrease in the frequency of the activity may negatively impact on the manner in which an individual responds to the "driving" section of the NDI. The NDI does not allow for a "not applicable" option for any sections, which has been showed to create less reliable results for this particular section.

This study shows excellent internal reliability (α = 0.9) and concurrent validity which is similar to other translations and cross-cultural adaptations of the NDI.

2.10 The Quadruple Visual Analogue Scale (QVAS)

The QVAS is a specific application of the Visual Analogue Scale and has a high reliability and validity (Yeomans 2000). Price *et al.* (1994) concluded that "Visual analogue scales of pain have been demonstrated to be reliable, generalizable, internally consistent measures of clinical and experimental pain sensation intensity, separate measures of pain sensation intensity and pain unpleasantness and relatively sensitive measures of effects of analgesic treatments." Visual analogue scales are frequently used in the measurement of pain and has the benefit of being easily administered to patients (Gallagher *et al.* 2002).

The QVAS (Appendix E4) has four very specific sections: "Pain level in the current moment in time", "Usual or average pain", "Peak or maximum pain level", "Pain at best". Each factor is scored from 0 to 10. An average is produced from three of the four factors and converted to a percentage. Low intensity is ≤ 50 with high-intensity pain >50 (Yeomans 2000). According to this researcher both the NDI and the QVAS have become very popular in pain research and in the clinical assessment of pain and that these questionnaires have a high reliability and validity. Spadoni *et al.* (2004) found that a minimal detectable change between 27.3% (3 points) and 31.8% (3.5 points) at 90% confidence level is required for a meaningful change.

Chapter Three

Methodology

3.1 Introduction

This chapter deals with the collection of data and the research methodology used for this study. The process of statistical analysis is also discussed.

The primary data is the data collected from the participant responses and the results obtained once the statistical analysis was completed. Secondary data is the data from literature, internet, books, and journals on original validity and reliability testing of the NDI and the QVAS with which to compare the outcome of the results in the research study.

3.2 Study Design

This study was designed as a quantitative validity and reliability assessment study comparing the English versions of the NDI and the QVAS to their translated Afrikaans counterparts. Permission was obtained from Dr H. Vernon (Appendix H) for the translation of the English NDI and Dr S. Yeomans (Appendix I) for translation of the English QVAS to Afrikaans.

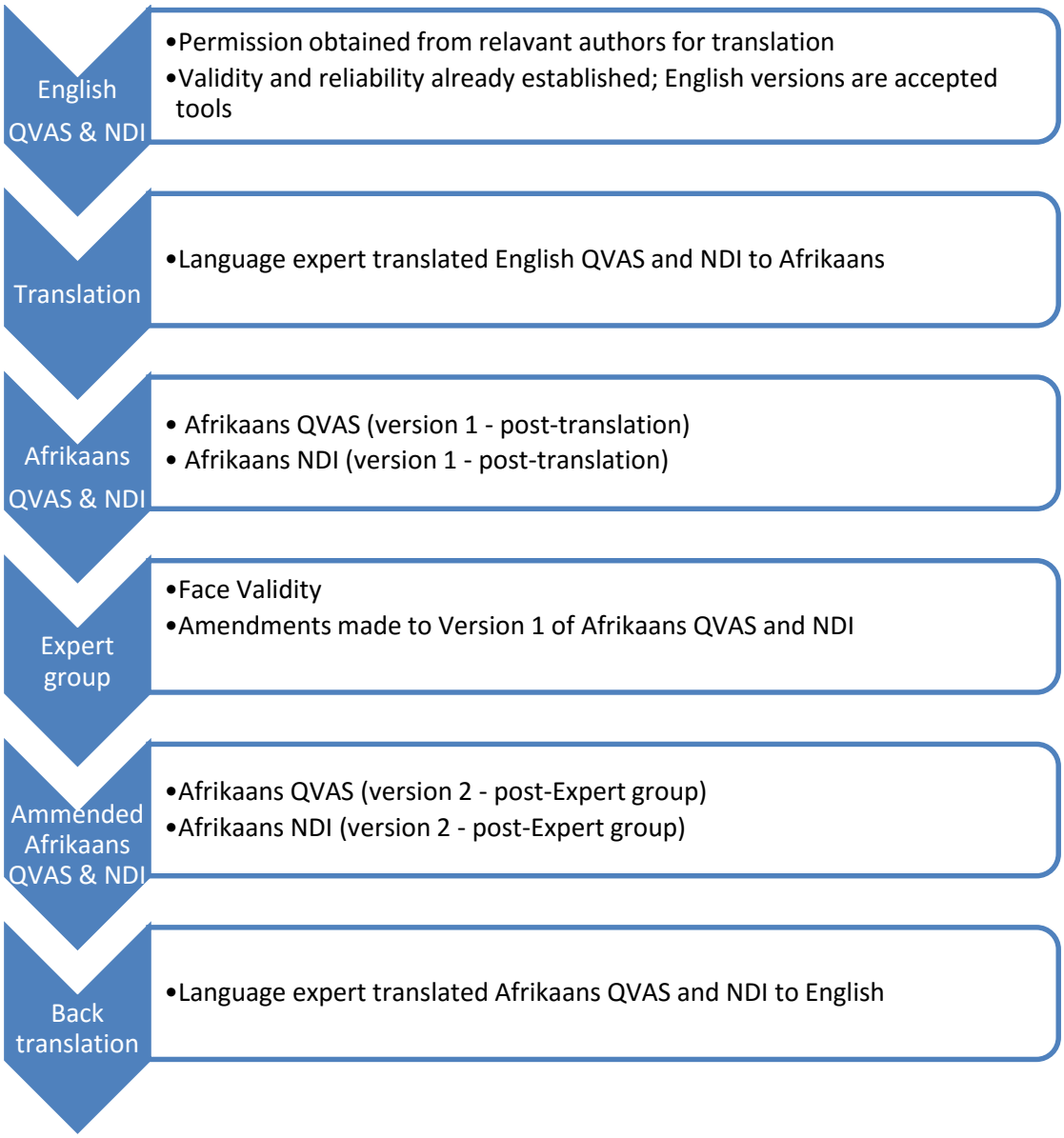
The original NDI and QVAS were translated by a language expert with a Bachelor's degree in Afrikaans and Linguistics to their respective Afrikaans counterparts (Appendix M).

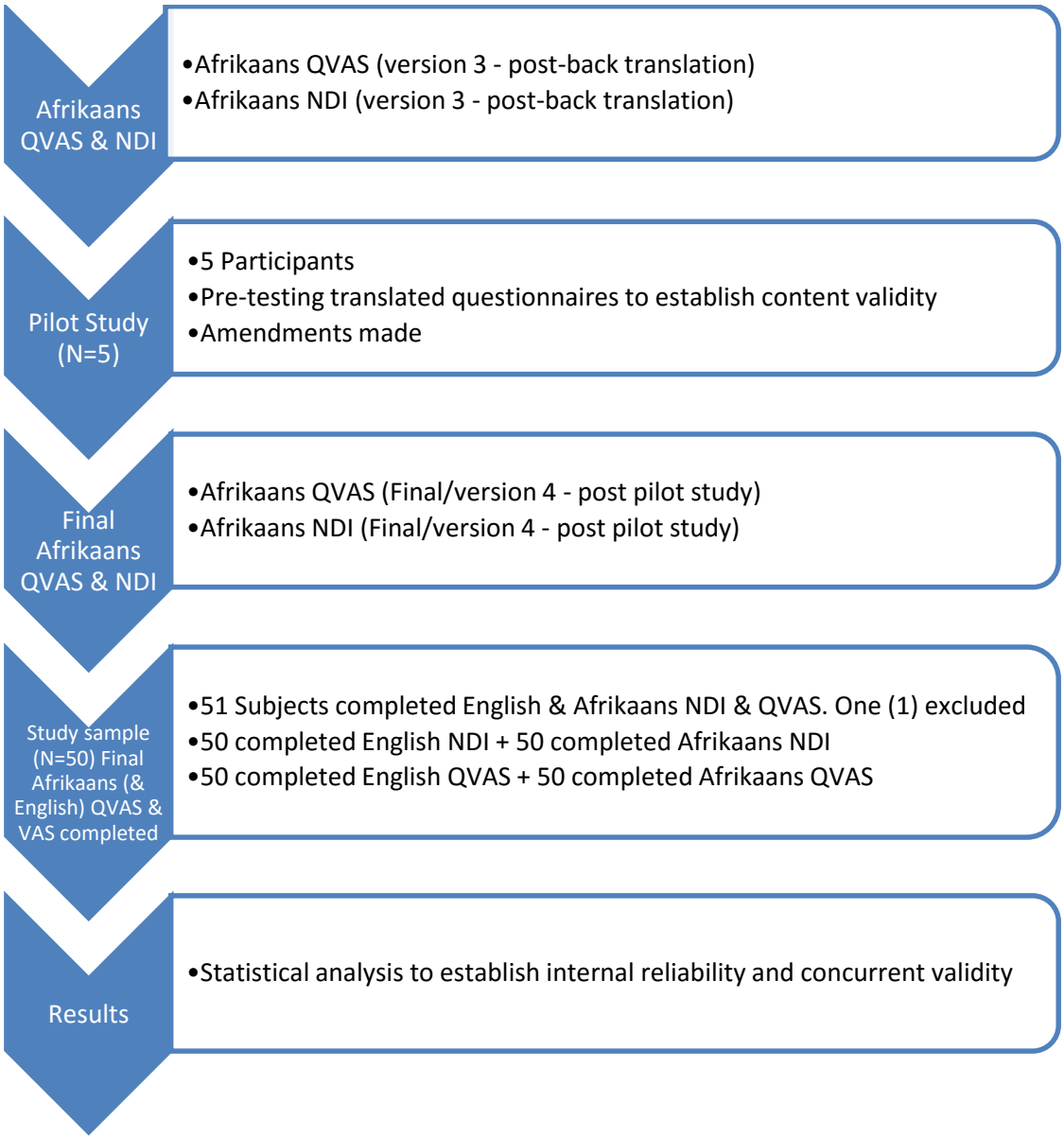
The subsequently translated versions of the NDI and QVAS were then scrutinised by an Expert group who established the face and content validity of the respective questionnaires. The Expert group consisted of ten participants. Three of the participants had NP or a previous history of NP and had no formal medical knowledge, one chiropractic student who has completed a questionnaire study, two chiropractic students who are completing research studies, one medical doctor and three chiropractors of whom one has considerable statistical knowledge. The researcher acted as the moderator of the group and made sure that all responses were recorded and accurately noted. Each participant was required to read a Letter of Information (Appendix F2) and sign an Informed Consent Form (Appendix F3), Code of Conduct (Appendix F1) and a Confidentiality Statement (Appendix G).

The Expert group participants were provided with both the English and Afrikaans versions of the NDI and the QVAS. The participants analysed and critiqued each of the Afrikaans versions of the questionnaires and commented on how well it reflected the meaning of the English versions. Each question was discussed in sequential order. Where irregularities were found or changes proposed, the group as a whole voted to adopt that change (Appendix K).

After completion of the Expert group discussion, the recommendations were made to the translated versions of the questionnaires. The completed Afrikaans questionnaires were then presented to another language expert (lecturer at high school level) who did the back translation to English (Appendix L1 and L2). Following this procedure, concept versions of NDI and QVAS were produced for testing in a small pilot study (Jorritsma *et al.* 2010).

The following diagram depicts the steps followed during the translation process of the questionnaire.





Flow Diagram 1: Depiction of the translation process

3.3 Pilot Study

After the Expert group finalised the Afrikaans versions of the questionnaires and the back translation was completed, both the Afrikaans and English versions were given to five bilingual pilot participants who completed the questionnaires and then scrutinised and commented on the translated questionnaires via a pilot study checklist (Appendix C).

A pilot study is a preliminary or trial run of a larger study that is conducted in preparation for that study to determine the feasibility of a research tool (Trochim 2001). The aim of the pilot study is to determine if the sample population could relate to the questionnaire and if any further discrepancies or errors are brought to the fore as per the guidelines set by Fink and Kosecoff (1985).

This step pre-tested the translated versions in the target language (Schellingerhout *et al.* 2011) and established the content validity of these questionnaires.

3.4 Study Group

3.4.1 Sample method and size

Participants were recruited via a non-probability convenience sampling technique. The study was limited to bilingual participants only.

A minimum of 50 participants (Ally 2006 and pers. comm., 23 March 2015 Esterhuizen) with 200 completed questionnaires were used for the study (50 participants each completing one Afrikaans NDI, one English NDI, one Afrikaans QVAS and one English QVAS).

3.4.2 Participants inclusion criteria

- Only participants with self-reported neck pain were included. Cervical spine pain was defined as any pain located between the occiput and the third thoracic vertebra (Côté *et al.* 1998 and Rezai *et al.* 2009)
- Only participants who are fluent in reading both the Afrikaans and English languages were included.
- Only participants who could read and sign the Letter of Information and Informed Consent Form (Appendix A) were included.
- For participation in this study, the individual needs to be 18 years of age or older.

3.4.3 Participants exclusion criteria

- Participants who are not fluent in reading Afrikaans and English.
- Individuals who are younger than 18 years of age.

3.4.4 Recruitment of participants

Permission to conduct this study was obtained from:

- Durban University Institutional Research and Ethics Committee.

- Port Natal NG Kerk (Appendix J1), Ballito Gesinskerk (Appendix J2) and NG Kerk Umhlanga (Appendix J3).

Permission was obtained from the individuals in charge at the relevant data collection sites. Once the researcher arrived at these data collection sites, there was a verbal screening process in which the participants who suffered from self-reported neck pain were asked to take part in the study. The letter of information was written in English and the informed consent form was written in Afrikaans to ensure participants were, in fact, bilingual and could read and understand English and Afrikaans.

3.5 Data Collection

3.5.1 Participants

For this study, there were four data collection sites. The Durban University of Technology Chiropractic Day Clinic, NG Kerk Umhlanga, NG Kerk Ballito, and Port Natal NG Kerk. After participants were verbally screened in order to assess if they suffer from self-reported NP, they were asked to take part in the study. Participants were then given a chance to read and to ask questions about the Letter of Information and the Informed Consent Forms (Appendix A), before signing the document. All Letters of Information and Informed Consent Form were collected and put into sealed Box A. The numbered Afrikaans NDI (Appendix E1) and QVAS (Appendix E3) were then given to the participants together with a corresponding numbered tag. After completion the participants handed the Afrikaans NDI and QVAS back to the researcher and the Afrikaans NDI was put into sealed Box B, the Afrikaans QVAS was stored in sealed Box C. After the particular activity was completed (more or less an hour) the corresponding English NDI (Appendix E2) and QVAS (Appendix E4) was given to the participants to complete. After completion the English NDI was put into sealed Box D and the English QVAS put into sealed Box E. Together there were 51 participants and only one questionnaire set was rejected due to incompletion.

3.5.2 Sample allocation

Each participant had to complete each of the four questionnaires – the Afrikaans NDI and QVAS questionnaires and the English NDI and QVAS questionnaires. No group allocations were made. Each individual was compared to him/herself to increase the statistical power (Hough 2010).

3.6 Procedure for Study Group

The questionnaires were duplicated and coded so that the English and Afrikaans counterparts could be identified and paired. After individuals went through a verbal screening process and agreed to participate in the study, by signing the letter of information and consent form (Appendix A), the Afrikaans versions of the NDI (Appendix E1) and the QVAS (Appendix E3) were handed out to the group of participants to complete. The participants were given a numbered tag that corresponds to the same numbered questionnaire pairs.

After a period of approximately an hour (either after the case history in the Durban University of Technology Day Clinic (Ally 2006 and Miller 2004) or after the relevant activity at other data collection sites), the same participants were asked to complete one English NDI (Appendix E2) and one English QVAS (Appendix E4).

The completed questionnaires were collected in four separate boxes (Box B and C pertained to the Afrikaans NDI and QVAS and box D and E pertained to the English NDI and QVAS).

3.7 Inclusion and Exclusion of questionnaires

Fifty-one participants completed the Afrikaans and English NDI and QVAS questionnaires. This means that there was a total of 204 questionnaires completed. Out of the 51 participants, one participant's questionnaires were excluded due to incompletion. The 50 valid sets of questionnaires were then used for data analysis. A set of questionnaires consisted of one Afrikaans NDI, one English NDI, one Afrikaans QVAS and one English QVAS.

3.8 Statistical Analysis

The collected data was submitted to a statistician for data capturing purposes. The descriptive statistics were analysed using the SPSS package (IBM SPSS version 23). The generated data will be represented by means of graphs, bar graphs, and tables for visual communication.

Further analysis of the data was made by using tests for discordance, concurrent validity and reliability such as the Cohen's Kappa, P-value's, Pearson's Correlation Analysis, Bland-Altman Procedure and Cronbach's Alpha. If there is a significant correlation between the two questionnaires, concurrency can be claimed. The level of confidence is set at 95% or $\alpha = 0.05$ (pers. comm. 23 March 2015 Esterhuizen).

3.8.1 Cohen's Kappa

Cohen's Kappa (Cohen 1960) is an index of inter-rater reliability that is commonly used to measure the level of agreement between two sets of dichotomous ratings or scores.

According to Wood (2007), Kappa values can be in a range of -1.0 to +1.0. For a perfect agreement between two raters, a kappa value of +1.0 is required. For perfect and consistent disagreement, a kappa value of -1.0 is required. Lastly, if there is a kappa value of 0, it means that the two raters show a random level of agreement/disagreement, thus there is no relationship between their ratings.

The formula for Cohen's Kappa is:

$$\text{Kappa} = \frac{O - E}{1 - E}$$

"O" is for the observed percentage of agreement and is the proportion of ratings where the scorers are in agreement. "E" represents the expected percentage of agreement and is the proportion of agreements that would be expected "by chance" between the raters if they were scoring randomly (Wood 2007).

3.8.2 Pearson's Correlation Analysis

Pearson correlation coefficient (r) investigates the relationship between two quantitative, continuous linear variables. This coefficient measures the strength of the association between the two variables (Pearson's Correlation Coefficient 2015). Positive values denote a positive linear correlation while negative values denote a negative linear correlation. A value of 0 denotes no correlation and the closer the value is to 1 or -1, the stronger the linear correlation (Pearson's Correlation 2015).

3.8.3 Bland-Altman Procedure

Correlation studies the relationship between one variable and another, not the differences, thus it quantifies the degree to which two variables are related. A high correlation does not necessarily imply that there is good agreement between the two methods. Due to this, Bland and Altman (1983 cited in Giavarina 2015) introduced an alternative analysis method, which is centred on the quantification of the agreement between two quantitative measurements by studying the mean difference and constructing limits of agreement. The Bland-Altman plot and analysis is a comparison technique used to compare two measurements of the same variable (NCSS 2015).

3.8.4 Cronbach's Alpha

Cronbach's Alpha was developed by Lee Cronbach in 1951 to provide a measure of the internal consistency of a test or scale and it is expressed as a number between 0 and 1 (Tavakol and Dennick 2011).

In other words, it is a coefficient of reliability or consistency. It measures internal consistency or how closely related a set of items are as a group (SAS 2015).

The formula for Cronbach's Alpha is:

$$\alpha = \frac{N \cdot \bar{c}}{\bar{v} + (N-1) \cdot \bar{c}}$$

N is equal to the number of items, c-bar is the average inter-item covariance among the items and v-bar equals the average variance (SAS 2015).

3.9 Ethical Considerations

The researcher obtained consent to conduct the study from the relevant institutions (mentioned previously). All participants were required to complete Letters of Information and Informed Consent Forms, indicating that they were participating voluntarily in the study. This included members of the Expert group, pilot study, and main study. Anonymity of the participants was preserved due to all questionnaires being kept separate from the Letters of Information and Informed Consent Forms. All data was coded for analysis and reporting, in order to protect the identity (maintain anonymity) of participants.

All documents (related to the research) will be kept safe and secure during data collection, recording, analysis and reporting (and thereafter it will be stored in a designated storage facility in the Department of Chiropractic and Somatology for 15 years before the documents will be shredded).

Chapter Four

Results

4.1 Introduction

This chapter covers the results that were obtained from the data collection process through the use of statistical analysis of the data.

4.2 Participants (Age)

The youngest participant was 21 years of age and the oldest participant was 86 years of age. The mean age of the participants was 56.84 years (SD = 19.92).

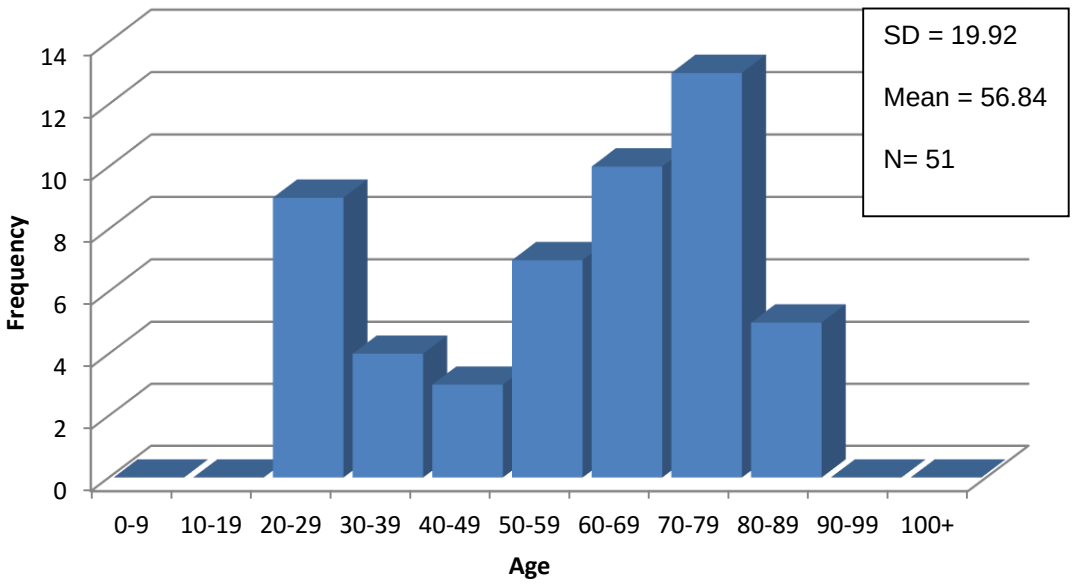


Figure 1: Age Distribution (Histogram)

4.3 Questionnaires

A total of 51 participants completed the Afrikaans and English questionnaires of the NDI and QVAS. Of the 51 completed sets of questionnaires, one set was excluded, due to the incompletion of the questionnaire.

4.4 Cross-Tabulations and Frequencies

Tables 3 to 12 show the frequencies of responses to each corresponding section of the English and Afrikaans NDI questionnaires in a cross-tabulated form. The cells along the diagonal (highlighted in red) show where the participants agreed in the English and Afrikaans NDI questionnaires (concordant responses). The cells above and below the highlighted diagonal represent where participants disagreed in their responses to the English and Afrikaans NDI questionnaires (discordant responses).

Tables 13 to 16 show the frequencies of responses to each corresponding section of the English and Afrikaans QVAS questionnaires in a cross-tabulated form. The cells along the diagonal (highlighted in red) show where the participants agreed in the English and Afrikaans QVAS questionnaires (concordant responses). The cells above and below the highlighted diagonal represent where participants disagreed in their responses to the English and Afrikaans QVAS questionnaires (discordant responses).

Figures 2 to 11 represent the frequencies of responses to each section of the NDI by language.

Figures 12 to 15 represent the frequencies of responses to each question of the QVAS by language.

4.4.1 Frequencies of the Neck Disability Index (NDI) Questionnaire

Table 1: Section 1 (Pain Intensity) Cross-tabulation of responses with regards to English (E) and Afrikaans (A) questions for the Neck Disability Index

		A1						Total
		0	1	2	3	4	5	
E1	0	14	2	0	0	0	0	16
	1	5	13	3	0	0	0	21
	2	1	1	4	0	0	0	6
	3	0	1	2	2	0	0	5
	4	0	0	0	0	1	0	1
	5	0	0	0	0	0	1	1
Total		20	17	9	2	1	1	50

Table 1 illustrates that in Section 1 (Pain Intensity) there are thirty-five (70%) agreements out of a total of fifty (concordant responses highlighted in red).

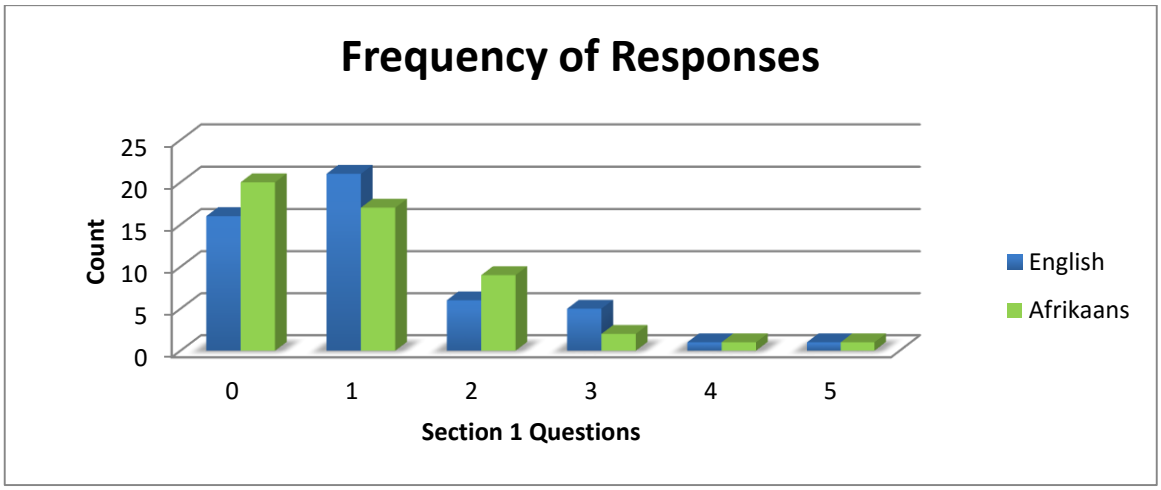


Figure 2: **Section 1 (Pain Intensity) Bar chart of the frequency of responses with regards to the Neck Disability Index by language**

Figure 2 depicts the frequency or responses by language for Section 1 (Pain Intensity) of the NDI. In column 0 and 2, the Afrikaans columns are higher than the English counterparts. This could possibly indicate that the Afrikaans phrases were better understood than the English phrases. In column 1 and 3 the reverse is true, which may indicate that the English phrases were better understood than the Afrikaans counterparts. In column 4 and 5 the columns are of equal height which seems to indicate that the English and Afrikaans phrases were equally well understood.

Table 2: **Section 2 (Personal Care) Cross-tabulation of responses with regards to English (E) and Afrikaans (A) questions for the Neck Disability Index**

		A2						Total
		0	1	2	3	4	5	
E2	0	22	2	0	1	0	0	25
	1	4	11	1	2	0	0	18
	2	0	1	4	0	0	0	5
	3	0	0	0	0	0	0	0
	4	0	0	0	0	1	0	1
	5	0	0	0	0		1	1
Total		26	14	5	3	1	1	50

Table 2 illustrates that in Section 2 (Personal Care) there are thirty-nine (78%) agreements out of a total of fifty (concordant responses highlighted in red.

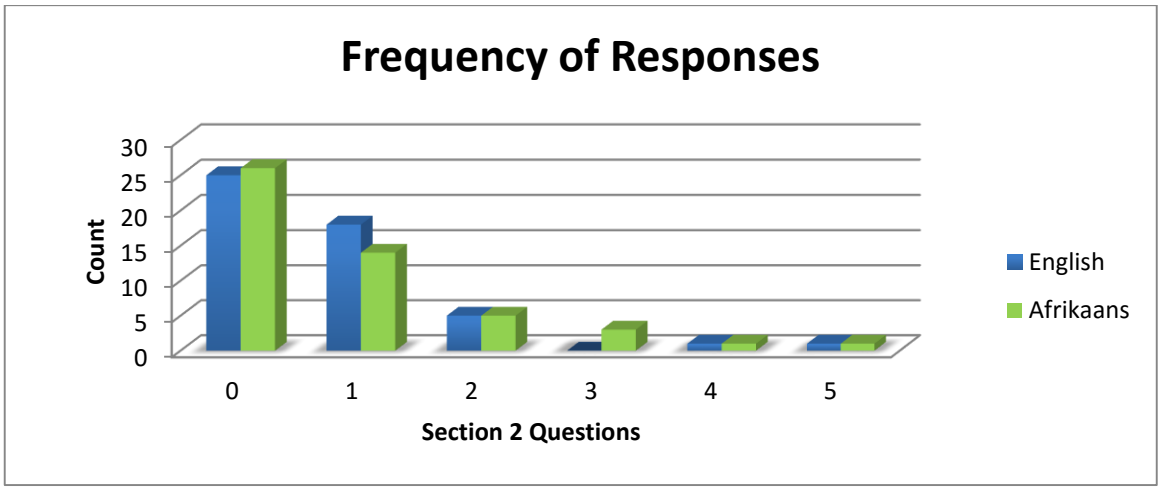


Figure 3: **Section 2 (Personal Care) Bar chart of the frequency of responses with regards to the Neck Disability Index by language**

Figure 3 depicts the frequency or responses by language for Section 2 (Personal Care) of the NDI. In column 0 and 3, the Afrikaans columns are higher than the English counterparts. This could possibly indicate that the Afrikaans phrases were better understood than the English phrases. In column 1 the reverse is true, which may indicate that the English phrases were better understood than the Afrikaans counterparts. In column 2, 4 and 5 the columns are of equal height which seems to indicate that the English and Afrikaans phrases were equally well understood.

Table 3: **Section 3 (Lifting) Cross-tabulation of responses with regards to English (E) and Afrikaans (A) questions for the Neck Disability Index**

		A3						Total
		0	1	2	3	4	5	
E3	0	10	3	0	0	0	0	13
	1	1	11	0	0	0	0	12
	2	0	0	11	1	0	0	12
	3	0	1	3	2	0	0	6
	4	0	0	0	1	4	1	6
	5	0	0	0	0	0	1	1
Total		11	15	14	4	4	2	50

Table 3 illustrates that in Section 3 (Lifting) there are thirty-nine (78%) agreements out of a total of fifty (concordant responses highlighted in red).

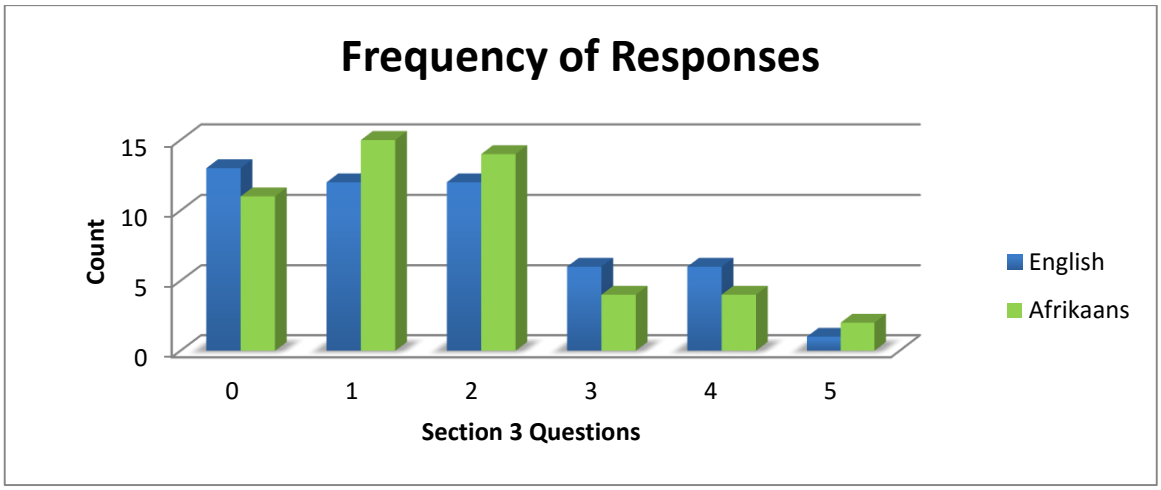


Figure 4: **Section 3 (Lifting) Bar chart of the frequency of responses with regards to the Neck Disability Index by language**

Figure 4 depicts the frequency or responses by language for Section 3 (Lifting) of the NDI. In column 1, 2 and 5, the Afrikaans columns are higher than the English counterparts. This could possibly indicate that the Afrikaans phrases were better understood than the English phrases. In column 0, 3 and 4 the reverse is true, which may indicate that the English phrases were better understood than the Afrikaans counterparts.

Table 4: **Section 4 (Reading) Cross-tabulation of responses with regards to English (E) and Afrikaans (A) questions for the Neck Disability Index**

		A4						Total
		0	1	2	3	4	5	
E4	0	12	2	1	0	0	0	15
	1	3	12	2	1	0	0	18
	2	1	0	7	1	0	0	9
	3	0	0	1	4	0	0	5
	4	0	0	0	1	1	0	2
	5	0	0	0	0	0	1	1
Total		16	14	11	7	1	1	50

Table 4 illustrates that in Section 4 (Reading) there are thirty-seven (74%) agreements out of a total of fifty (concordant responses highlighted in red).

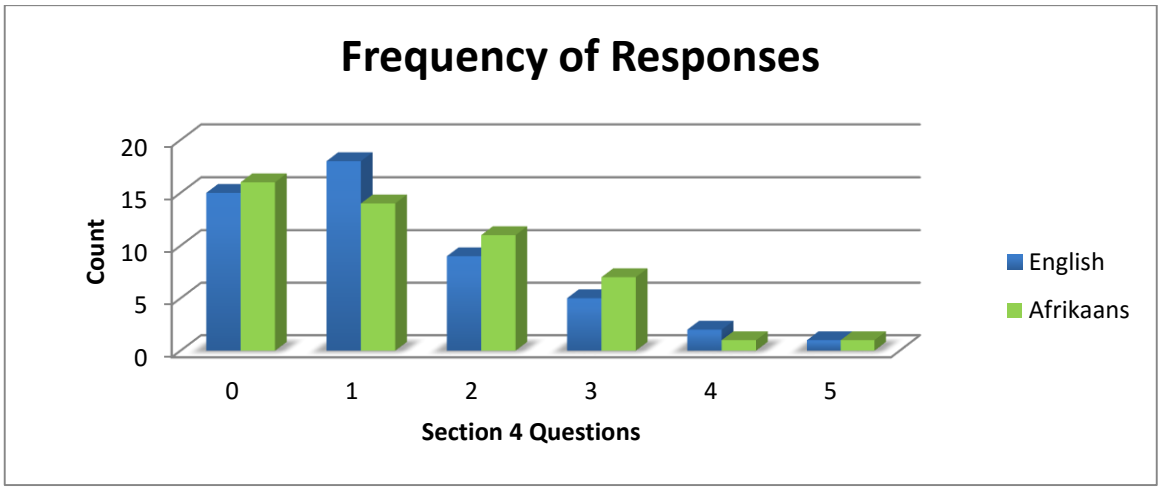


Figure 5: **Section 4 (Reading) Bar chart of the frequency of responses with regards to the Neck Disability Index by language**

Figure 5 depicts the frequency or responses by language for Section 4 (Reading) of the NDI. In column 2 and 3, the Afrikaans columns are higher than the English counterparts. This could possibly indicate that the Afrikaans phrases were better understood than the English phrases. In column 0, 1 and 4 the reverse is true, which may indicate that the English phrases were better understood than the Afrikaans counterparts. In column 5 the columns are of equal height which seems to indicate that the English and Afrikaans phrases were equally well understood.

Table 5: **Section 5 (Headaches) Cross-tabulation of responses with regards to English (E) and Afrikaans (A) questions for the Neck Disability Index**

		A5						Total
		0	1	2	3	4	5	
E5	0	12	0	0	0	0	0	12
	1	2	11	3	1	0	0	17
	2	0	2	5	4	0	0	11
	3	0	0	0	2	1	0	3
	4	0	0	0	1	5	0	6
	5	0	0	0	0	0	1	1
Total		14	13	8	8	6	1	50

Table 5 illustrates that in Section 5 (Headaches) there are thirty-six (72%) agreements out of a total of fifty (concordant responses highlighted in red).

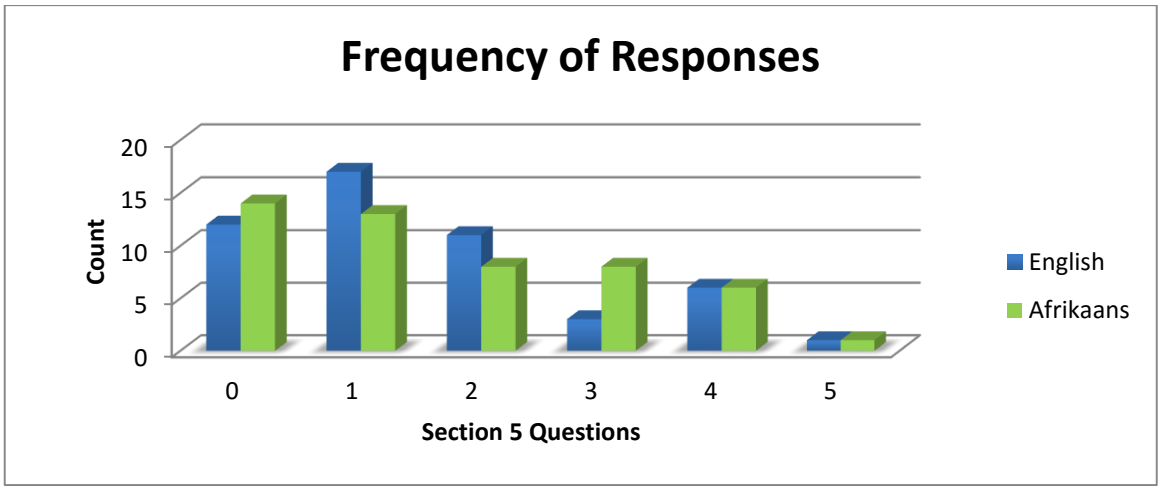


Figure 6: **Section 5 (Headaches) Bar chart of the frequency of responses with regards to the Neck Disability Index by language**

Figure 6 depicts the frequency or responses by language for Section 5 (Headaches) of the NDI. In column 0 and 3, the Afrikaans columns are higher than the English counterparts. This could possibly indicate that the Afrikaans phrases were better understood than the English phrases. In column 1 and 2 the reverse is true, which may indicate that the English phrases were better understood than the Afrikaans counterparts. In columns 4 and 5 the columns are of equal height which seems to indicate that the English and Afrikaans phrases were equally well understood.

Table 6: **Section 6 (Concentration) Cross-tabulation of responses with regards to English (E) and Afrikaans (A) questions for the Neck Disability Index**

		A6						Total
		0	1	2	3	4	5	
E6	0	12	2	0	0	0	0	14
	1	2	17	1	0	0	0	20
	2	0	5	4	1	0	0	10
	3	0	0	0	2	0	0	2
	4	0	0	0	0	2	0	2
	5	0	0	0	0	0	2	2
Total		14	24	5	3	2	2	50

Table 6 illustrates that in Section 6 (Concentration) there are thirty-nine (78%) agreements out of a total of fifty (concordant responses highlighted in red).

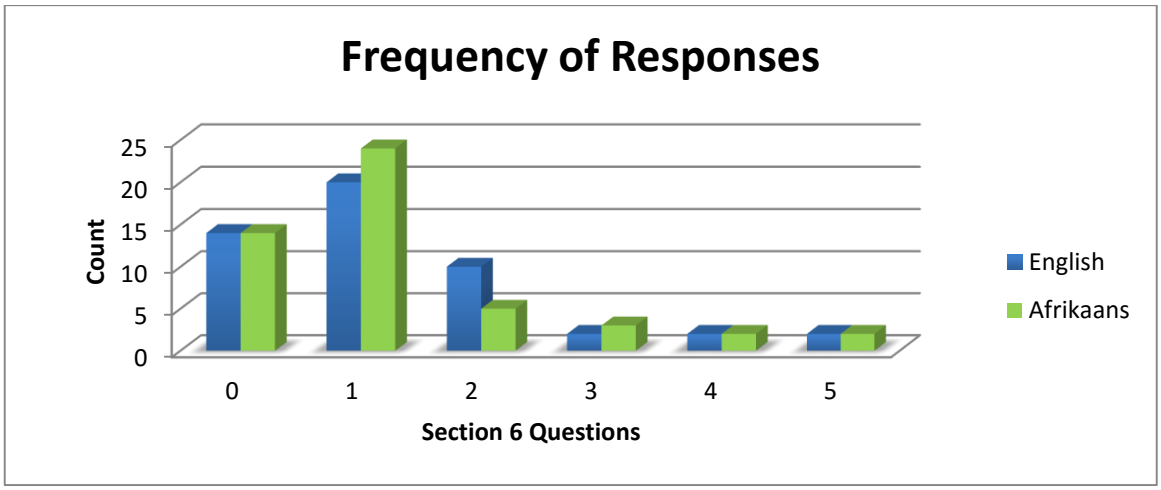


Figure 7: **Section 6 (Concentration) Bar chart of the frequency of responses with regards to the Neck Disability Index by language**

Figure 7 depicts the frequency or responses by language for Section 6 (Concentration) of the NDI. In column 1 and 3, the Afrikaans columns are higher than the English counterparts. This could possibly indicate that the Afrikaans phrases were better understood than the English phrases. In column 2 the reverse is true, which may indicate that the English phrases were better understood than the Afrikaans counterparts. In columns 0, 4 and 5 the columns are of equal height which seems to indicate that the English and Afrikaans phrases were equally well understood.

Table 7: **Section 7 (Work) Cross-tabulation of responses with regards to English (E) and Afrikaans (A) questions for the Neck Disability Index**

		A7						Total
		0	1	2	3	4	5	
E7	0	14	1	0	0	0	0	15
	1	5	9	3	0	0	0	17
	2	1	3	7	2	0	0	13
	3	0	0	1	1	0	0	2
	4	0	0	0	0	2	0	2
	5	0	0	0	0	0	1	1
Total		20	13	11	3	2	1	50

Table 7 illustrates that in Section 7 (Work) there are thirty-four (68%) agreements out of a total of fifty (concordant responses highlighted in red).

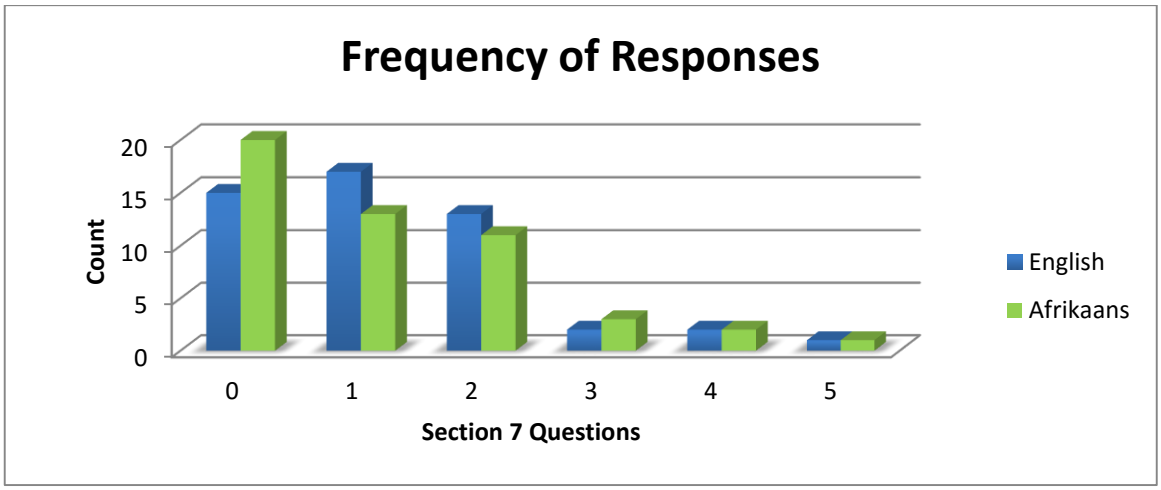


Figure 8: **Section 7 (Work) Bar chart of frequency of responses with regards to the Neck Disability Index by language**

Figure 8 depicts the frequency or responses by language for Section 7 (Work) of the NDI. In column 1 and 3, the Afrikaans columns are higher than the English counterparts. This could possibly indicate that the Afrikaans phrases were better understood than the English phrases. In column 1 and 2 the reverse is true, which may indicate that the English phrases were better understood than the Afrikaans counterparts. In columns 4 and 5 the columns are of equal height which seems to indicate that the English and Afrikaans phrases were equally well understood.

Table 8: **Section 8 (Driving) Cross-tabulation of responses with regards to English (E) and Afrikaans (A) questions for the Neck Disability Index**

		A8						Total
		0	1	2	3	4	5	
E8	0	10	3	0	0	0	0	13
	1	2	11	7	1	0	0	21
	2	0	2	7	0	0	0	9
	3	0	1	0	2	0	0	3
	4	0	0	0	0	1	0	1
	5	0	0	0	1	0	2	3
Total		12	17	14	4	1	2	50

Table 8 illustrates that in Section 8 (Driving) there are thirty-three (66%) agreements out of a total of fifty (concordant responses highlighted in red).

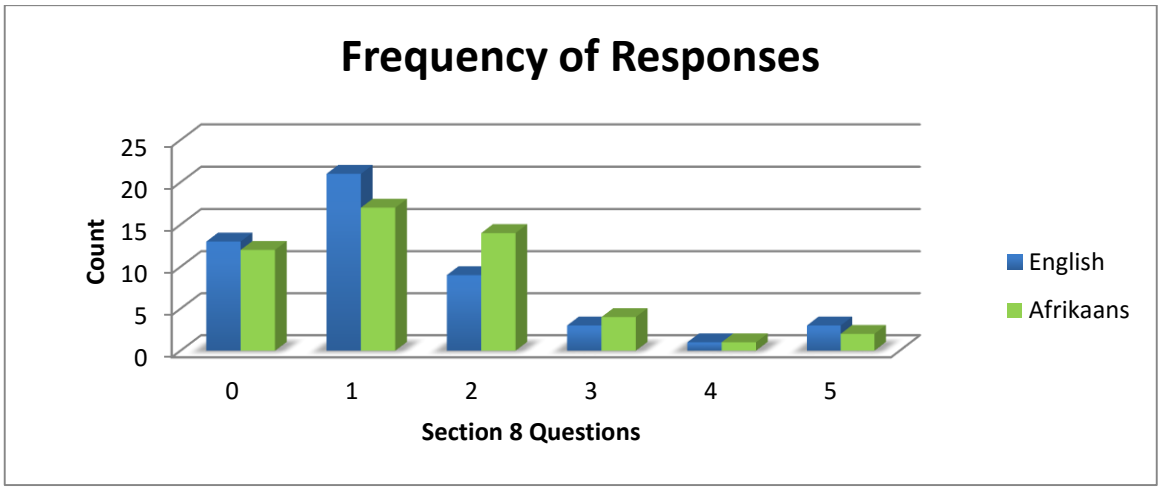


Figure 9: **Section 8 (Driving) Bar chart of the frequency of responses with regards to the Neck Disability Index by language**

Figure 9 depicts the frequency or responses by language for Section 8 (Driving) of the NDI. In column 2 and 3, the Afrikaans columns are higher than the English counterparts. This could possibly indicate that the Afrikaans phrases were better understood than the English phrases. In column 0, 1 and 5 the reverse is true, which may indicate that the English phrases were better understood than the Afrikaans counterparts. In column 4, the columns are of equal height which seems to indicate that the English and Afrikaans phrases were equally well understood.

Table 9: **Section 9 (Sleeping) Cross-tabulation of responses with regards to English (E) and Afrikaans (A) questions for the Neck Disability Index**

		A9						Total
		0	1	2	3	4	5	
E9	0	15	2	1	0	0	0	18
	1	1	16	1	0	0	0	18
	2	0	1	6	2	0	0	9
	3	0	0	0	1	0	0	1
	4	0	0	0	0	3	0	3
	5	0	0	0	0	0	1	1
Total		16	19	8	3	3	1	50

Table 9 illustrates that in Section 9 (Sleeping) there are forty-two (84%) agreements out of a total of fifty (concordant responses highlighted in red).

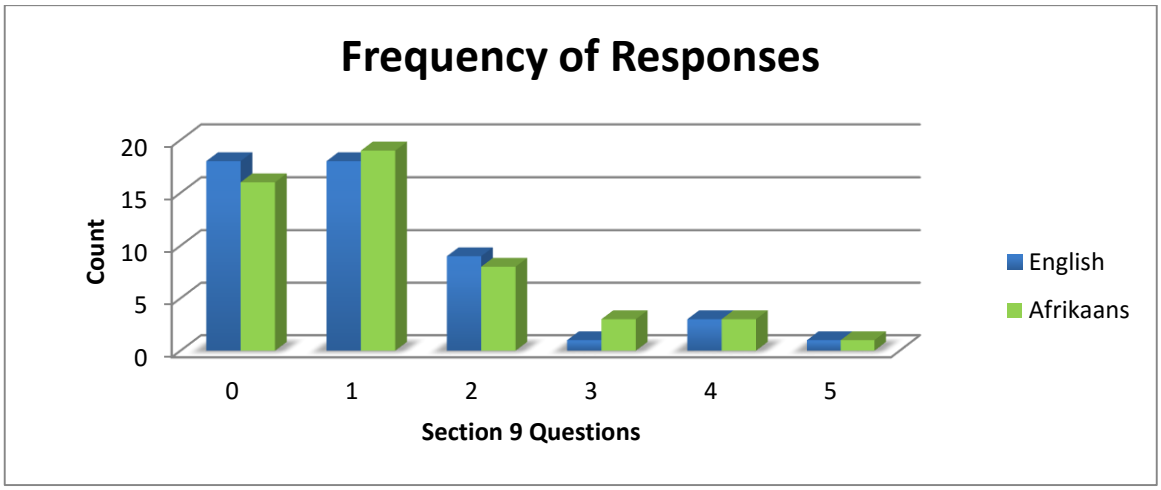


Figure 10: **Section 9 (Sleeping) Bar chart of the frequency of responses with regards to the Neck Disability Index by language**

Figure 10 depicts the frequency or responses by language for Section 9 (Sleeping) of the NDI. In column 1 and 3, the Afrikaans columns are higher than the English counterparts. This could possibly indicate that the Afrikaans phrases were better understood than the English phrases. In column 0 and 2 the reverse is true, which may indicate that the English phrases were better understood than the Afrikaans counterparts. In column 4 and 5 the columns are of equal height which seems to indicate that the English and Afrikaans phrases were equally well understood.

Table 10: **Section 10 (Recreation) Cross-tabulation of responses with regards to English (E) and Afrikaans (A) questions for the Neck Disability Index**

		A10						Total
		0	1	2	3	4	5	
E10	0	10	3	0	0	0	0	13
	1	0	10	6	1	0	0	17
	2	0	0	7	2	1	0	10
	3	0	0	0	2	1	0	3
	4	0	0	0	1	1	0	2
	5	0	0	0	1	0	4	5
Total		10	13	13	7	3	4	50

Table 10 illustrates that in Section 10 (Recreation) there are thirty-four (68%) agreements out of a total of fifty (concordant responses highlighted in red).

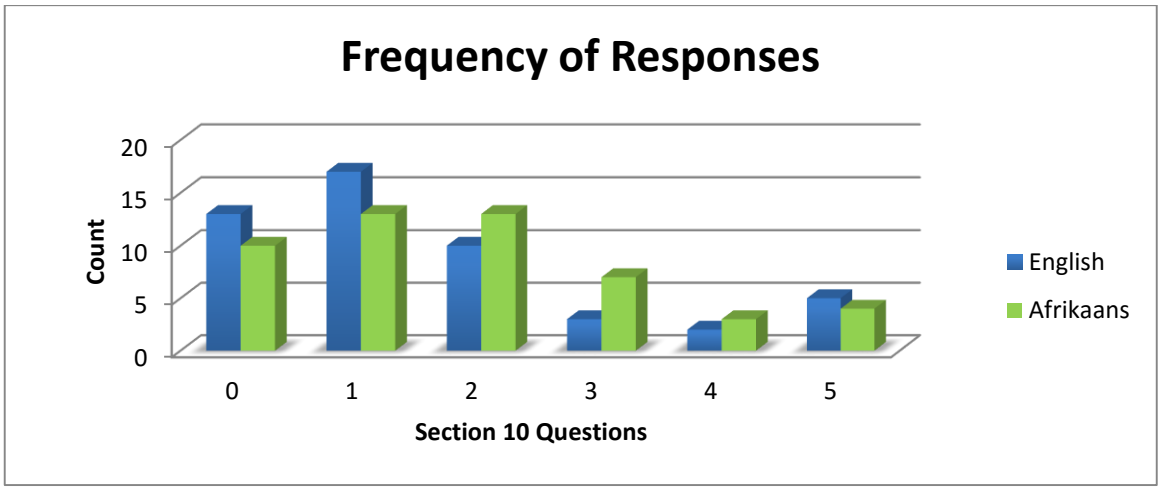


Figure 11: **Section 10 (Recreation) Bar chart of the frequency of responses with regards to the Neck Disability Index by language**

Figure 11 depicts the frequency or responses by language for Section 9 (Sleeping) of the NDI. In column 2, 3 and 4 the Afrikaans columns are higher than the English counterparts. This could possibly indicate that the Afrikaans phrases were better understood than the English phrases. In column 0, 1 and 5 the reverse is true, which may indicate that the English phrases were better understood than the Afrikaans counterparts.

4.4.2 Frequencies of the Quadruple Visual Analogue Scale (QVAS)

Table 11: **Question 1 Cross-tabulation of responses with regards to English (E) and Afrikaans (A) questions for the Quadruple Visual Analogue Scale**

		A1											Total
		0	1	2	3	4	5	6	7	8	9	10	
E1	0	9	3	0	0	0	0	0	0	0	0	0	12
	1	0	7	3	0	0	0	0	0	0	0	0	10
	2	0	0	6	0	0	0	0	0	0	0	0	6
	3	0	0	1	6	1	1	0	0	0	0	0	9
	4	0	0	0	0	3	0	0	1	0	0	0	4
	5	0	0	0	0	0	2	0	0	0	0	0	2
	6	0	0	0	0	1	0	0	1	0	0	0	2
	7	0	0	0	0	0	0	0	2	0	0	0	2
	8	0	0	0	0	0	0	1	0	1	0	0	2
	9	0	0	0	0	0	0	0	0	0	1	0	1
	10	0	0	0	0	0	0	0	0	0	0	0	0
Total		9	10	10	6	5	3	1	4	1	1	0	50

Table 11 illustrates that in Question 1 (Current Pain) there are thirty-seven (74%) agreements out of a total of fifty (concordant responses highlighted in red).

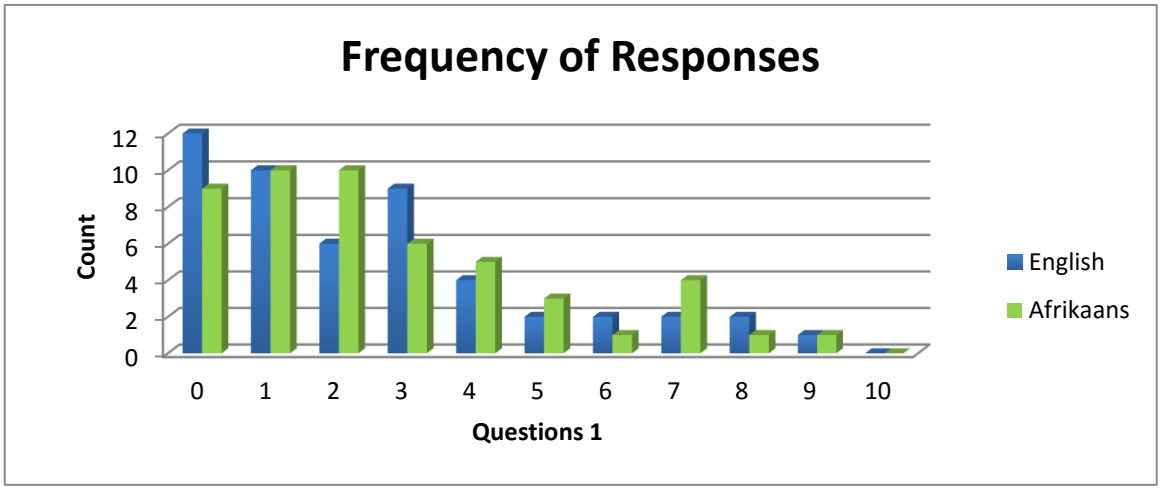


Figure 12: **Question 1 Bar chart of frequency of responses with regards to the Quadruple Visual Analogue Scale by language**

Figure 12 depicts the frequency of the numeric responses for Question 1.

Table 12: **Question 2 Cross-tabulation of responses with regards to English (E) and Afrikaans (A) questions for the Quadruple Visual Analogue Scale**

		A2											Total
		0	1	2	3	4	5	6	7	8	9	10	
E2	0	4	0	1	0	0	0	0	0	0	0	0	5
	1	1	2	4	0	0	0	0	0	0	0	0	7
	2	0	0	6	1	3	0	0	0	0	0	0	10
	3	0	0	1	3	1	1	0	0	0	0	0	6
	4	0	0	0	0	4	2	1	0	0	0	0	7
	5	0	0	0	0	1	5	0	0	0	0	0	6
	6	0	0	0	0	0	0	2	0	0	0	0	2
	7	0	0	0	0	0	0	0	2	1	0	0	3
	8	0	0	0	0	0	0	1	0	1	0	0	2
	9	0	0	0	0	0	0	0	0	0	2	0	2
	10	0	0	0	0	0	0	0	0	0	0	0	0
Total		5	2	12	4	9	8	4	2	2	2	0	50

Table 12 illustrates that in Question 2 (Average Pain) there are thirty-one (62%) agreements out of a total of fifty (concordant responses highlighted in red).

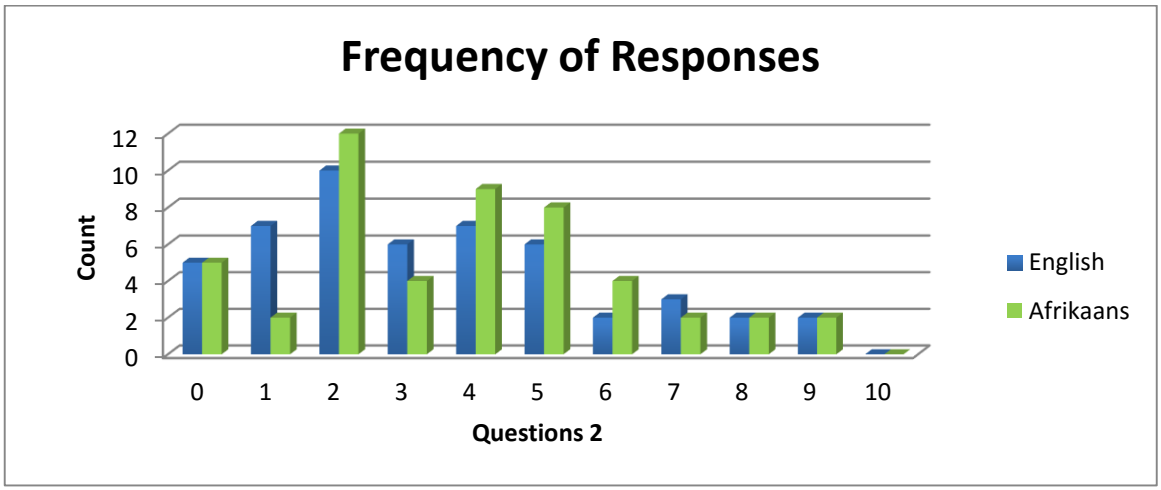


Figure 13: **Question 2 Bar chart of frequency of responses with regards to the Quadruple Visual Analogue Scale by language**

Figure 13 depicts the frequency of the numeric responses for Question 2.

Table 13: **Question 3 Cross-tabulation of responses with regards to English (E) and Afrikaans (A) questions for the Quadruple Visual Analogue Scale**

		A3											Total
		0	1	2	3	4	5	6	7	8	9	10	
E3	0	11	1	0	0	0	0	0	0	0	0	0	12
	1	1	14	0	0	0	0	0	0	0	0	0	15
	2	1	1	7	0	0	0	0	0	0	0	0	9
	3	0	1	1	2	1	0	0	0	0	0	0	5
	4	0	1	0	1	0	0	0	0	0	0	0	2
	5	0	1	1	0	1	0	0	0	0	0	0	3
	6	0	0	0	0	0	0	1	0	0	0	0	1
	7	0	0	0	0	0	0	0	1	0	0	0	1
	8	0	0	0	0	0	1	1	0	0	0	0	2
	9	0	0	0	0	0	0	0	0	0	0	0	0
	10	0	0	0	0	0	0	0	0	0	0	0	0
Total		13	19	9	3	2	1	2	1	0	0	0	50

Table 13 illustrates that in Question 3 (Pain level at Best) there are thirty-six (72%) agreements out of a total of fifty (concordant responses highlighted in red). This still indicates a good level of agreement as depicted by a Kappa value of 0.7300.

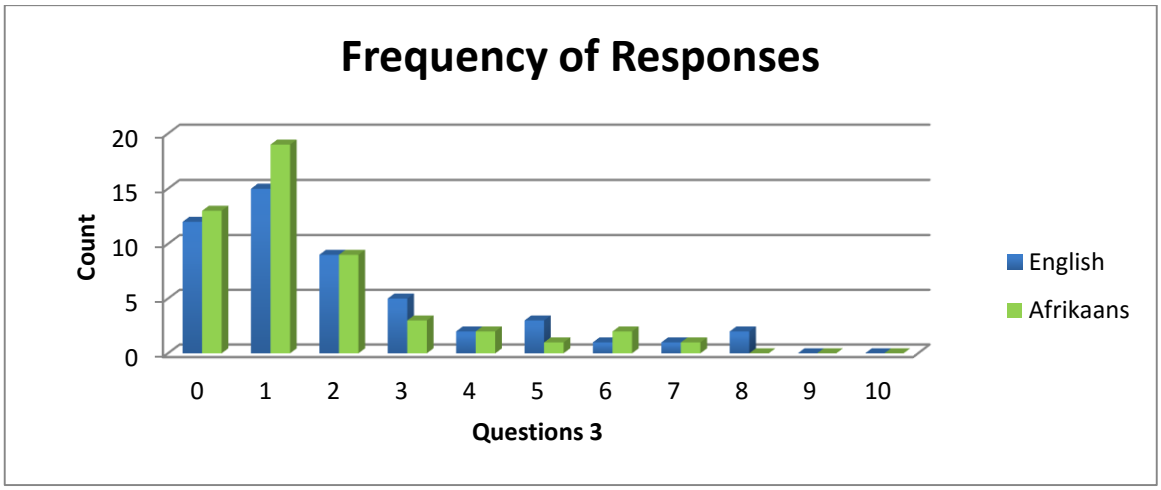


Figure 14: **Question 3 Bar chart of frequency of responses with regards to the Quadruple Visual Analogue Scale by language**

Figure 14 depicts the frequency of the numeric responses for Question 3.

Table 14: **Question 4 Cross-tabulation of responses with regards to English (E) and Afrikaans (A) questions for the Quadruple Visual Analogue Scale**

		A4											Total
		0	1	2	3	4	5	6	7	8	9	10	
E4	0	4	0	0	1	0	1	0	0	0	0	0	6
	1	0	2	0	0	0	0	0	0	0	0	0	2
	2	1	0	0	1	0	0	0	0	0	0	0	2
	3	0	0	1	1	0	0	0	0	0	0	0	2
	4	0	0	0	0	3	0	0	1	0	0	0	4
	5	0	0	0	0	0	3	2	0	0	0	0	5
	6	0	0	0	0	0	0	6	1	0	0	0	7
	7	0	0	0	0	0	0	0	3	0	0	0	3
	8	0	0	0	0	0	0	0	0	5	1	0	6
	9	0	0	0	0	0	0	0	0	0	8	0	8
	10	0	0	0	0	0	0	0	0	0	0	5	5
Total		5	2	1	3	3	4	8	5	5	9	5	50

Table 14 illustrates that in Question 4 (Pain level at Worst) there are forty (80%) agreements out of a total of fifty (concordant responses highlighted in red).

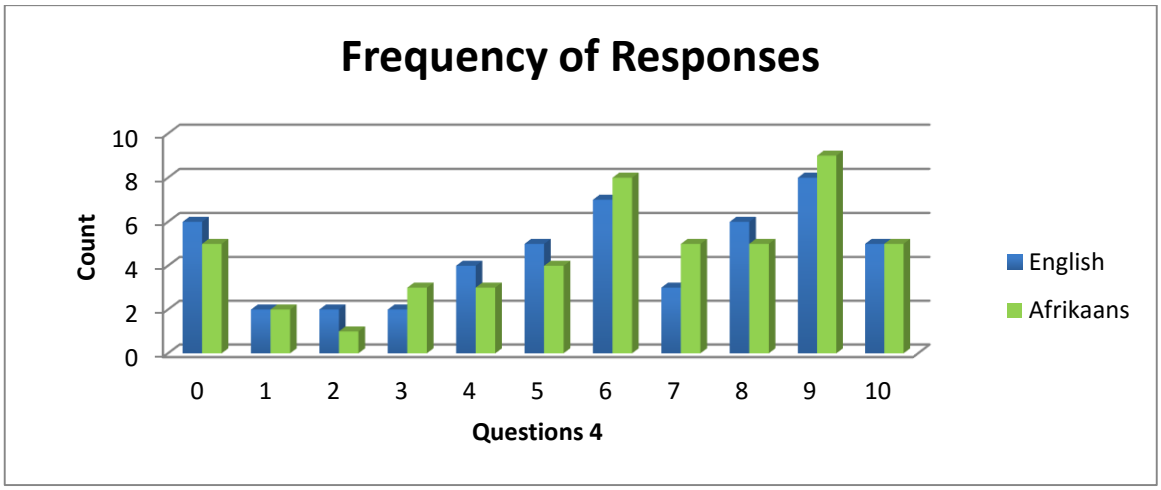


Figure 15: Question 4 Bar chart of frequency of responses with regards to the Quadruple Visual Analogue Scale by language

Figure 15 depicts the frequency of the numeric responses for Question 4.

4.5 Statistical Methodology

Face validity was established through the use of an Expert group and content validity was established with the use of a pilot study.

Next, concurrent validity was measured using Pearson's Correlation Analysis and Bland-Altman's Analysis. Reliability or internal consistency of the scores was measured by Cronbach's Alpha Testing for all items to the total construct.

4.5.1 Concurrent Validity

The scale to be validated (Afrikaans translation) was assessed against the previously validated version (English) in order to assess agreement and evidence of bias.

4.5.1.1 Kappa Statistics

Table 15: Cohen's Kappa values for agreement between the English and Afrikaans Neck Disability Index Questionnaires

Section	% of Agreement	Weighted Cohen's Kappa	Strength of Agreement	p-value
Section 1 - Pain Intensity	70%	0.7075	Good agreement	< 0.00001
Section 2 - Personal Care	78%	0.7093	Good agreement	< 0.00001
Section 3 - Lifting	78%	0.8407	Very good agreement	< 0.00001
Section 4 - Reading	74%	0.7562	Good agreement	< 0.00001
Section 5 - Headaches	72%	0.8051	Very good agreement	< 0.00001
Section 6 - Concentration	78%	0.8254	Very good agreement	< 0.00001
Section 7 - Work	68%	0.7308	Good agreement	< 0.00001
Section 8 - Driving	66%	0.6953	Good agreement	< 0.00001
Section 9 - Sleeping	84%	0.8571	Very good agreement	< 0.00001
Section 10 - Recreation	68%	0.7678	Good agreement	< 0.00001

Table 15 shows the linear Kappa values and corresponding levels of agreement for the individual sections of the English and Afrikaans NDI sections. The Kappa values range from 0.6953 to 0.8571 which corresponds to good to very good levels of agreement.

The p-value significance is set at <0.05. The p-values for the individual sections of the NDI are all less than 0.00001 which indicates great significance.

Table 16: Cohen's Kappa values for agreement between the English and Afrikaans Quadruple Visual Analogue Scale

Section	% of Agreement	Weighted Cohen's Kappa	Strength of Agreement	p-value
Question 1	74.00%	0.8610	Very good agreement	< 0.00001
Question 2	62.00%	0.8060	Very good agreement	< 0.00001
Question 3	72.00%	0.7300	Good agreement	< 0.00001
Question 4	80.00%	0.8930	Very good agreement	< 0.00001

Table 16 shows the linear Kappa values and corresponding levels of agreement for the individual questions for the English and Afrikaans QVAS. The Kappa values range from 0.7300 to 0.8930 which corresponds to good to very good levels of agreement.

The p-value significance is set at <0.05. The p-values for the individual sections of the NDI are all <0.00001 which indicates great significance.

4.5.1.2 Pearson's Correlation Analysis

Correlation of the scores:

There was a very high correlation between English and Afrikaans total scores for NDI (r = 0.977) and QVAS (r = 0.969). However, high correlation does not mean there was no consistent bias.

Table 17: Pearson's Correlation of total scores for English and Afrikaans Neck Disability Index

		Total Score (out of 50) English
Total Score (out of 50) Afrikaans	Pearson Correlation	.977**
	Sig. (2-tailed)	<0.001
	N	50

Table 17 indicates there was a very high correlation between English and Afrikaans total scores for NDI (r = 0.977).

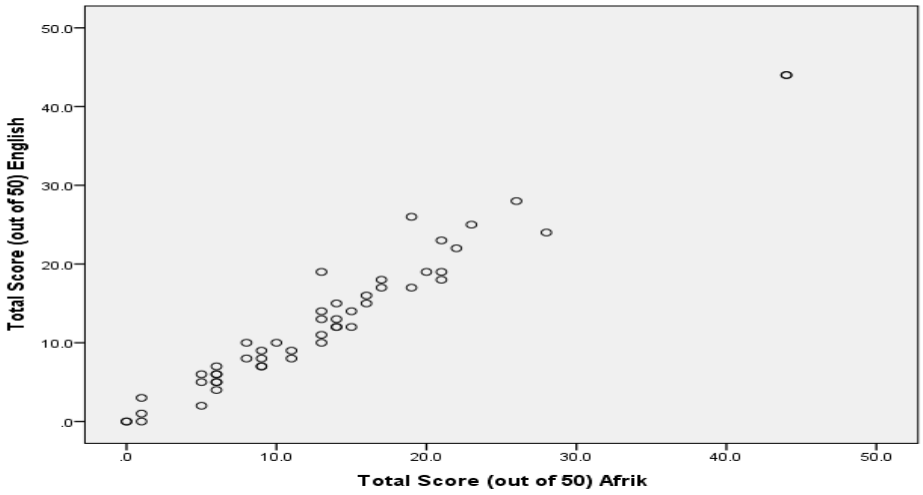


Figure 16: Scatter chart depicting total scores for both the English and Afrikaans Neck Disability Index

There is a strong positive linear relationship (Figure 16) between the two variables and is supported by a significant p-value (p < 001).

Table 18: Pearson's Correlation of total scores (% out of 100) for English and Afrikaans Quadruple Visual Analogue Scale

		Total Score (% out of 100) English
Total Score (% out of 100) Afrikaans	Pearson Correlation	0.969**
	Sig. (2-tailed)	<0.001
	N	50

Table 18 indicates there was a very high correlation between English and Afrikaans total scores for QVAS (r = 0.969).

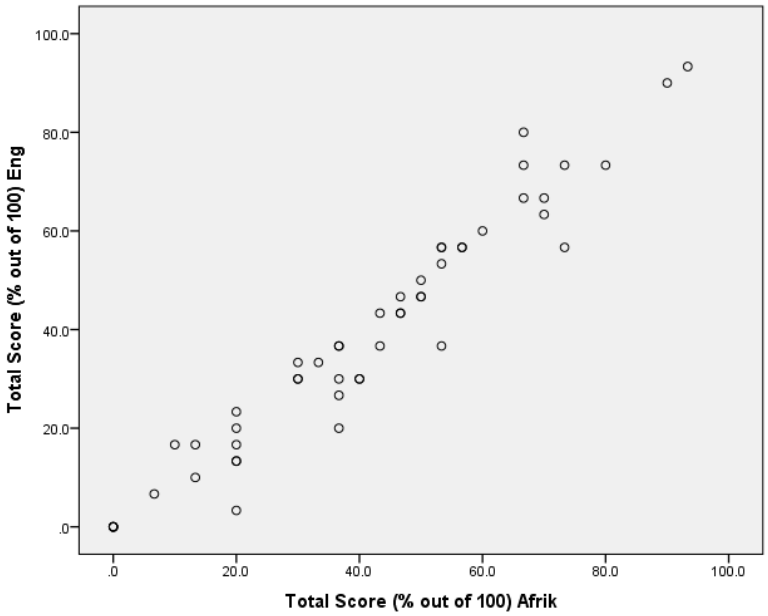


Figure 17: Scatter chart depicting total scores (% out of 100) for both the English and Afrikaans Quadruple Visual Analogue Scale

There is a strong positive linear relationship (Figure 17) between the two variables and is supported by a significant p-value (p < 001).

4.5.1.3 Bland-Altman procedure for Neck Disability Index

Firstly, the differences between the two scores were calculated and compared with 0 using a one sample t-test (similar procedure as a paired t-test on the differences).

Table 19: One-Sample Statistics for Neck Disability Index

One-Sample Statistics				
	N	Mean	Std. Deviation	Std. Error Mean
diff1	50	0.3400	2.06635	0.29223

Table 20: One-Sample Test for Neck Disability Index

One-Sample Test						
	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Difference NDI	1.163	49	0.250	0.34000	-0.2472	0.9272

According to Table 20, there was no significant difference between the mean of the differences (0.34) and 0, meaning that the two scores were measuring similarly and the two questionnaires can be used interchangeably.

Next, a linear regression analysis using the mean of the scores as the independent variable and the difference of the scores as the dependent variable were conducted.

Table 21: Coefficients for the Neck Disability Index

Coefficients[a]						
Model		Unstandardised Coefficients		Standardised Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.727	0.505		1.440	0.156
	mean1	-0.030	0.031	-0.134	-0.940	0.352
a. Dependent Variable: diff1						

Table 21 used a linear regression analysis indicating a p-value of 0.352; therefore there was concurrent validity of the Afrikaans scale on the English scale. If the mean is not statistically significant, it can be interpreted as no consistent bias in the results.

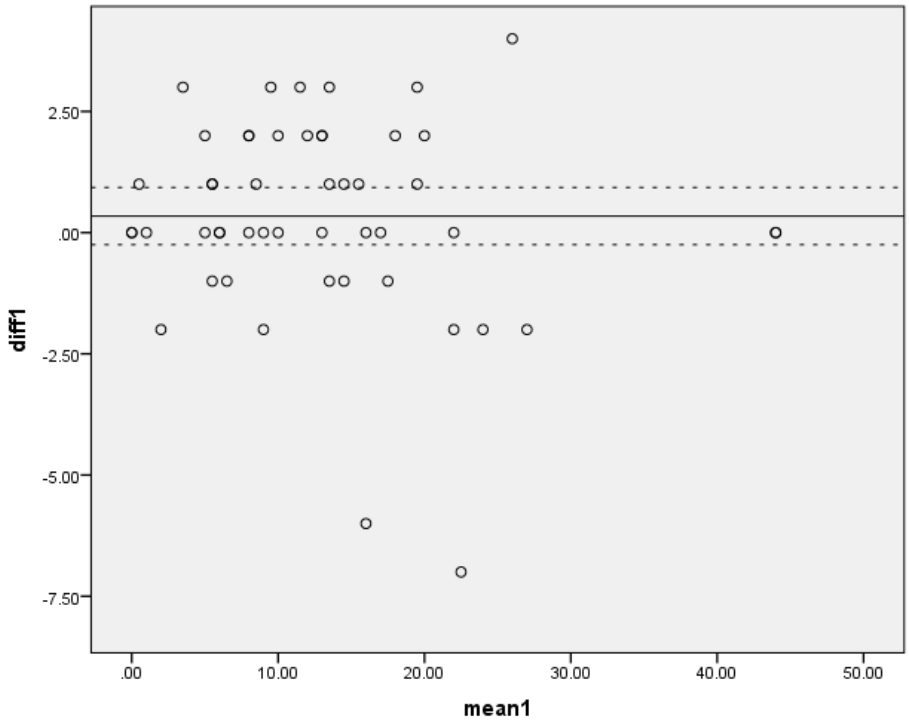


Figure 18: Scatter plot of the variability for the Neck Disability Index

Figure 18 shows that the mean difference was close to 0 and that the 95% confidence interval of the limits of agreement is narrow, and thus the two questionnaires are equivalent. Also the scatter of the variability is consistent across the graph, meaning that there was no consistent bias.

4.5.1.4 Bland-Altman procedure for the Quadruple Visual Analogue Scale

Firstly, the differences between the two scores were calculated and compared with 0 using a one sample t-test (similar procedure as a paired t-test on the differences).

Table 22: One-Sample Statistics for the Quadruple Visual Analogue Scale

One-Sample Statistics				
	N	Mean	Std. Deviation	Std. Error Mean
diff2	50	2.3333	6.07026	0.85846

Table 22 indicates that there was a significant difference between the mean of the differences and 0, meaning that the difference between the scores are statistically significant.

Table 23: One-Sample Test for the Quadruple Visual Analogue Scale

One-Sample Test						
	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Difference QVAS	2.718	49	0.009	2.33333	0.6082	4.0585

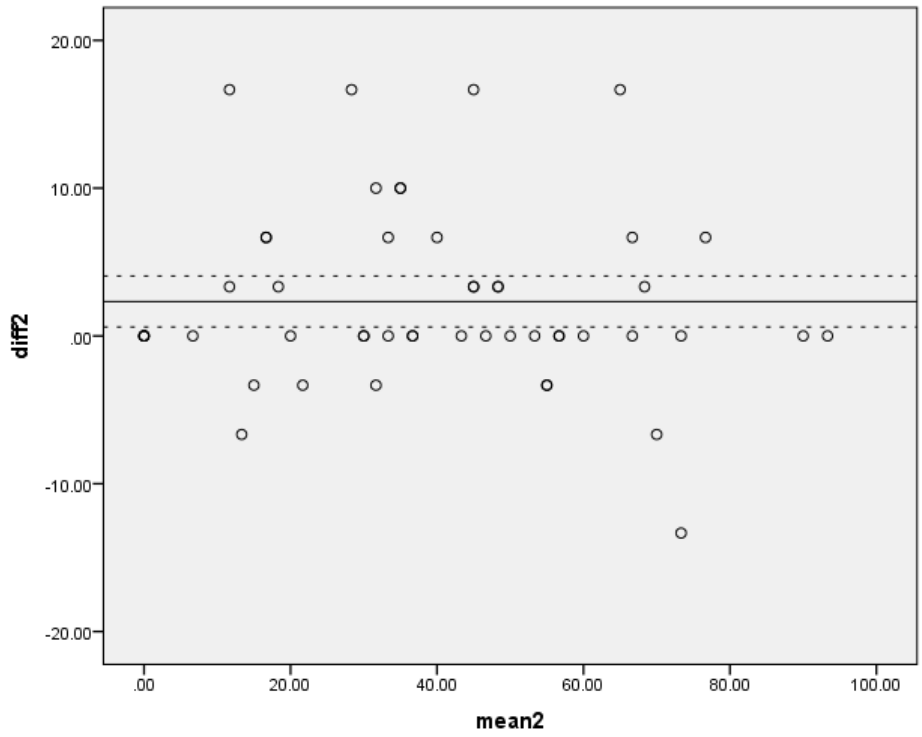


Figure 19: Scatter chart of the variability for the Quadruple Visual Analogue Scale

Next, a linear regression analysis using the mean of the scores as the independent variable and the difference of the scores as the dependent variable were conducted.

Table 24: Coefficients for the Quadruple Visual Analogue Scale

Coefficients[a]						
Model		Unstandardised Coefficients		Standardised Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.297	1.699		1.940	0.058
	mean2	-0.024	0.036	-0.095	-0.659	0.513
a. Dependent Variable: diff2						

4.5.2 **Internal Reliability**

Both the Afrikaans and English versions of each questionnaire were tested for reliability of all items to the whole construct and also each individual section via Cronbach's Alpha.

4.5.2.1 Cronbach's Alpha for the NDI

Table 25: Cronbach's Alpha for English and Afrikaans NDI

English NDI Cronbach's Alpha	Afrikaans NDI Cronbach's Alpha	N of Items
0.914	0.900	50

According to Table 25, the Cronbach's Alpha for the Afrikaans version of the NDI was slightly lower ($\alpha = 0.900$) than that for its English counterpart ($\alpha = 0.914$), but the consistency was still very high, as a Cronbach's Alpha greater than 0.7 ($\alpha > 0.7$) indicates reliability of an item or scale. Thus, both the Afrikaans and English versions of the NDI were deemed reliable.

4.5.2.2 Cronbach's Alpha for the QVAS

Table 26: Cronbach's Alpha for English and Afrikaans QVAS

English QVAS Cronbach's Alpha	Afrikaans QVAS Cronbach's Alpha	N of Items
0.870	0.883	4

In Table 26 the internal reliability of the Afrikaans version of the QVAS, with a Cronbach's Alpha of $\alpha = 0.883$ was even higher than that of the English version ($\alpha = 0.870$), thus both the Afrikaans and English versions of the QVAS were deemed reliable.

4.5.2.3 Cronbach's Alpha for Individual Sections in NDI

In Table 27 to Table 36 the Cronbach's Alpha of section 1 to section 10 of the English NDI is $\alpha > 0.899$ and for the Afrikaans NDI $\alpha > 0.883$. For each individual section, the Afrikaans Cronbach's Alpha is slightly lower than the English counterpart, but all individual sections are greater than 0.7. This indicates that both the individual Afrikaans and English sections of the NDI were deemed reliable.

Table 27: Cronbach's Alpha for Section One of English and Afrikaans NDI

Section	Cronbach's Alpha	
	English	Afrikaans
Section 1 - Pain Intensity	0.900	0.883

The Cronbach's Alpha of section one of the English NDI is 0.900 and for the Afrikaans NDI it is 0.883. The Afrikaans Cronbach's Alpha is slightly lower than the English counterpart, but both sections are greater than 0.7, thus indicating reliability.

Table 28: Cronbach's Alpha for Section Two of English and Afrikaans NDI

Section	Cronbach's Alpha	
	English	Afrikaans
Section 2 - Personal Care	0.901	0.886

The Cronbach's Alpha of section two of the English NDI is 0.901 and for the Afrikaans NDI it is 0.886. The Afrikaans Cronbach's Alpha is slightly lower than the English counterpart, but both sections are greater than 0.7, thus indicating reliability.

Table 29: Cronbach's Alpha for Section Three of English and Afrikaans NDI

Section	Cronbach's Alpha	
	English	Afrikaans
Section 3 - Lifting	0.918	0.898

The Cronbach's Alpha of section three of the English NDI is 0.918 and for the Afrikaans NDI it is 0.898. The Afrikaans Cronbach's Alpha is slightly lower than the English counterpart, but both sections are greater than 0.7, thus indicating reliability.

Table 30: Cronbach's Alpha for Section Four of English and Afrikaans NDI

Section	Cronbach's Alpha	
	English	Afrikaans
Section 4 - Reading	0.902	0.888

The Cronbach's Alpha of section four of the English NDI is 0.902 and for the Afrikaans NDI it is 0.888. The Afrikaans Cronbach's Alpha is slightly lower than the English counterpart, but both sections are greater than 0.7, thus indicating reliability.

Table 31: Cronbach's Alpha for Section Five of English and Afrikaans NDI

Section	Cronbach's Alpha	
	English	Afrikaans
Section 5 - Headaches	0.920	0.908

The Cronbach's Alpha of section five of the English NDI is 0.920 and for the Afrikaans NDI it is 0.908. The Afrikaans Cronbach's Alpha is slightly lower than the English counterpart, but both sections are greater than 0.7, thus indicating reliability.

Table 32: Cronbach's Alpha for Section Six of English and Afrikaans NDI

Section	Cronbach's Alpha	
	English	Afrikaans
Section 6 - Concentration	0.900	0.887

The Cronbach's Alpha of section six of the English NDI is 0.900 and for the Afrikaans NDI it is 0.887. The Afrikaans Cronbach's Alpha is slightly lower than the English counterpart, but both sections are greater than 0.7, thus indicating reliability.

Table 33: Cronbach's Alpha for Section Seven of English and Afrikaans NDI

Section	Cronbach's Alpha	
	English	Afrikaans
Section 7 - Work	0.901	0.888

The Cronbach's Alpha of section seven of the English NDI is 0.901 and for the Afrikaans NDI it is 0.888. The Afrikaans Cronbach's Alpha is slightly lower than the English counterpart, but both sections are greater than 0.7, thus indicating reliability.

Table 34: Cronbach's Alpha for Section Eight of English and Afrikaans NDI

Section	Cronbach's Alpha	
	English	Afrikaans
Section 8 - Driving	0.899	0.884

The Cronbach's Alpha of section eight of the English NDI is 0.899 and for the Afrikaans NDI it is 0.884. The Afrikaans Cronbach's Alpha is slightly lower than the English counterpart, but both sections are greater than 0.7, thus indicating reliability.

Table 35: Cronbach's Alpha for Section Nine of English and Afrikaans NDI

Section	Cronbach's Alpha	
	English	Afrikaans
Section 9 - Sleeping	0.910	0.891

The Cronbach's Alpha of section nine of the English NDI is 0.910 and for the Afrikaans NDI it is 0.891. The Afrikaans Cronbach's Alpha is slightly lower than the English counterpart, but both sections are greater than 0.7, thus indicating reliability.

Table 36: Cronbach's Alpha for Section Ten of English and Afrikaans NDI

Section	Cronbach's Alpha	
	English	Afrikaans
Section 10 - Recreation	0.904	0.887

The Cronbach's Alpha of section ten of the English NDI is 0.904 and for the Afrikaans NDI it is 0.887. The Afrikaans Cronbach's Alpha is slightly lower than the English counterpart, but both sections are greater than 0.7, thus indicating reliability for both versions.

4.5.2.4 Cronbach's Alpha for Individual Questions in QVAS

In Table 37 to Table 40, the Cronbach's Alpha of question 1 to question 4 of the English QVAS is $\alpha > 0.772$ and for the Afrikaans NDI $\alpha > 0.803$. For each individual section, the Afrikaans Cronbach's Alpha is slightly higher than the English counterpart, indicating greater reliability than the English counterpart. All individual Afrikaans and English questions of the QVAS were deemed reliable.

Table 37: Cronbach's Alpha for Question One of English and Afrikaans QVAS

Section	Cronbach's Alpha	
	English	Afrikaans
Question 1	0.781	0.813

The Cronbach's Alpha of question one of the English QVAS is 0.781 and for the Afrikaans NDI it is 0.813. The Afrikaans Cronbach's Alpha is slightly higher than the

English counterpart, indicating greater reliability than the English version. Both versions have a Cronbach's Alpha greater than 0.7, thus indicating reliability.

Table 38: Cronbach's Alpha for Question Two of English and Afrikaans QVAS

Section	Cronbach's Alpha	
	English	Afrikaans
Question 2	0.772	0.803

The Cronbach's Alpha of question two of the English QVAS is 0.772 and for the Afrikaans NDI it is 0.803. The Afrikaans Cronbach's Alpha is slightly higher than the English counterpart, indicating greater reliability than the English version. Both versions have a Cronbach's Alpha greater than 0.7, thus indicating reliability.

Table 39: Cronbach's Alpha for Question Three of English and Afrikaans QVAS

Section	Cronbach's Alpha	
	English	Afrikaans
Question 3	0.884	0.887

The Cronbach's Alpha of question three of the English QVAS is 0.884 and for the Afrikaans NDI it is 0.887. The Afrikaans Cronbach's Alpha is slightly higher than the English counterpart, indicating greater reliability than the English version. Both versions have a Cronbach's Alpha greater than 0.7, thus indicating reliability.

Table 40: Cronbach's Alpha for Question Four of English and Afrikaans QVAS

Section	Cronbach's Alpha	
	English	Afrikaans
Question 4	0.886	0.890

The Cronbach's Alpha of question four of the English QVAS is 0.886 and for the Afrikaans NDI it is 0.890. The Afrikaans Cronbach's Alpha is slightly higher than the English counterpart, indicating greater reliability than the English version. Both versions have a Cronbach's Alpha greater than 0.7, thus indicating reliability.

Chapter Five

Discussion

5.1 Introduction

In this chapter a discussion of the results will take place. If the results do contain any differences or variances, then possible explanations will be explored to account for these variances.

5.2 Participants

In this sample of participants, the ages ranged from 21 years of age to 86 years of age. This indicates a good age distribution representing the general population as 71.58% of the South African population are in this age bracket (Central Intelligence Agency 2013). The mean age of the participants was 56.84 years. Older participants have a higher probability of having experienced neck pain or have a greater chance of having degenerative changes than a younger participant.

5.3 Questionnaires

A total of 51 participants completed the Afrikaans and English questionnaires of the NDI and QVAS. Of the 51 completed sets of questionnaires, one set was excluded due to incompletion, thus 50 completed questionnaire sets were used for statistical analysis.

5.4 Cross-Tabulations of NDI

Table 8 illustrates that in Section 8 (Driving) there are thirty-three (66%) agreements out of a total of fifty (concordant responses highlighted in red). With a Kappa value of 0.6953 there is a good level of agreement, although section 8 has the least amount of concordant responses out of all the sections of the NDI.

A possible explanation is that the majority of questionnaires in this study are answered by elderly individuals. They might not experience driving a motor vehicle as often (or at all) as younger individuals and this may influence a number of discordant responses. It might be difficult for an elderly individual to conceptualise how the pain would affect the activity. These assumptions, however, would need further validation to determine whether they do indeed have an impact on the interpretation of the questionnaire. The results indicate, based on research done by Ally (2006), Cook *et al. (*2006) and Wu *et al.* (2010) that it is possible that the inability to drive, lack of ownership of motor vehicle or a decrease in the frequency of the activity may negatively impact on the manner in which an individual responds to this particular question.

5.5 Frequencies of the Quadruple Visual Analogue Scale

The QVAS is a numeric pain rating scale with four sections (current pain, pain at best level, average pain and pain at worst level). Figures 12 to 15 depict the frequency of the numeric responses to each of the four questions, but the numeric rating scale contains no words or phrases, thus the agreement between the two questionnaires were only analysed using concordant responses and Cohen's Kappa.

Table 12 illustrated that in Question 2 (Average Pain) there are thirty-one (62%) agreements out of a total of fifty. Question 2 has the least amount of concordant responses. This might be due to increased difficulty for an individual to reliably quantify average neck pain over a period of time. In comparison, it stands to reason that it is easier to quantify Question 3 (Pain at Best) and Question 4 (Pain at Worst) as these are absolute measurements for an individual.

5.6 Concurrent Validity of QVAS

Table 22 indicates that there was a significant difference between the mean of the differences and 0, meaning that the difference between the scores was statistically significant. However, the more important question here is, whether a mean difference of 2.3 is clinically important. According to Spadoni et al. (2004) a minimal detectable change between 27.3% (3 points) and 31.8% (3.5 points) at 90% confidence level is required for a meaningful change. The mean difference of 2.3 for the QVAS, is below these levels, thus the two questionnaires can be used interchangeably. The linear regression analysis showed that there was no bias ($p = 0.513$) and, therefore, the concurrent validity is established. The scatter plot also shows narrow limits of agreement, and evidence for no consistent bias.

5.7 Concurrent Validity of NDI

The Afrikaans version of the NDI indicates a significant level of validity ($r = 0.977$) and reliability ($\alpha = 0.900$). This compares very favourably with levels of concurrent validity and reliability reported by other translated versions of the NDI depicted in Table 41.

Table 41: α and r Values for Translated Questionnaires

Questionnaire	α Value	r value
Thai (Uthaikhup 2011)	α = 0.85	*r* = 0.64
Turkish (Aslan 2008)	α = 0.89	*r* = 0.508
Korean (Lee 2006)	α = 0.96	*r* = 0.86
Iranian (Mousavi 2007)	α = 0.88	*r* = 0.90
Greek (Trouli 2008)	α = 0.85	*r* = 0.93
Finnish (Salo 2010)	α = 0.85	*r* = 0.58
Chinese (Wu 2010)	α = 0.89	*r* = 0.75

Chapter Six

Conclusion

and

Recommendations

6.1 Conclusion

The aim of this study was to validate the Afrikaans translated versions of the Neck Disability Index (NDI) and the Quadruple Visual Analogue Scale (QVAS) as until now no such Afrikaans translations of these questionnaires existed. The aim was to determine the reliability and validity of the Afrikaans translated versions and not to construct or develop a new pain scale.

Face validity of the translated versions was determined by analyses and critique through the use of a focus group. The content validity and feasibility were determined by pre-testing the translated version in the target language (Schellingerhout *et al.* 2011). The original versions of the NDI, QVAS and the Afrikaans translated versions were presented to five bilingual participants for analysis and critique.

The translated versions of the NDI and QVAS were then put through thorough statistical evaluations in order to establish the concurrent validity and internal reliability of the translated questionnaires.

The results indicated a significant level of concurrent validity for both the NDI and the QVAS. Results indicated a significant level of validity for the NDI ($r = 0.977$) and QVAS ($r = 0.969$) and a significant level of reliability for the NDI ($\alpha = 0.900$) and for the QVAS ($\alpha = 0.883$).

Both the Afrikaans versions of the NDI and QVAS were deemed reliable and concurrent validity was established. This means that both the NDI and QVAS were successfully translated and that the Afrikaans versions can now be used within the Afrikaans population as viable alternatives to the English NDI and QVAS. There are now acceptable measurement tools that are socially and culturally adapted for the Afrikaans population. This will assist in providing more precise information to health-care practitioners and researchers with regards to neck pain and disability of individuals and for a population group where, before, there might not have been any statistical data.

6.2 Recommendations

Although it was found that both the NDI and QVAS were successfully translated into Afrikaans, some recommendations could be made to the research process to further increase reliability and validity. These recommendations will now be discussed.

It would be useful to include a socio-demographic questionnaire together with the target questionnaires, to understand participant's level of education (formal or informal), gender, race, age and level of income and the effect it has on successfully answering the target questionnaires.

The aim this study was to develop validated and reliable Afrikaans counterparts for the English NDI and QVAS. Future studies should be done to further improve the Afrikaans versions of the NDI and QVAS by doing a comparative study between White and Coloured Afrikaans speaking people. This will indicate where there are language differences between the two largest Afrikaans speaking population groups in South Africa (Statistics South Africa 2011) and how the questionnaires should be adapted accordingly.

There is an argument to increase the sample size as a whole and to stratify the sample population to increase the number of participants within various age groups, as this will increase the statistical power of the study. The least represented age group in this study was the 30-50 year age group. A larger sample size may better allow for appropriate age stratification, as in a study by Hoy *et al.* (2010) which indicated that there is a higher prevalence of neck pain amongst women and that the risk of developing neck pain increases until 35-49 year age group, after which the risk begins to decline.

It was found that section 8 of the NDI, which pertains to pain whilst in control of a motor vehicle, had the least concordant responses compared to all the other sections of the NDI. It is not known whether the discordances in this section has to do with the ability to drive, car ownership or the colloquial language used in this section. It is therefore recommended for a qualitative study in the form of Delphi panels of this section to be done before refining the Afrikaans NDI or translating the English NDI into another target language.

Lastly, it could be beneficial to appoint an administrative assistant instead of using the researcher to administer the questionnaires to eliminate any form of bias when the data collection is done.

The validity and reliability of the translated versions of the NDI and the QVAS could be improved even further by including these recommendations in future studies.

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Appendix A

LETTER OF INFORMATION

Dear Participant

I would like to thank you for being part of my study.

Title of the Research Study: Concurrent validity of the Afrikaans versions of the Neck Disability Index questionnaire and Quadruple Visual Analogue Scale

Principal Researcher: Stephanus CJ le Roux, B-Tech Chiropractic

Supervisor: Dr Anthony van der Meulen, M-Tech Chiropractic

Introduction and Purpose of the Study:

Neck pain has a continual negative impact on the economy due to disability, loss of work hours and decreased production. This means that there is a great interest in neck pain research and the effect it has on an individual. Due to the effect that neck pain has on people's lives, there is a need for early diagnosis and assessment of patients. In the purely Afrikaans speaking population, there is to date no validated assessment tool to measure the degree of disability caused by neck pain. The purpose of this study is to validate the Afrikaans versions of the Neck Disability Index and the Quadruple Visual Analogue Scale.

Outline of the Procedures:

For you to be included in this study you need to meet the following requirements:

- You must be fluent in reading both the Afrikaans and English languages.
- You must be able to read and sign the Letter of Information and Informed Consent Form.
- You must be 18 years or older.
- All questionnaires need to be completed in full.

Time Duration: Two sessions of approximately 15 minutes each with a time interval between sessions of roughly an hour e.g. Church service, case history or lecture period.

Benefits, risks and costs: This study would contribute the necessary information to stimulate research in the area of the prevalence or incidence of NP in the Afrikaans speaking community. Results of the study will be available in the form of a dissertation in the DUT library. There are no risks involved, costs or remuneration associated regarding your participation in this study.

Reason/s why the Participant May Be Withdrawn from the Study: You, as the participant, are allowed to withdraw from the study at any time.

Confidentiality: The questionnaire is anonymous and no personal/identifying information will be recorded. All information that is obtained will be treated as strictly confidential. The usage of the data collected in this study will be used solely as outlined above.

Persons to Contact in the Event of Any Problems or Queries:
Researcher: Mr. SCJ le Roux (0844325223)
Supervisor: Dr A van der Meulen (0312620776)
Institutional Research Ethics administrator on 031 373 2900. Complaints can be reported to the DVC: TIP, Prof F. Otieno on 031 373 2382 or dvctip@dut.ac.za.

TOESTEMMINGSBRIEF

Verklaring Van Ooreenkoms Om Deel Te Neem In Die Studie:

- Ek bevestig hiermee dat ek ingelig is deur die navorser, Stephanus Christoffel Jacobs le Roux, oor die aard, gedrag, voordele en risiko's van hierdie studie.
- Ek het ook die bogenoemde skriftelike inligting (Brief van Inligting) ten opsigte van die studie ontvang, gelees en verstaan.
- Ek is bewus daarvan dat die resultate van die studie, insluitend persoonlike inligting aangaande my geslag, ouderdom, geboortedatum en volle naam sal anoniem verwerk word in 'n studie verslag.
- In die lig van die vereistes van navorsing, stem ek saam dat die data wat ingesamel is tydens hierdie studie in 'n gerekenariseerde stelsel kan verwerk word deur die navorser.
- Ek kan op enige stadium, sonder vooroordeel, my toestemming en deelname aan die studie onttrek.
- Ek het genoeg geleentheid gekry om vrae te vra en (uit my eie vrye wil) verklaar myself bereid om deel te neem aan die studie.
- Ek verstaan dat beduidende nuwe bevindings ontwikkel in die loop van hierdie navorsing, wat verband hou met my deelname, aan my beskikbaar gestel sal word.

_____	_____	_____	_____
Volle Naam	**Geboortedatum**	**Datum**	**Handtekening**

Ek, Stephanus Christoffel Jacobs le Roux, hiermee bevestig dat die bogenoemde deelnemer ten volle ingelig is oor die aard, gedrag en risiko's van die bogenoemde studie.

Stephanus Christoffel Jacobs le Roux	_____	_____
Navorser	**Datum**	**Handtekening**

_____	_____	_____
Getuie	**Datum**	**Handtekening**

Appendix B1

Nekgestremdheids-Indeks

LEES ASSEBLIEF:
Hierdie vraelys is ontwerp om vir ons inligting te gee oor hoe jou nekpyn jou vermoë om jou daaglikse lewe te hanteer, beïnvloed.
Beantwoord asseblief elke afdeling en **MERK IN ELKE AFDELING NET DIE EEN BLOKKIE WAT OP JOU VAN TOEPASSING IS.**

Ons besef jy kan in een afdeling twee of meer stellings oorweeg wat op jou betrekking het, maar merk asseblief net die blokkie wat jou probleem of toestand **NOU DIE BESTE BESKRYF**.

Afdeling 1: Pynintensiteit □ Ek het geen pyn op die oomblik nie □ Die pyn is baie lig op die oomblik □ Die pyn is matig op die oomblik □ Die pyn is redelik pynvol op die oomblik □ Die pyn is baie erg op die oomblik □ Die pyn is die ergste denkbare pyn op die oomblik	**Afdeling 6: Konsentrasie** □ Ek kan, wanneer nodig, ten volle konsentreer met geen probleme nie □ Ek kan, wanneer nodig, ten volle konsentreer, maar met ’n bietjie moeite □ Dit is redelik moeilik om te konsentreer wanneer nodig □ Dit is baie moeilik om te konsentreer wanneer nodig □ Dit is ongelooflik moeilik om te konsentreer wanneer nodig □ Ek kan glad nie konsentreer nie
Afdeling 2: Persoonlike Sorg (Was, aantrek, ens) □ Ek kan gewoonlik myself versorg sonder om ekstra pyn te ervaar □ Ek kan gewoonlik myself versorg, maar dit veroorsaak ekstra pyn □ Dit is pynlik om myself te versorg en ek is stadig en versigtig □ Ek het hulp nodig, maar ek kan self die meeste van my persoonlike sorg behartig □ Ek het elke dag hulp nodig in die meeste aspekte van persoonlike sorg □ Ek bly in die bed en trek nie aan nie en ek was myself met moeite	**Afdeling 7: Werk** □ Ek kan soveel werk doen soos ek wil □ Ek kan net my gewone werk doen, maar nie enige ekstra werk nie □ Ek kan die meeste van my gewone werk doen, maar geen ekstra werk nie □ Ek kan nie my gewone werk doen nie □ Ek kan skaars enige werk doen □ Ek kan geen werk doen nie
Afdeling 3: Optel van Voorwerpe □ Ek kan swaar voorwerpe optel sonder ekstra pyn □ Ek kan swaar voorwerpe optel, maar dit veroorsaak ekstra pyn □ Pyn verhinder my om swaar voorwerpe van	**Afdeling 8: Bestuur** □ Ek kan my voertuig bestuur sonder enige nekpyn □ Ek kan my voertuig bestuur, so lank as wat ek wil, met slegs 'n ligte pyn in my nek □ Ek kan my voertuig bestuur so lank as

die vloer af op te tel, maar ek kan dit doen as dit gerieflik geplaas is, soos byvoorbeeld op 'n tafel □ Pyn verhinder my om swaar voorwerpe op te tel, maar ek kan lig tot medium gewigte optel as dit gerieflik geplaas is □ Ek kan net baie ligte voorwerpe optel □ Ek kan niks optel of dra nie	wat ek wil met slegs matige pyn in my nek □ Ek kan nie my voertuig bestuur so lank as wat ek wil nie, weens matige pyn in my nek □ Ek kan skaars bestuur as gevolg van hewige pyn in my nek □ Ek kan glad nie my voertuig bestuur nie
Afdeling 4: Lees □ Ek kan lees soveel as wat ek wil met geen pyn in my nek nie □ Ek kan lees soveel as wat ek wil met slegs ligte pyn in my nek □ Ek kan lees soveel as wat ek wil met slegs matige pyn in my nek □ Ek kan nie lees so veel as wat ek wil nie, as gevolg van 'n matige pyn in my nek □ Ek kan skaars lees weens hewige pyn in my nek □ Ek kan glad nie lees nie	**Afdeling 9: Slaap** □ Ek het geen slaapprobleme nie □ My slaap is effens versteur (minder as 1 uur sonder slaap) □ My slaap is effens versteur (1-2 ure sonder slaap) □ My slaap is matig versteur (2-3 ure sonder slaap) □ My slaap is grootliks versteur (3-5 ure sonder slaap) □ My slaap is heeltemal versteur (5-7 ure sonder slaap)
Afdeling 5: Hoofpyne □ Ek het geen hoofpyne nie □ Ek ervaar soms effense hoofpyne □ Ek ervaar soms matige hoofpyne □ Ek ervaar gereeld matige hoofpyne □ Ek ervaar gereeld hewige hoofpyne □ Ek ervaar byna altyd hoofpyne	**Afdeling 10: Ontspanning** □ Ek kan deelneem aan al my ontspannings- aktiwiteite sonder enige nekpyn □ Ek kan deelneem aan al my ontspannings- aktiwiteite, maar daar is pyn in my nek □ Ek kan deelneem aan die meeste, maar nie al my gewone ontspannings-aktiwiteite nie, as gevolg van pyn in my nek □ Ek kan deelneem aan slegs 'n paar van my gewone ontspannings-aktiwiteite, as gevolg van pyn in my nek □ Ek kan skaars enige ontspannings-aktiwiteite doen as gevolg van pyn in my nek □ Ek kan by geen ontspannings-aktiwiteite betrokke raak nie

Appendix B2

Neck Disability Index

PLEASE READ:

This 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 section and **MARK IN EACH SECTION ONLY THE ONE BOX THAT APPLIES TO YOU**.

We realise you may consider that two or more statements in any one section relate to you, **BUT PLEASE JUST MARK THE BOX THAT MOST CLOSELY DESCRIBES YOUR PROBLEM.**

Section 1: Pain Intensity □ I have no pain at the moment □ The pain is very mild at the moment □ The pain is moderate at the moment □ The pain is fairly severe at the moment □ The pain is very severe at the moment □ The pain is the worst imaginable at the moment	**Section 6: Concentration** □ I can concentrate fully when I want to with no difficulty □ I can concentrate fully when I want to with slight difficulty □ I have a fair degree of difficulty in concentrating when I want to □ I have a lot of difficulty in concentrating when I want to □ I have a great deal of difficulty in concentrating when I want to □ I cannot concentrate at all
Section 2: Personal Care (Washing, Dressing, etc.) □ I can look after myself normally without causing extra pain □ I can look after myself normally but it causes extra pain □ It is painful to look after myself and I am slow and careful □ I need some help but can manage most of my personal care □ I need help every day in most aspects of self-care □ I do not get dressed, I wash with difficulty and stay in bed	**Section 7: Work** □ I can do as much work as I want to □ I can only do my usual work, but no more □ I can do most of my usual work, but no more □ I cannot do my usual work □ I can hardly do any work at all □ I can't do any work at all
Section 3: Lifting □ I can lift heavy weights without extra pain □ I can lift heavy weights but it gives extra	**Section 8: Driving** □ I can drive my car without any neck pain □ I can drive my car as long as I want with

pain □ Pain prevents me lifting heavy weights off the floor, but I can manage if they are conveniently placed, for example on a table □ Pain prevents me from lifting heavy weights but I can manage light to medium weights if they are conveniently positioned □ I can only lift very light weights □ I cannot lift or carry anything	slight pain in my neck □ I can drive my car as long as I want with moderate pain in my neck □ I can't drive my car as long as I want because of moderate pain in my neck □ I can hardly drive at all because of severe pain in my neck □ I can't drive my car at all
Section 4: Reading □ I can read as much as I want to with no pain in my neck □ I can read as much as I want to with slight pain in my neck □ I can read as much as I want with moderate pain in my neck □ I can't read as much as I want because of moderate pain in my neck □ I can hardly read at all because of severe pain in my neck □ I cannot read at all	**Section 9: Sleeping** □ I have no trouble sleeping □ My sleep is slightly disturbed (less than 1 hr sleepless) □ My sleep is mildly disturbed (1-2 hrs sleepless) □ My sleep is moderately disturbed (2-3 hrs sleepless) □ My sleep is greatly disturbed (3-5 hrs sleepless) □ My sleep is completely disturbed (5-7 hrs sleepless)
Section 5: Headaches □ I have no headaches at all □ I have slight headaches, which come infrequently □ I have moderate headaches, which come infrequently □ I have moderate headaches, which come frequently □ I have severe headaches, which come frequently □ I have headaches almost all the time	**Section 10: Recreation** □ I am able to engage in all my recreation activities with no neck pain at all □ I am able to engage in all my recreation activities, with some pain in my neck □ I am able to engage in most, but not all of my usual recreation activities because of pain in my neck □ I am able to engage in a few of my usual recreation activities because of pain in my neck □ I can hardly do any recreation activities because of pain in my neck □ I can't do any recreation activities at all

Appendix B3

VIERVOUDIGE VISUELE ANALOOG SKAAL

Naam van Pasiënt: _____ Datum: _____

Instruksie: Omring asseblief die nommer wat die vraag die beste beskryf.

Let wel: As jy meer as een klagte het, beantwoord asseblief elke vraag vir elke afsonderlike klagte en dui die telling aan vir elke klagte. Dui asseblief jou pynvlak aan soos op hierdie oomblik , jou gemiddelde pynvlak, jou pynvlak op sy ligste en op sy ergste.

Voorbeeld:

Hoofpyn Nek Lae Rug

Geen pyn _____ **Ergste Moontlike Pyn**

0 1 2 (3) 4 (5) 6 7 8 (9) 10

---

1. Wat is jou pynvlak OP HIERDIE OOMBLIK?

Geen pyn _____ **Ergste Moontlike Pyn**

0 1 2 3 4 5 6 7 8 9 10

2. Wat is jou TIPIESE of GEMIDDELDE pynvlak?

Geen pyn _____ **Ergste Moontlike Pyn**

0 1 2 3 4 5 6 7 8 9 10

3. Wat is jou pynvlak OP SY LIGSTE (hoe naby aan "0" is jou pynvlak as dit op sy minste is?)

Geen pyn _____ **Ergste Moontlike Pyn**

0 1 2 3 4 5 6 7 8 9 10

4. Wat is jou pynvlak as dit OP SY ERGSTE IS? (hoe naby aan "0" is jou pynvlak as dit op sy ergste is?)

Geen pyn _____ **Ergste Moontlike Pyn**

0 1 2 3 4 5 6 7 8 9 10

Pasiënt Handtekening: _____ Eksaminator Handtekening: _____

Appendix B4

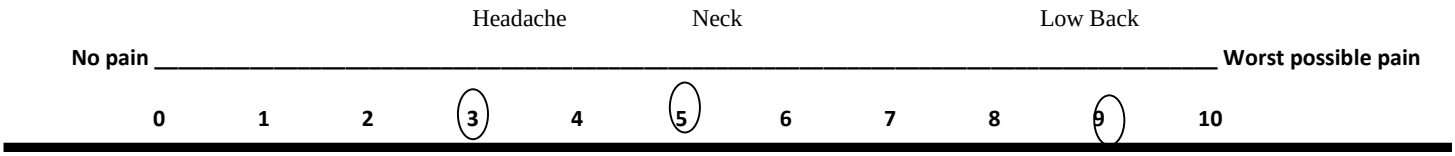
QUADRUPLE VISUAL ANALOGUE SCALE

Patient Name: _____ Date: _____

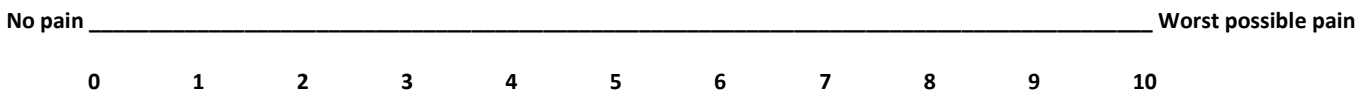
Instructions: Please circle the number that best describes the question being asked.

Note: If you have more than one complaint, please answer each question for each individual complaint and indicate the score for each complaint. Please indicate your pain level right now, average pain, and pain at its best and worst.

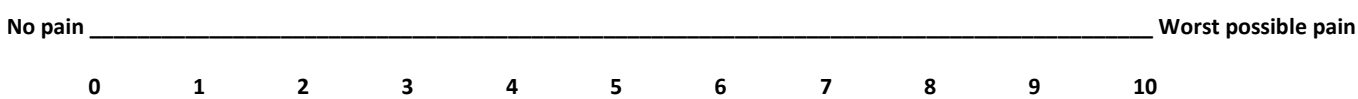
Example:



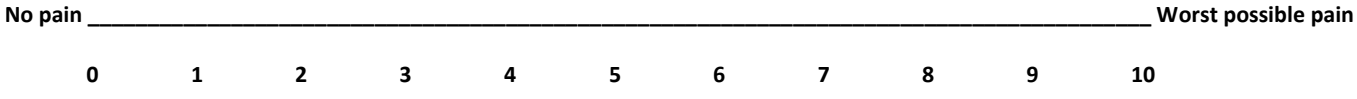
1. What is your pain RIGHT NOW?



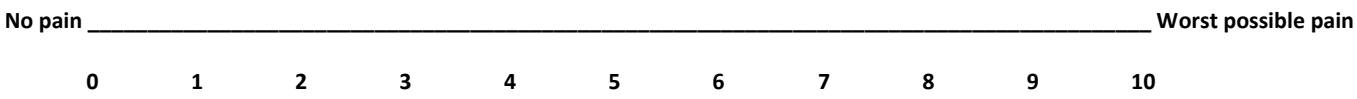
2. What is your TYPICAL or AVERAGE pain?



3. What is your pain level AT ITS BEST (How close to "0" does your pain get at its best)?



4. What is your pain level AT ITS WORST (How close to "10" does your pain get at its worst)?



Patient's Signature: _____ Examiner's Signature: _____

Appendix C

Pre-test Evaluation

1 What is your opinion of the subject presented in this questionnaire?
(Please mark the most appropriate box)

- 1.1 Extremely interesting ☐
- 1.2 Interesting ☐
- 1.3 Average ☐
- 1.4 Boring ☐
- 1.5 Very boring ☐

2 Do you think the topics raised in this questionnaire were adequately covered?

- 2.1 Yes ☐
- 2.2 No ☐

3 What is your opinion about the covering letter?
(Please mark one box only)

- 3.1 Very clear ☐
- 3.2 Clear ☐
- 3.3 Adequate ☐
- 3.4 Unclear ☐
- 3.5 Needs revising ☐

4 How would you describe the instructions accompanying each of the questions?
(Please mark one box only)

- 4.1 Very clear ☐
- 4.2 Clear ☐
- 4.3 Adequate ☐
- 4.4 Unclear ☐
- 4.5 Needs revising ☐

5 Do you think the questionnaire is too long?

- 5.1 Yes ☐
- 5.2 No ☐

6 What is your opinion of the wording of the questionnaire?
(Please mark the appropriate box/es)

- 6.1 The meaning of **all questions** is absolutely clear ☐
- 6.2 The meaning of **most** questions is clear ☐
- 6.3 There is too much chiropractic/ medical jargon ☐
- 6.4 The questions will not be understood by lay persons ☐
- 6.5 The questionnaire needs to be revised because it is unclear ☐

If you had any difficulty answering any question/s, please write the number/s of the question/s in the space below with a suggestion on how the question/s can be improved?

_____

Thank you for your most valuable time in helping me with my research project.

Appendix D1

Nekgestremdheids-Indeks

LEES ASSEBLIEF:
Hierdie vraelys is ontwerp om vir ons inligting te gee oor hoe jou nekpyn jou vermoë om jou daaglikse lewe te hanteer, beïnvloed.

Beantwoord asseblief elke afdeling en **MERK IN ELKE AFDELING NET DIE EEN BLOKKIE WAT OP JOU VAN TOEPASSING IS.**

Ons besef jy kan in een afdeling twee of meer stellings oorweeg wat op jou betrekking het, maar merk asseblief net die blokkie wat jou probleem of toestand **NOU DIE BESTE BESKRYF**.

Afdeling 1: Bestuur	**Afdeling 2: Werk**	**Afdeling 3: Ontspanning**	**Afdeling 4: Konsentrasie**	**Afdeling 5: Persoonlike Sorg (Was, aantrek, ens.)**
□ Ek kan my motor bestuur sonder enige nekpyn □ Ek kan my motor bestuur, so lank as wat ek wil, met 'n ligte pyn in my nek □ Ek kan my motor bestuur so lank as wat ek wil met matige pyn in my nek □ Ek kan nie my motor bestuur so lank as wat ek wil nie, weens matige pyn in my nek □ Ek kan amper glad nie bestuur as gevolg van hewige pyn in my nek nie □ Ek kan glad nie my motor bestuur nie	□ Ek kan soveel werk doen soos ek wil □ Ek kan net my gewone werk doen, maar nie enige ekstra werk nie □ Ek kan die meeste van my gewone werk doen, maar geen ekstra werk nie □ Ek kan nie my gewone werk doen nie □ Ek kan skaars enige werk doen □ Ek kan geen werk doen nie	□ Ek kan deelneem aan al my ontspannings- aktiwiteite sonder enige nekpyn □ Ek kan deelneem aan al my ontspannings-aktiwiteite, maar daar is ‘n bietjie pyn in my nek □ Ek kan deelneem aan die meeste, maar nie al my gewone ontspannings-aktiwiteite nie, as gevolg van pyn in my nek □ Ek kan deelneem aan slegs 'n paar van my gewone ontspannings-aktiwiteite, as gevolg van pyn in my nek □ Ek kan skaars enige ontspannings-aktiwiteite doen as gevolg van pyn in my nek □ Ek kan by geen ontspannings-aktiwiteite betrokke raak nie	□ Ek kan, wanneer ek wil, ten volle konsentreer met geen probleme nie □ Ek kan, wanneer nodig, ten volle konsentreer, maar met ’n bietjie moeite □ Dit is redelik moeilik om te konsentreer wanneer ek wil □ Dit is baie moeilik om te konsentreer wanneer ek wil □ Dit is ongelooflik moeilik om te konsentreer wanneer ek wil □ Ek kan glad nie konsentreer nie	□ Ek kan gewoonlik myself versorg sonder om ekstra pyn te ervaar □ Ek kan gewoonlik myself versorg, maar dit veroorsaak ekstra pyn □ Dit is pynlik om myself te versorg en ek is stadig en versigtig □ Ek het hulp nodig, maar ek kan self die meeste van my persoonlike sorg behartig □ Ek het elke dag hulp nodig in die meeste aspekte van persoonlike sorg □ Ek trek nie aan nie, bly in die bed en ek was myself met moeite
Afdeling 6: Lees	**Afdeling 7: Slaap**	**Afdeling 8: Pynintensiteit**	**Afdeling 9: Hoofpyne**	**Afdeling 10: Optel van Voorwerpe**
□ Ek kan lees soveel as wat ek wil met geen pyn in my nek nie □ Ek kan lees soveel as wat ek wil met slegs ligte pyn in my nek □ Ek kan lees soveel as wat ek wil met matige pyn in my nek □ Ek kan nie lees soveel as wat ek wil nie, as gevolg van 'n matige pyn in my nek □ Ek kan skaars lees weens hewige pyn in my nek □ Ek kan glad nie lees nie	□ Ek slaap sonder moeite □ My slaap is effens versteur (minder as 1 uur sonder slaap) □ My slaap is ligtelik versteur (1-2 ure sonder slaap) □ My slaap is matig versteur (2-3 ure sonder slaap) □ My slaap is grootliks versteur (3-5 ure sonder slaap) □ My slaap is heeltemal versteur (5-7 ure sonder slaap)	□ Ek het geen pyn op die oomblik nie □ Die pyn is baie lig op die oomblik □ Die pyn is matig op die oomblik □ Die pyn is redelik pynvol op die oomblik □ Die pyn is baie erg op die oomblik □ Die pyn is die ergste denkbare pyn op die oomblik	□ Ek het geen hoofpyne nie □ Ek ervaar soms ligte hoofpyne □ Ek ervaar soms matige hoofpyne □ Ek ervaar gereeld matige hoofpyne □ Ek ervaar gereeld hewige hoofpyne □ Ek ervaar byna altyd hoofpyne	□ Ek kan swaar voorwerpe optel sonder ekstra pyn □ Ek kan swaar voorwerpe optel, maar dit veroorsaak ekstra pyn □ Pyn verhinder my om swaar voorwerpe van die vloer af op te tel, maar ek kan dit doen as dit gerieflik geplaas is, soos byvoorbeeld op 'n tafel □ Pyn verhinder my om swaar voorwerpe op te tel, maar ek kan lig tot medium gewigte optel as dit gerieflik geplaas is □ Ek kan net baie ligte voorwerpe optel □ Ek kan niks optel of dra nie

Appendix D2

Neck Disability Index

PLEASE READ:

This 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 section and **MARK IN EACH SECTION ONLY THE ONE BOX THAT APPLIES TO YOU**.

We realise you may consider that two or more statements in any one section relate to you, **BUT PLEASE JUST MARK THE BOX THAT MOST CLOSELY DESCRIBES YOUR PROBLEM.**

Section 1: Pain Intensity	**Section 2: Personal Care (Washing, Dressing, etc.)**	**Section 3: Lifting**	**Section 4: Reading**	**Section 5: Headaches**
□ I have no pain at the moment □ The pain is very mild at the moment □ The pain is moderate at the moment □ The pain is fairly severe at the moment □ The pain is very severe at the moment □ The pain is the worst imaginable at the moment	□ I can look after myself normally without causing extra pain □ I can look after myself normally but it causes extra pain □ It is painful to look after myself and I am slow and careful □ I need some help but can manage most of my personal care □ I need help every day in most aspects of self-care □ I do not get dressed, I wash with difficulty and stay in bed	□ I can lift heavy weights without extra pain □ I can lift heavy weights but it gives extra pain □ Pain prevents me lifting heavy weights off the floor, but I can manage if they are conveniently placed, for example on a table □ Pain prevents me from lifting heavy weights but I can manage light to medium weights if they are conveniently positioned □ I can only lift very light weights □ I cannot lift or carry anything	□ I can read as much as I want to with no pain in my neck □ I can read as much as I want to with slight pain in my neck □ I can read as much as I want with moderate pain in my neck □ I can't read as much as I want because of moderate pain in my neck □ I can hardly read at all because of severe pain in my neck □ I cannot read at all	□ I have no headaches at all □ I have slight headaches, which come infrequently □ I have moderate headaches, which come infrequently □ I have moderate headaches, which come frequently □ I have severe headaches, which come frequently □ I have headaches almost all the time
Section 6: Concentration	**Section 7: Work**	**Section 8: Driving**	**Section 9: Sleeping**	**Section 10: Recreation**
□ I can concentrate fully when I want to with no difficulty □ I can concentrate fully when I want to with slight difficulty □ I have a fair degree of difficulty in concentrating when I want to □ I have a lot of difficulty in concentrating when I want to □ I have a great deal of difficulty in concentrating when I want to □ I cannot concentrate at all	□ I can do as much work as I want to □ I can only do my usual work, but no more □ I can do most of my usual work, but no more □ I cannot do my usual work □ I can hardly do any work at all □ I can't do any work at all	□ I can drive my car without any neck pain □ I can drive my car as long as I want with slight pain in my neck □ I can drive my car as long as I want with moderate pain in my neck □ I can't drive my car as long as I want because of moderate pain in my neck □ I can hardly drive at all because of severe pain in my neck □ I can't drive my car at all	□ I have no trouble sleeping □ My sleep is slightly disturbed (less than 1 hr sleepless) □ My sleep is mildly disturbed (1-2 hrs sleepless) □ My sleep is moderately disturbed (2-3 hrs sleepless) □ My sleep is greatly disturbed (3-5 hrs sleepless) □ My sleep is completely disturbed (5-7 hrs sleepless)	□ I am able to engage in all my recreation activities with no neck pain at all □ I am able to engage in all my recreation activities, with some pain in my neck □ I am able to engage in most, but not all of my usual recreation activities because of pain in my neck □ I am able to engage in a few of my usual recreation activities because of pain in my neck □ I can hardly do any recreation activities because of pain in my neck □ I can't do any recreation activities at all

Appendix D3

VIERVOUDIGE VISUELE ANALOOG SKAAL

Naam van Pasiënt: Nie van toepassing Datum: Nie van toepassing

Instruksie: Okring asseblief die nommer wat die vraag die beste beskryf.

Voorbeeld:

Nekpyn

Geen pyn _____ **Ergste Moontlike Pyn**

0 1 2 3 4 (5) 6 7 8 9 10

1. **Wat is jou pynvlak OP HIERDIE OOMBLIK?**

Geen pyn _____ **Ergste Moontlike Pyn**

0 1 2 3 4 5 6 7 8 9 10

2. **Wat is jou TIPIESE of GEMIDDELDE pynvlak?**

Geen pyn _____ **Ergste Moontlike Pyn**

0 1 2 3 4 5 6 7 8 9 10

3. **Wat is jou pynvlak OP SY LIGSTE (hoe naby aan "0" is jou pynvlak as dit op sy minste is?)**

Geen pyn _____ **Ergste Moontlike Pyn**

0 1 2 3 4 5 6 7 8 9 10

4. **Wat is jou pynvlak as dit OP SY ERGSTE IS? (hoe naby aan "10" is jou pynvlak as dit op sy ergste is?)**

Geen pyn _____ **Ergste Moontlike Pyn**

0 1 2 3 4 5 6 7 8 9 10

Pasiënt Handtekening: Nie van toepassing Eksaminator Handtekening: Nie van toepassing

Appendix D4

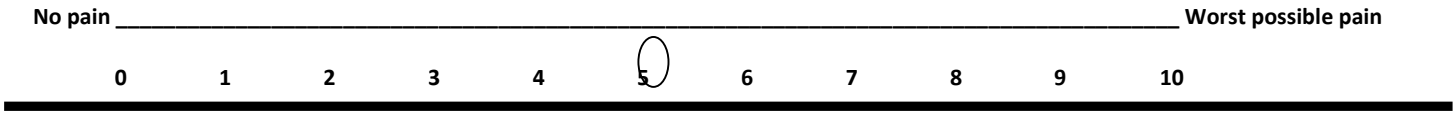
QUADRUPLE VISUAL ANALOGUE SCALE

Patient Name: Not applicable Date: Not applicable

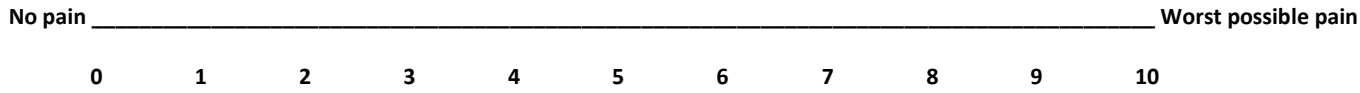
Instructions: Please circle the number that best describes the question being asked.

Example:

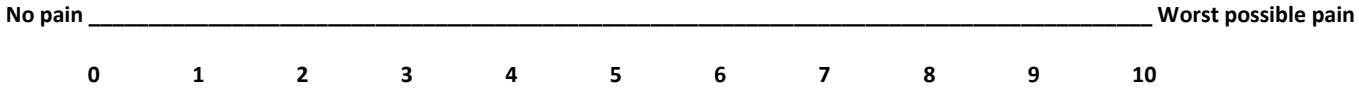
Neck pain



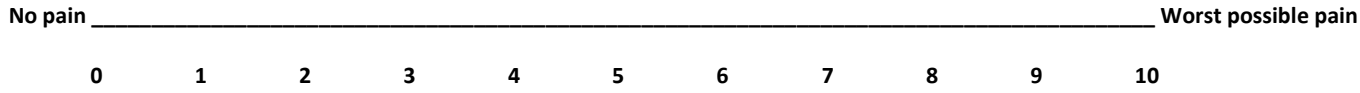
1. **What is your pain RIGHT NOW?**



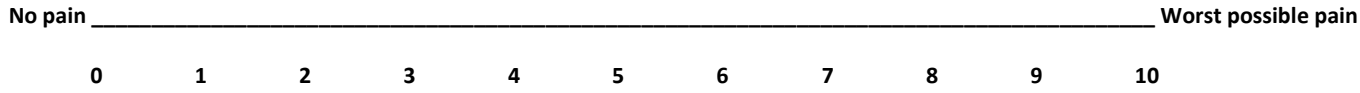
2. **What is your TYPICAL or AVERAGE pain?**



3. **What is your pain level AT ITS BEST (How close to "0" does your pain get at its best)?**



4. **What is your pain level AT ITS WORST (How close to "10" does your pain get at its worst)?**



Patient's Signature: Not applicable Examiner's Signature: Not applicable

Appendix E1

Nekgestremdheids-Indeks

LEES ASSEBLIEF:
Hierdie vraelys is ontwerp om vir ons inligting te gee oor hoe jou nekpyn jou vermoë om jou daaglikse lewe te hanteer, beïnvloed.

Beantwoord asseblief elke afdeling en **MERK IN ELKE AFDELING NET DIE EEN BLOKKIE WAT OP JOU VAN TOEPASSING IS.**

Ons besef jy kan in een afdeling twee of meer stellings oorweeg wat op jou betrekking het, maar merk asseblief net die blokkie wat jou probleem of toestand **NOU DIE BESTE BESKRYF**.

Afdeling 1: Bestuur	**Afdeling 2: Werk**	**Afdeling 3: Ontspanning**	**Afdeling 4: Konsentrasie**	**Afdeling 5: Persoonlike Sorg (Was, aantrek, ens.)**
□ Ek kan my motor bestuur sonder enige nekpyn □ Ek kan my voertuig bestuur, so lank as wat ek wil, met 'n ligte pyn in my nek □ Ek kan my voertuig bestuur so lank as wat ek wil met matige pyn in my nek □ Ek kan nie my voertuig bestuur so lank as wat ek wil nie, weens matige pyn in my nek □ Ek kan amper glad nie bestuur as gevolg van hewige pyn in my nek nie □ Ek kan glad nie my voertuig bestuur nie	□ Ek kan soveel werk doen soos ek wil □ Ek kan net my gewone werk doen, maar nie enige ekstra werk nie □ Ek kan die meeste van my gewone werk doen, maar geen ekstra werk nie □ Ek kan nie my gewone werk doen nie □ Ek kan skaars enige werk doen □ Ek kan geen werk doen nie	□ Ek kan deelneem aan al my ontspannings-aktiwiteite sonder enige nekpyn □ Ek kan deelneem aan al my ontspannings-aktiwiteite, maar daar is ’n bietjie pyn in my nek □ Ek kan deelneem aan die meeste, maar nie al my gewone ontspannings-aktiwiteite nie, as gevolg van pyn in my nek □ Ek kan deelneem aan slegs 'n paar van my gewone ontspannings-aktiwiteite, as gevolg van pyn in my nek □ Ek kan skaars enige ontspannings-aktiwiteite doen as gevolg van pyn in my nek □ Ek kan by geen ontspannings-aktiwiteite betrokke raak nie	□ Ek kan, wanneer ek wil, ten volle konsentreer met geen probleme nie □ Ek kan, wanneer nodig, ten volle konsentreer, maar met ’n bietjie moeite □ Dit is redelik moeilik om te konsentreer wanneer ek wil □ Dit is baie moeilik om te konsentreer wanneer ek wil □ Dit is ongelooflik moeilik om te konsentreer wanneer ek wil □ Ek kan glad nie konsentreer nie	□ Ek kan gewoonlik myself versorg sonder om ekstra pyn te ervaar □ Ek kan gewoonlik myself versorg, maar dit veroorsaak ekstra pyn □ Dit is pynlik om myself te versorg en ek is stadig en versigtig □ Ek het hulp nodig, maar ek kan self die meeste van my persoonlike sorg behartig □ Ek het elke dag hulp nodig in die meeste aspekte van persoonlike sorg □ Ek trek nie aan nie, bly in die bed en ek was myself met moeite
Afdeling 6: Lees	**Afdeling 7: Slaap**	**Afdeling 8: Pynintensiteit**	**Afdeling 9: Hoofpyne**	**Afdeling 10: Optel van Voorwerpe**
□ Ek kan lees soveel as wat ek wil met geen pyn in my nek nie □ Ek kan lees soveel as wat ek wil met slegs ligte pyn in my nek □ Ek kan lees soveel as wat ek wil met matige pyn in my nek □ Ek kan nie lees soveel as wat ek wil nie, as gevolg van 'n matige pyn in my nek □ Ek kan skaars lees weens hewige pyn in my nek □ Ek kan glad nie lees nie	□ Ek sonder moeite □ My slaap is effens versteur (minder as 1 uur sonder slaap) □ My slaap is ligtelik versteur (1-2 ure sonder slaap) □ My slaap is matig versteur (2-3 ure sonder slaap) □ My slaap is grootliks versteur (3-5 ure sonder slaap) □ My slaap is heeltemal versteur (5-7 ure sonder slaap)	□ Ek het geen pyn op die oomblik nie □ Die pyn is baie lig op die oomblik □ Die pyn is matig op die oomblik □ Die pyn is redelik pynvol op die oomblik □ Die pyn is baie erg op die oomblik □ Die pyn is die ergste denkbare pyn op die oomblik	□ Ek het geen hoofpyne nie □ Ek ervaar soms ligte hoofpyne □ Ek ervaar soms matige hoofpyne □ Ek ervaar gereeld matige hoofpyne □ Ek ervaar gereeld hewige hoofpyne □ Ek ervaar byna altyd hoofpyne	□ Ek kan swaar voorwerpe optel sonder ekstra pyn □ Ek kan swaar voorwerpe optel, maar dit veroorsaak ekstra pyn □ Pyn verhinder my om swaar voorwerpe van die vloer af op te tel, maar ek kan dit doen as dit gerieflik geplaas is, soos byvoorbeeld op 'n tafel □ Pyn verhinder my om swaar voorwerpe op te tel, maar ek kan lig tot medium gewigte optel as dit gerieflik geplaas is □ Ek kan net baie ligte voorwerpe optel □ Ek kan niks optel of dra nie

Appendix E2

Neck Disability Index

PLEASE READ:

This 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 section and **MARK IN EACH SECTION ONLY THE ONE BOX THAT APPLIES TO YOU**.

We realise you may consider that two or more statements in any one section relate to you, **BUT PLEASE JUST MARK THE BOX THAT MOST CLOSELY DESCRIBES YOUR PROBLEM.**

Section 1: Pain Intensity	**Section 2: Personal Care (Washing, Dressing, etc.)**	**Section 3: Lifting**	**Section 4: Reading**	**Section 5: Headaches**
□ I have no pain at the moment □ The pain is very mild at the moment □ The pain is moderate at the moment □ The pain is fairly severe at the moment □ The pain is very severe at the moment □ The pain is the worst imaginable at the moment	□ I can look after myself normally without causing extra pain □ I can look after myself normally but it causes extra pain □ It is painful to look after myself and I am slow and careful □ I need some help but can manage most of my personal care □ I need help every day in most aspects of self-care □ I do not get dressed, I wash with difficulty and stay in bed	□ I can lift heavy weights without extra pain □ I can lift heavy weights but it gives extra pain □ Pain prevents me lifting heavy weights off the floor, but I can manage if they are conveniently placed, for example on a table □ Pain prevents me from lifting heavy weights but I can manage light to medium weights if they are conveniently positioned □ I can only lift very light weights □ I cannot lift or carry anything	□ I can read as much as I want to with no pain in my neck □ I can read as much as I want to with slight pain in my neck □ I can read as much as I want with moderate pain in my neck □ I can't read as much as I want because of moderate pain in my neck □ I can hardly read at all because of severe pain in my neck □ I cannot read at all	□ I have no headaches at all □ I have slight headaches, which come infrequently □ I have moderate headaches, which come infrequently □ I have moderate headaches, which come frequently □ I have severe headaches, which come frequently □ I have headaches almost all the time
Section 6: Concentration	**Section 7: Work**	**Section 8: Driving**	**Section 9: Sleeping**	**Section 10: Recreation**
□ I can concentrate fully when I want to with no difficulty □ I can concentrate fully when I want to with slight difficulty □ I have a fair degree of difficulty in concentrating when I want to □ I have a lot of difficulty in concentrating when I want to □ I have a great deal of difficulty in concentrating when I want to □ I cannot concentrate at all	□ I can do as much work as I want to □ I can only do my usual work, but no more □ I can do most of my usual work, but no more □ I cannot do my usual work □ I can hardly do any work at all □ I can't do any work at all	□ I can drive my car without any neck pain □ I can drive my car as long as I want with slight pain in my neck □ I can drive my car as long as I want with moderate pain in my neck □ I can't drive my car as long as I want because of moderate pain in my neck □ I can hardly drive at all because of severe pain in my neck □ I can't drive my car at all	□ I have no trouble sleeping □ My sleep is slightly disturbed (less than 1 hr sleepless) □ My sleep is mildly disturbed (1-2 hrs sleepless) □ My sleep is moderately disturbed (2-3 hrs sleepless) □ My sleep is greatly disturbed (3-5 hrs sleepless) □ My sleep is completely disturbed (5-7 hrs sleepless)	□ I am able to engage in all my recreation activities with no neck pain at all □ I am able to engage in all my recreation activities, with some pain in my neck □ I am able to engage in most, but not all of my usual recreation activities because of pain in my neck □ I am able to engage in a few of my usual recreation activities because of pain in my neck □ I can hardly do any recreation activities because of pain in my neck □ I can't do any recreation activities at all

Appendix E3

VIERVOUDIGE VISUELE ANALOOG SKAAL

Naam van Pasiënt: Nie van toepassing Datum: Nie van toepassing

Instruksie: Omring asseblief die nommer wat die vraag die beste beskryf.

Voorbeeld:

Nekpyn

Geen pyn _____ **Ergste Moontlike Pyn**

0 1 2 3 4 (5) 6 7 8 9 10

1. **Wat is jou pynvlak OP HIERDIE OOMBLIK?**

Geen pyn _____ **Ergste Moontlike Pyn**

0 1 2 3 4 5 6 7 8 9 10

2. **Wat is jou TIPIESE of GEMIDDELDE pynvlak?**

Geen pyn _____ **Ergste Moontlike Pyn**

0 1 2 3 4 5 6 7 8 9 10

3. **Wat is jou pynvlak OP SY LIGSTE (hoe naby aan "0" is jou pynvlak as dit op sy minste is?)**

Geen pyn _____ **Ergste Moontlike Pyn**

0 1 2 3 4 5 6 7 8 9 10

4. **Wat is jou pynvlak as dit OP SY ERGSTE IS? (hoe naby aan "10" is jou pynvlak as dit op sy ergste is?)**

Geen pyn _____ **Ergste Moontlike Pyn**

0 1 2 3 4 5 6 7 8 9 10

Pasiënt Handtekening: Nie van toepassing Eksaminator Handtekening: Nie van toepassing

Appendix E4

QUADRUPLE VISUAL ANALOGUE SCALE

Patient Name: Not applicable Date: Not applicable

Instructions: Please circle the number that best describes the question being asked.

Example:

Neck pain

No pain _____ **Worst possible pain**

0 1 2 3 4 (5) 6 7 8 9 10

1. What is your pain RIGHT NOW?

No pain _____ **Worst possible pain**

0 1 2 3 4 5 6 7 8 9 10

2. What is your TYPICAL or AVERAGE pain?

No pain _____ **Worst possible pain**

0 1 2 3 4 5 6 7 8 9 10

3. What is your pain level AT ITS BEST (How close to "0" does your pain get at its best)?

No pain _____ **Worst possible pain**

0 1 2 3 4 5 6 7 8 9 10

4. What is your pain level AT ITS WORST (How close to "10" does your pain get at its worst)?

No pain _____ **Worst possible pain**

0 1 2 3 4 5 6 7 8 9 10

Patient's Signature: Not applicable Examiner's Signature: Not applicable

Appendix F1

Code of Conduct during meetings

Behaviour during Meetings

It is expected of all the members of the expert group, the researcher and supervisor to adhere to the basic rules and regulations of an expert group meeting.
Any comments may be raised during the procedure should a participant feel the need to address any of the expert group members or the researcher and supervisor of the study
Every participant of the meeting must:

- Act appropriately and treat all participants of the meeting with respect.
- Make no derogatory comments either through speech or action.
- Act in a manner that is unbiased and fair.
- Be open and honest about any action or comments and give a reason for them.
- Be clear and honest when giving a personal view of any part of the meeting or questionnaire.
- Participants should not interrupt a member during his or her addressing of the group

Declaration of interest:

Should any of the participants have a financial, personal or other material interest in the outcome of the study, it is expected that this standing will be raised to the researcher and/or supervisor.

Confidentiality:

In conjunction with the letter of information and informed consent and confidentiality agreement, it is noted that all information discussed during the expert group meeting will be kept confidential.

Breach of code of conduct:

Any participant not adhering to the above speculated rules may be asked to leave the expert group meeting with no discrimination for future attendance to meetings as such.

Please print in block letters:

Expert Group Member: _____ Signature: _____

Witness Name: _____ Signature: _____

Researcher's Name: _____ Signature: _____

Supervisor's Name: _____ Signature: _____

Appendix F2

LETTER OF INFORMATION

Dear Participant

I would like to welcome you into my study.

Title of the Research Study: Concurrent validity of the Afrikaans versions of the Neck Disability Index questionnaire and Quadruple Visual Analogue Scale

Principal Researcher: Stephanus CJ le Roux, B-Tech Chiropractic

Supervisor: Dr Anthony van der Meulen, M-Tech Chiropractic

Brief Introduction and Purpose of the Study:

Neck pain has a continual negative impact on the economy due to disability, loss of work hours and decreased production. This means that there is a great interest in neck pain research and the effect it has on an individual. Due to the effect that neck pain has on people's lives, there is a need for early diagnosis and assessment of patients. In the purely Afrikaans speaking population, there is to date no validated assessment tool to measure the degree of disability caused by neck pain. The purpose of this study is to validate the Afrikaans versions of the Neck Disability Index and the Quadruple Visual Analogue Scale.

Inclusion criteria for the expert group:

- Two – Four patients, with and without NP.
- One researcher who has completed a questionnaire study.
- One student completing a research study.
- One statistician.
- One medical doctor.
- Two chiropractors.
- All members of the group need to be fluent in both the Afrikaans and English languages.
- Completion of all the required forms for the expert group (Appendix E (Letter of Information and Informed Consent), Appendix F (Code of Conduct), Appendix G (Confidentiality Statement)).

Exclusion criteria for the expert group:

- Anyone that is unable to attend the expert group.
- Anyone unwilling to sign the required documents (Appendices E to G) for the expert group, indicating that they are voluntarily participating.

Outline of the Procedures:

Following the telephonic conversation, we would have scheduled this meeting in advance. The course of this meeting should last an estimated 2 hours. This will occur in the Chiropractic Board Room. Should you agree to partake in this meeting, you will now be asked to sign the letter of information and informed consent. The procedure of the meeting will now be explained.

Role of participants: Participants of the study is expected to firstly abide by the code of conduct as set out in Appendix F (Code of conduct). It is the role of the participants to make comments and suggestions with regards to the study. Every comment will be discussed thoroughly by the researcher, supervisor and participants until such time all parties are satisfied.

For you to be included in this study you need to meet the following requirements:

- You must be fluent in reading both the Afrikaans and English languages.
- You must be able to read and sign the Letter of Information and Informed Consent Form.
- You must be 18 years or older.

Benefits, risks and costs: This study would contribute the necessary information to stimulate research in the area of the prevalence or incidence of NP in the Afrikaans speaking community. Results of the study will be available in the form of a dissertation in the DUT library. There are no risks involved, costs or remuneration associated regarding your participation in this study.

Reason/s why the Participant May Be Withdrawn from the Study: You, as the participant, are allowed to withdraw from the expert group at any time.

Confidentiality: All participants must abide by the confidentiality statement (appendix F)

Persons to Contact in the Event of Any Problems or Queries:
Researcher: Mr SCJ le Roux (0844325223)
Supervisor: Dr A van der Meulen (0832332924)
Institutional Research Ethics administrator on 031 373 2900. Complaints can be reported to the DVC: TIP, Prof F. Otieno on 031 373 2382 or dvctip@dut.ac.za.

Appendix F3

CONSENT

Statement of Agreement to Participate in the Research Study:

- I hereby confirm that I have been informed by the researcher, Stephanus Christoffel Jacobs le Roux, about the nature, conduct, benefits and risks of this study - Research Ethics Clearance Number: _____,
- I have also received, read and understood the above written information (Participant Letter of Information) regarding the study.
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerised system by the researcher.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
- I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.

_____ _____ _____ _____
Full Name of Participant Date Time Signature / Right Thumbprint

I, Stephanus Christoffel Jacobs le Roux, herewith confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

Stephanus Christoffel Jacobs le Roux _____ _____
Full Name of Researcher Date Signature

_____ _____ _____
Full Name of Witness (If applicable) Date Signature

Appendix G

IMPORTANT NOTICE: This form is to be read and filled in by every member participating in the expert group, before the focus group meeting convenes.

CONFIDENTIALITY STATEMENT AND CODE OF CONDUCT: Expert group

1. All information contained in the research documents and any information discussed during the focus group meeting must be kept private and confidential. This is especially binding to any information that may identify any of the participants in the expert group.

2. None of the information shall be communicated to any other individual or organisation outside of this specific focus group as to the decisions of this expert group.

3. The information from this focus group will be made public in terms of a dissertation/thesis and/or journal publication, which will in no way identify any of the participants involved in this expert group.

4. The returned questionnaires will be coded and kept anonymous in the research process.

5. The expert group may be either voice or video recorded, as a transcript of the proceedings will need to be made. The data will be stored securely under password protection.

6. All data generated from this expert group (including the recording) will be kept for 15 years in a secure location at Durban University of Technology and thereafter will be destroyed.

Once this form has been read and agreed to, please fill in the appropriate information below and sign to acknowledge agreement.

Please print in block letters:

Focus Group Member: _____ Signature: _____

Witness Name: _____ Signature: _____

Researcher's Name: _____ Signature: _____

Supervisor's Name: _____ Signature: _____

Appendix H

Gmail by Google

Fanus le Roux <fanusleroux@gmail.com>

Permission for use of NDIQ

6 messages

Fanus le Roux <fanusleroux@gmail.com> 2 February 2015 at 21:27

To: hvernon@cmcc.ca

Dear Professor Vernon,

I am currently a Chiropractic Master Student at Durban University of Technology in South Africa. I would love the opportunity and permission to translate your original NDIQ to the Afrikaans language to use locally in South Africa.

Thank you in advance for your response.

Kind Regards
Stephanus le Roux

Howard Vernon <HVernon@cmcc.ca> 3 February 2015 at 17:13

To: Fanus le Roux <fanusleroux@gmail.com>

Dear Dr. le Roux,

Thanks for your message and your interest in the NDI. I appreciate the offer to translate the NDI into Afrikaans. I am happy to see this happen, but there are now internationally accepted rules and procedures for translation and cross-cultural adaptation of questionnaires. I have attached the work of Schellingerhout et al. who have set these standards. Once you review them, please let me know if you can follow this prescription.

Otherwise, a local translation by yourself would have no external validity and could not be used by anyone other than yourself.

Let me know what you think.

Thanks,

Dr. Howard Vernon

From: Fanus le Roux [mailto:fanusleroux@gmail.com]
Sent: Monday, February 02, 2015 2:27 PM
To: Howard Vernon
Subject: Permission for use of NDIQ

2 attachments

Schellingerhout_2011.pdf
344K

Schellingerhout2_2011.pdf
302K

Fanus le Roux <fanusleroux@gmail.com> 16 February 2015 at 11:27

To: Howard Vernon <HVernon@cmcc.ca>

Dear Dr. Vernon,

Thank you for your reply and the permission to use the NDIQ in my study. I am happy to comply with the procedures and rules set out by Schellingerhout et al. One thing that they was that the methodological quality of the translation processes of the translations were poor, as the translated versions was not pre-tested in the target population. I am planning on doing a small pilot study (2 to 4 participants) in the target population. After the completion of the pilot study the participants would give me feedback on the translated version of the NDIQ in order to address this issue. Would you agree that this step is beneficial?

There was also a request by my research committee to include a small proportion of non-neck pain participants in the study to test all variables. What are your thoughts on this?

Regards

Stephanus le Roux

Appendix I

Fanus le Roux <fanusleroux@gmail.com>

Permission to utilise QVAS in translation

2 messages

Fanus le Roux <fanusleroux@gmail.com> 2 February 2015 at 21:34

To: sgyeomans@charter.net

Dear Professor Yeomans,

I am currently a Chiropractic Master Student at Durban University of Technology in South Africa. I am doing a translation of the QVAS to the Afrikaans language to use locally in South Africa. The QVAS is published in your book "The Clinical Application of Outcomes Assessments". I would be grateful if you grant me permission to use the QVAS in my Masters dissertation. If it is not possible for you to grant the permission for use, can you kindly direct me to the appropriate person to contact in this regard?

Thank you in advance for your response.

Kind Regards
Stephanus le Roux

Steven Yeomans <sgyeomansdc@gmail.com> 2 February 2015 at 22:54

To: Fanus le Roux <fanusleroux@gmail.com>

No problem! You have my permission to translate the QVAS.

Steven Yeomans, DC, FACO

[Quoted text hidden]

Steven G. Yeomans, DC, FACO

404 Eureka St.

Ripon, WI 54971-0263920-748-3644 (V)

920-748-3642 (F)

sgyeomansdc@gmail.com

www.yeomansdc.com

Appendix J1

DUT DURBAN UNIVERSITY OF TECHNOLOGY

FACULTY OF HEALTH SCIENCES

Department of Chiropractic and Somatolo
Chiropractic Clinic
Faculty of Health Sciences
Ritson Campus
Durban University of Technology

11 Ritson Road, Berea, Durban 4001

P O Box 1334, Durban, 4000, South Africa

Tel: (031)373 2205

www.dut.ac.za

LETTER OF INFORMATION

Dear Ds. Erxleben,

My name is Stephanus le Roux. I am currently a Chiropractic Master student at Durban University of Technology completing my Masters dissertation.

The title of my research study is the "*Concurrent validity of the Afrikaans versions of the Neck Disability Index questionnaire and Quadruple Visual Analogue Scale*". The purpose of my study is to translate the English versions of the Neck Disability Index and Quadruple Visual Analogue Scale to Afrikaans. In order to do this I require bilingual participants to complete these questionnaires. I would appreciate the opportunity and permission from NG Umhlanga Gemeente (name of church) to approach the congregation members for participating in my study.

I would require two sessions of approximately 15 minutes. The first would be where participants fill in the one pair of the questionnaires. After roughly an hour another session would be needed to complete the second pair of questionnaires.

These questionnaires are anonymous and no personal/identifying information will be recorded. All information that is obtained will be treated as strictly confidential.

NG Umhlanga Gemeente (name of church) may at any stage withdraw consent and permission for the study to be conducted at their premises.

Please feel free to contact me (Stephanus le Roux) on 0844325223 or my supervisor, Dr Anthony van der Meulen, on 0312620776 at any stage if you require further information.

I hereby give permission for the researcher (Stephanus le Roux) to utilise NG Umhlanga Gemeente (name of church) as a platform to conduct his study.

AG Erxleben [redacted] 01/04/2015

Name **Signature** **Date**

Appendix J2

DUT
DURBAN UNIVERSITY OF TECHNOLOGY

FACULTY OF HEALTH SCIENCES

Department of Chiropractic and Somatology:
Chiropractic Clinic
Faculty of Health Sciences
Ritson Campus
Durban University of Technology

11 Ritson Road, Berea, Durban 4001

P O Box 1334, Durban, 4000, South Africa

Tel: (031)373 2205

www.dut.ac.za

LETTER OF INFORMATION

Dear Ds. Venter,

My name is Stephanus le Roux. I am currently a Chiropractic Master student at Durban University of Technology completing my Masters dissertation.

The title of my research study is the "*Concurrent validity of the Afrikaans versions of the Neck Disability Index questionnaire and Quadruple Visual Analogue Scale*". The purpose of my study is to translate the English versions of the Neck Disability Index and Quadruple Visual Analogue Scale to Afrikaans. In order to do this I require bilingual participants to complete these questionnaires. I would appreciate the opportunity and permission from NGK PORT NATAL (name of church) to approach the congregation members for participating in my study.

I would require two sessions of approximately 15 minutes. The first would be where participants fill in the one pair of the questionnaires. After roughly an hour another session would be needed to complete the second pair of questionnaires.

These questionnaires are anonymous and no personal/identifying information will be recorded. All information that is obtained will be treated as strictly confidential.

NGK PORT NATAL (name of church) may at any stage withdraw consent and permission for the study to be conducted at their premises.

Please feel free to contact me (Stephanus le Roux) on 0844325223 or my supervisor, Dr Anthony van der Meulen, on 0312620776 at any stage if you require further information.

I hereby give permission for the researcher (Stephanus le Roux) to utilise NGK PORT NATAL (name of church) as a platform to conduct his study.

D.J. VENTER	[redacted]	2015/04/02
Name	**Signature**	**Date**

Appendix J3

DUT DURBAN UNIVERSITY OF TECHNOLOGY

LETTER OF INFORMATION

Dear Ds. Small,

My name is Stephanus le Roux. I am currently a Chiropractic Master student at Durban University of Technology completing my Masters dissertation.

The title of my research study is the "*Concurrent validity of the Afrikaans versions of the Neck Disability Index questionnaire and Quadruple Visual Analogue Scale*". The purpose of my study is to translate the English versions of the Neck Disability Index and Quadruple Visual Analogue Scale to Afrikaans. In order to do this I require bilingual participants to complete these questionnaires. I would appreciate the opportunity and permission from Ballito Gesinskerk - NG Noordkus (name of church) to approach the congregation members for participating in my study.

I would require two sessions of approximately 15 minutes. The first would be where participants fill in the one pair of the questionnaires. After roughly an hour another session would be needed to complete the second pair of questionnaires.

These questionnaires are anonymous and no personal/identifying information will be recorded. All information that is obtained will be treated as strictly confidential.

Ballito Gesinskerk -NG Noordkus (name of church) may at any stage withdraw consent and permission for the study to be conducted at their premises.

Please feel free to contact me (Stephanus le Roux) on 0844325223 or my supervisor, Dr Anthony van der Meulen, on 0312620776 at any stage if you require further information.

I hereby give permission for the researcher (Stephanus le Roux) to utilise Ballito Gesinskerk - NG Noordkus (name of church) as a platform to conduct his study.

Alwyn Small	[redacted]	2015-04-01
Name	**Signature**	**Date**

Appendix K

Changes to questionnaires after expert group discussion:

1. English NDI:
    a. Instructions are on a cover page and formatting changed from portrait to landscape.
    b. Sections one to ten are on the second page and are one page in length.
2. Afrikaans NDI
    a. Instructions are on a cover page and formatting changes from portrait to landscape.
    b. Sections one to ten are on the second separate page and are one page in length.
    c. Sections one to ten are randomised compared to sections one to ten of the English NDI.
        i. “Afdeling 1: Pynintensiteit” changed to “Afdeling 1: Bestuur”.
        ii. “Afdeling 2: Persoonlike Sorg” changed to “Afdeling 2: Werk”.
        iii. “Afdeling 3: Optel van Voorwerpe” changed to “Afdeling 3: Ontspanning”.
        iv. “Afdeling 4: Lees” changed to “Afdeling 4: Konsentrasie”.
        v. “Afdeling 5: Hoofpyne” changed to “Afdeling 5: Persoonlike Sorg”.
        vi. “Afdeling 6: Konsentrasie” changed to “Afdeling 6: Lees”.
        vii. “Afdeling 7: Werk” changed to“Afdeling 7: Slaap”.
        viii. “Afdeling 8: Bestuur” changed to “Afdeling 8: Pynintensiteit”.
        ix. “Afdeling 9: Slaap” changed to “Afdeling 9: Hoofpyne”.
        x. “Afdeling 10: Ontspanning” changed to “Afdeling 10: Optel van Voorwerpe”.
    d. In the pre-expert group NDI, “Afdeling 2” point number 6: “Ek bly in die bed en trek nie aan nie en ek was myself met moeite” changed to “Afdeling 5” point number 6 in the post-expert group NDI: “Ek trek nie aan nie, bly in die bed en en ek was myself met moeite”.
    e. In the pre-expert group NDI, “Afdeling 4” point number 3: “Ek kan lees soveel as wat ek wil met slegs matige pyn in my nek” changed to “Afdeling 6” point number 3 in the post-expert group NDI: “Ek kan lees soveel as wat ek wil met matige pyn in my nek”.
    f. In the pre-expert group NDI, “Afdeling 5” point number 2: “Ek ervaar soms effense hoofpyne” changed to “Afdeling 9” point number 2 in the post-expert group NDI: “Ek ervaar soms ligte hoofpyne”.

g. In the pre-expert group NDI, “Afdeling 6” point number 1: “Ek kan, wanneer nodig, ten volle konsentreer met geen probleme nie” changed to “Afdeling 4” point number 1 in the post-expert group NDI: “Ek kan, wanneer ek wil, ten volle konsentreer met geen probleme nie”.
h. In the pre-expert group NDI, “Afdeling 6” point number 3: “Dit is redelik moeilik om te konsentreer wanneer nodig” changed to “Afdeling 4” point number 3 in the post-expert group NDI: “Dit is redelik moeilik om te konsentreer wanneer ek wil”.
i. In the pre-expert group NDI, “Afdeling 6” point number 4: “Dit is baie moeilik om te konsentreer wanneer nodig” changed to “Afdeling 4” point number 4 in the post-expert group NDI: “Dit is baie moeilik om te konsentreer wanneer ek wil”.
j. In the pre-expert group NDI, “Afdeling 6” point number 5: “Dit is ongelooflik moeilik om te konsentreer wanneer nodig” changed to “Afdeling 4” point number 5 in the post-expert group NDI: “Dit is ongelooflik moeilik om te konsentreer wanneer ek wil”.
k. In the pre-expert group NDI, “Afdeling 8” point number 1: “Ek kan my voertuig bestuur sonder enige nekpyn” changed to “Afdeling 1” point number 1 in the post-expert group NDI: “Ek kan my motor bestuur sonder enige nekpyn”.
l. In the pre-expert group NDI, “Afdeling 8” point number 2: “Ek kan my voertuig bestuur, so lank as wat ek wil, met slegs 'n ligte pyn in my nek” changed to “Afdeling 1” point number 2 in the post-expert group NDI: “Ek kan my motor bestuur, so lank as wat ek wil, met 'n ligte pyn in my nek”.
m. In the pre-expert group NDI, “Afdeling 8” point number 3: “Ek kan my voertuig bestuur so lank as wat ek wil met slegs matige pyn in my nek” changed to “Afdeling 1” point number 3 in the post-expert group NDI: “Ek kan my motor bestuur so lank as wat ek wil met matige pyn in my nek”.
n. In the pre-expert group NDI, “Afdeling 8” point number 4: “Ek kan nie my voertuig bestuur so lank as wat ek wil nie, weens matige pyn in my nek” changed to “Afdeling 1” point number 4 in the post-expert group NDI: “Ek kan nie my motor bestuur so lank as wat ek wil nie, weens matige pyn in my nek”.
o. In the pre-expert group NDI, “Afdeling 8” point number 5: “Ek kan glad nie my voertuig bestuur nie” changed to “Afdeling 1” point number 5 in the post-expert group NDI: “Ek kan glad nie my motor bestuur nie”.

p. In the pre-expert group NDI, “Afdeling 9” point number 3: “My slaap is effens versteur (1-2 ure sonder slaap)” changed to “Afdeling 7” point number 3 in the post-expert group NDI: “My slaap is ligtelik versteur (1-2 ure sonder slaap)”.

3. English QVAS
    a. The section “**Note:** If you have more than one complaint, please answer each question for each individual complaint and indicate the score for each complaint. Please indicate your pain level right now, average pain, and pain at its best and worst”, was removed from the post-focus group questionnaire.
    b. The words “headache” and “low back” in the example section was removed from the questionnaire to avoid confusion.
4. Afrikaans QVAS
    a. The section “**Let wel:** As jy meer as een klagte het, beantwoord asseblief elke vraag vir elke afsonderlike klagte en dui die telling aan vir elke klagte. Dui asseblief jou pynvlak aan soos op hierdie oomblik, jou gemiddelde pynvlak, jou pynvlak op sy ligste en op sy ergste”, was removed from the post-focus group questionnaire.
    b. The words “hoofpyn” and “lae rug” in the example section was removed from the questionnaire to avoid confusion.

Changes to questionnaires after pilot study completion:

1. Afrikaans QVAS:
    a. At point number 4, the “0” was changed to “10”.

Appendix L1

Neck Disability Index

Please Read:
This questionnare is developed to provide us with informarion about how your neck pain is influencing your ability to manageyour activities of daily living

Please answer every section and **MARK IN EACH SECTION ONLY ONE BOX THAT APPLIES TO YOU**.

We realise that in each section you might have more than one answer that apllies toyou, but please only mark the box that **MOST CLOSEY DESCRIBES YOU PROBLEM.**

Section 1: Driving	**Section 2: Work**	**Section 3: Recreation**	**Section 4: Consentration**	**Section 5: Personal Care (Washing, Getting Dresses, etc.)**
□ I can drive my car without any neck pain □ I can drive my car as long as I want with slight pain in my neck □ I can drive my car as long as I want with moderate pain in my neck □ I can't drive my car as long as I want because of moderate pain in my neck □ I can hardly drive at all because of severe pain in my neck □ I cannot drive my car at all	□ I can do as much work as I want to □ I can only do my usual work, but cannot do any extra work □ I can do most of my usual work, but not any extra work □ I cannot do my usual work □ I can hardly do any work at all □ I can't do any work at all	□ I am able to engage in all my recreation activities without any neck pain □ I am able to engage in all my recreation activities, with a little pain in my neck □ I am able to engage in most, but not all of my usual recreation activities because of pain in my neck □ I am able to engage in only a few of my usual recreation activities because of pain in my neck □ I can hardly do any recreation activities because of pain in my neck □ I can't do any recreation activities at all	□ I can concentrate fully when I want to, with no difficulty □ I can concentrate fully when I want to, but with slight difficulty □ It is fairly difficult to concentrate when I want to □ I have a lot of difficulty in concentrating when I want to □ I have a great deal of difficulty in concentrating when I want to □ I cannot concentrate at all	□ I can look after myself normally without causing extra pain □ I can look after myself normally but it causes extra pain □ It is painful to look after myself and I am slow and careful □ I need some help, but can manage most of my personal care □ I need help every day in most aspects of self-care □ I do not get dressed, stay in bed and I wash myself with difficulty
Section 6: Reading	**Section 7: Sleeping**	**Section 8: Pain Intensity**	**Section 9: Headaches**	**Section 10: Lifting of Objects**
□ I can read as much as I want to with no pain in my neck □ I can read as much as I want to with slight pain in my neck □ I can read as much as I want with moderate pain in my neck □ I can't read as much as I want because of moderate pain in my neck □ I can hardly read at all because of severe pain in my neck □ I cannot read at all	□ I have no trouble sleeping □ My sleep is slightly disturbed (less than 1 hr without sleep) □ My sleep is mildly disturbed (1-2 hrs without sleep) □ My sleep is moderately disturbed (2-3 hrs without sleep) □ My sleep is greatly disturbed (3-5 hrs without sleep) □ My sleep is completely disturbed (5-7 hrs without sleep)	□ I have no pain at the moment □ The pain is very mild at the moment □ The pain is moderate at the moment □ The pain is fairly severe at the moment □ The pain is very severe at the moment □ The pain is the worst imaginable at the moment	□ I have no headaches at all □ I sometimes have slight headaches. □ I sometimes have moderate headaches. □ I have frequent moderate headaches □ I have frequent severe headaches □ I have headaches almost all the time	□ I can lift heavy weights without extra pain □ I can lift heavy weights but it causes extra pain □ Pain prevents me lifting heavy weights off the floor, but I can manage if they are conveniently placed, for example on a table □ Pain prevents me from lifting heavy weights but I can manage light to medium weights if they are conveniently positioned □ I can only lift very light weights □ I cannot lift or carry anything

Appendix L2

QUADRUPLE VISUAL ANALOGUE SCALE

Name of patient: Not applicable Date: Not appilcable

Instructions: Please circle the number that best decribes your level of pain/discomfort.

Example:

Neckpain

No pain _____ **Worst possible pain**

0 1 2 3 4 (5) 6 7 8 9 10

1. **What is your pain level AT THE MOMENT?**

No pain _____ **Worst possible pain**

0 1 2 3 4 5 6 7 8 9 10

2. **What is your typical or average level of pain?**

No pain _____ **Worst possible pain**

0 1 2 3 4 5 6 7 8 9 10

3. **What is your pain level at its best? (how close to "0"would your pain level be when it is at its best?)**

No pain _____ **Worst possible pain**

0 1 2 3 4 5 6 7 8 9 10

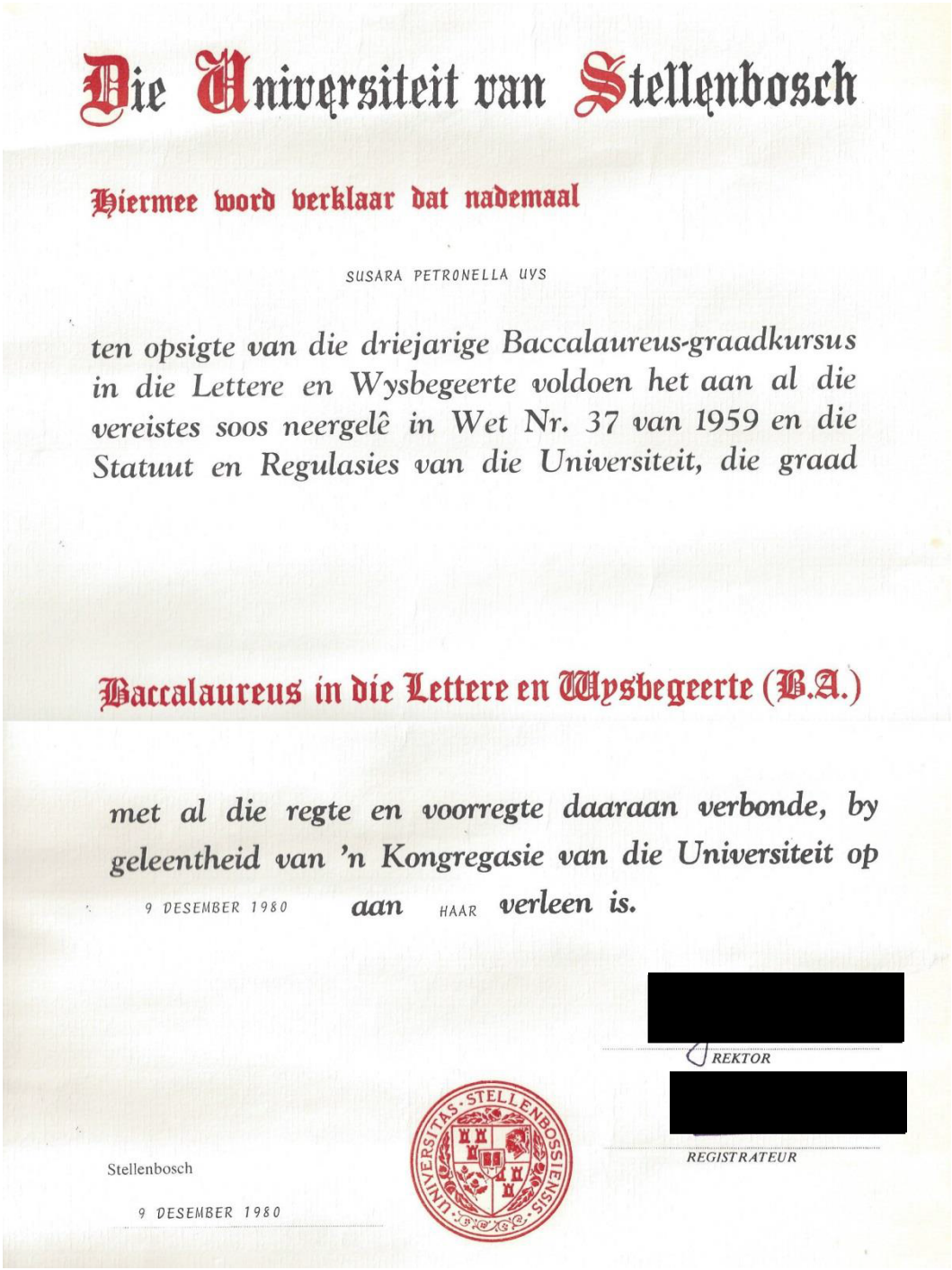
4. **What is you pain level at its worst? (how close to "0" would your pain level be when it is at its worst?)**

No pain _____ **Worst possible pain**

0 1 2 3 4 5 6 7 8 9 10

Patient Signature: Not applicable Examinator signature: Not applicable

Appendix M



Die Universiteit van Stellenbosch

Hiermee word verklaar dat nademaal

SUSARA PETRONELLA UYS

ten opsigte van die driejarige Baccalaureus-graadkursus in die Lettere en Wysbegeerte voldoen het aan al die vereistes soos neergelê in Wet Nr. 37 van 1959 en die Statuut en Regulasies van die Universiteit, die graad

Baccalaureus in die Lettere en Wysbegeerte (B.A.)

met al die regte en voorregte daaraan verbonde, by geleentheid van 'n Kongregasie van die Universiteit op

9 DESEMBER 1980 *aan* HAAR *verleen is.*

[redacted]

REKTOR

[redacted]

REGISTRATEUR

UNIVERSITAS STELLENBOSSIENSIS

Stellenbosch

9 DESEMBER 1980