A prospective pilot investigation of the Zulu translation of the CMCC Neck Disability Index Questionnaire and Short Form McGill Pain Questionnaire with respect to it's concurrent validity when compared to their English counterparts.

A dissertation completed in partial compliance with the requirements for a Master's Degree in Technology in the Department of Chiropractic at the Durban Institute of Technology.

BY

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I solemnly declare that this is my own work in compilation and execution.

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Signature	Place of Submission	Date of Submission

Dedication and Acknowledgements

First and foremost, I give much thanks and praise to the Lord for the many ways in which He has brought me to this point in my life. I have come to understand that there is no life without Him.

To two of the most awesome people I that know, my parents. Your love and unwavering support has been a pillar of strength for me. Thank you for everything you do and thank you more for always believing in me. I'll love you forever.

My fondest memories of D.I.T. and campus life are with my friends. A smile comes to my face when I think of all that we have shared with each other. I'm grateful that our paths crossed for the time they did. Best wishes to you all.

To my supervisor; your encouragement and guidance have been invaluable in this process. Thank you again for all your help, it is much appreciated.

To all my participants in the focus group, those involved in the research process itself, and those who assisted with the transcript, thank you for your help along the way and for making the steps towards completion as smooth as possible.

Abstract

Neck pain is a common problem, globally, as well as in South Africa. Zulu is the first language of a very large proportion of the South African population, and as such, addressing the needs of this population group with respect to neck pain is a priority. Many reliable pain indexes exist in English to record the degree of disability with regards to neck pain. These are invaluable tools in aiding the health practitioner to assess the progress of treatment and the severity of the patient's disability. Two of the most credible and frequently used indexes are the Canadian Memorial Chiropractic College Neck Disability Index (CMCC NDI) and the Short Form McGill Pain Questionnaire (SFMPQ). However, no such scale exists in Zulu.

The purpose of this pilot investigation was, firstly, to analyze and critique the Zulu translations of the CMCC NDI and the SFMPQ in order to establish their face validity. Secondly, to establish their concurrent validity ensuring that the translated questionnaires are specific and sensitive enough to use as tools in data collection when compared to their English counterparts. Thirdly, to make recommendations for further improvement in terms of the Zulu questionnaires and lastly, to make recommendations for further studies for improvement in terms of the use of these questionnaires as research tools amongst the Zulu speaking population of South Africa.

Firstly, the CMCC NDI and the SFMP questionnaires were translated into Zulu by means of a focus group. These versions were then assessed by means of a focus (or discussion) group, to assess their face validity. Changes were made to the original translations according to the recommendations of this group. These versions were then assessed with regards to their concurrent validity with the original English versions. Fifty volunteers, who were literate in both English and Zulu and who have suffered with neck pain, filled in both the Zulu and English versions of both questionnaires.

Much time, approximately forty-five minutes ,was given from the completion of the first set of questionnaires to the time the second set was completed to prevent participants simply copying their answers from the English questionnaires. These results were then analyzed using statistical tests. The null hypothesis was rejected at $\alpha = 0.05$ level of significance.

The results showed that, the Zulu SFMPQ had very good levels of agreement and concurrent validity as well as face validity (as per page 83) was established. For the Zulu CMCC NDI, although face validity was established (as per page 83), concurrent validity was not established and thus needed further adaptation to ensure correlation.

Concurrent validity was established for the Zulu SFMPQ whereas concurrent validity was not established for the Zulu CMCC NDI when compared with their English counterparts. Therefore, the Zulu CMCC NDI is not an accurate measurement index for neck pain in the Zulu speaking population. Further adaptation needs to be performed to ensure concurrent validity in terms of ensuring grammar and words and their meanings are culturally correct.

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Definition of terms

1. Prevalence: the measure of the number of people in a given population who have a symptom or disease at a particular point in time (point prevalence) or over a specified period (e.g. 1 year prevalence) (Skinner, 1995: 183).

2. Incidence: defined as the rate at which healthy individuals develop a new symptom or disease over a specified period of time (usually a lifetime) (Skinner, 1995: 183).

3. Sensitivity: The measure of a test's ability to correctly identify persons with a certain condition (Pope et al; 1991: 320).

4. Specificity: The measure of a test's accuracy in correctly identifying persons who do not have the condition and will test negative (Pope et al; 1991: 320).

5. Face validity: This is the simplest type of validity. It is determined by agreement between researchers and those with a vested interest in the questionnaire, that 'on the face of it' the tool seems valid (Mouton, 1996: 110).

6. Content validity: This is when the content of the questionnaire is considered effective, and well rounded enough to be able to assess a particular concept (Streiner and Norman, 1995: 20).

7. Construct validity: This measures how accurately answers to questions in a scale reflect theoretical predictions of a particular construct (Mouton, 1996: 128).

8. Concurrent validity: This is measured when a particular tool produces similar results when compared with another tool already known to be trustworthy. This is also called criterion validity (Mouton, 1996: 128).

9. Symmetrical two-way table: This is a table where the number of rows and columns are the same, and the categories being compared are the same, e.g. a two-by-two table or a three-by-three table (Esterhuizen, T. Biostatistician at UKZN. Personal communication. 2006)

10. Back-translation: The process where one can translate back from the final language into the source language (Guillemin, Bombardier and Beaton, 1993)

List of Abbreviations

- IVD – Intervertebral Disc
- SP – Spinous Process
- TVPs - Transverse Processes
- C – cervical
- T – thoracic
- L - lumbar
- CN – cranial nerve
- I – XII - roman numerals one to twelve
- EOP - external occipital protuberance
- IVF – intervertebral foramen
- SCM – Sternocleidomastoid muscle
- E – English
- Z – Zulu
- SFMPQ – Short Form McGill Pain Questionnaire
- MPQ – McGill Pain Questionnaire
- CMCC NDI – Canadian Memorial Chiropractic College Neck Disability Index

Chapter 1

Introduction

1.1. Introduction.

Cervical spine pain is broadly defined as pain located between the occiput and the third thoracic vertebra (Cote, Cassidy and Carroll, 1998). This presents as either acute pain which is defined as pain having severe symptoms over a short course (Dorland's Medical Dictionary, 1995: 13) of one to four days (Haslett et al; 1999: 820) or less than six months; or chronic pain, where the pain is defined as any pain that has been present for over six months (http://web.uct.ac.za/depts/anaes/pain/chronicp.htm, 2005).

The United States' National Center for Health Statistics reported 7% of men and 9,4% of women suffered from neck pain in the period between 1976-1980 (www.digital-doc.com/neckpain.htm, 2004), without predilection for acute or chronic pain. These statistics are slightly lower than similar rates of 9,5% of men and 13,5% of women found in Finland (www.digital-doc.com/neckpain.htm, 2004) which correlate with Dutch statistics of 13,4% (Cote et. al 1998) for the general population. It can thus be seen that neck pain is a common problem in our society and at any given time affects conservatively about 10% of the general population (www.digital-doc.com/neckpain.htm, 2004).

In South Africa, Drew (1995) conducted and epidemiological study at the Technikon-Natal Chiropractic Day Clinic comparing different types of conditions seen at the teaching clinic with those seen in the private chiropractic practices in South Africa (and more specifically Kwa-Zulu Natal). It was found that 54,4% of the patients presenting to the teaching clinic and 57,4% of the patients presenting to the private practices complained of neck pain. In addition to this, it was noted that this presentation reflected as a higher percentage than the norm as patients with neck problems presented more commonly for chiropractic treatment.

The above results are however supported by the fact that it has been noted that chronic pain affects one in four South Africans and can take many forms such as: lower back pain, headaches and neck pain (http://web.uct.ac.za/depts/anaes/pain/chronicp.htm, 2005).

It is unknown to which extent neck pain contributes to the 25% of chronic pain reported, as the analysis of neck pain in the South African context is complicated by the lack of information to date on the incidence and prevalence of neck pain in any of the native ethnic groups (e.g. our Zulu population in Kwa-Zulu Natal in South Africa).

The unknown extent of neck pain in the South African context is as a result of the paucity of the representation of these native ethnic groups in the South African statistics. At present there are a lack of appropriate research tools in order to accurately assess the populations that are non-English speaking. Nevertheless there are continuous and accelerating changes in the health care sector worldwide implying that more scientific data on health care issues must be developed and transformed into information and this into knowledge, to allow for more informed judgements by decision makers (Ferraz, 1997).

The stimulus for efficient delivery of health care has mobilised the scientific community to better study the field and role of outcome measurements in the design, measurement, and evaluation of health care programmes. The decision makers are thus recognising the importance of a comprehensive evaluation of patients (Ferraz, 1997), as we cannot allocate health care expenditure to a sector we know little about and provide an appropriate health care industry plan for the treatment of conditions for which the health-care sector can only estimate needs/expenditure based on global statistics that may not be relevant.

Accordingly, in order to meet the health care needs within the Zulu population and allow for their incorporation into the South African statistics, the validated and widely used English neck-pain questionnaires (Canadian Memorial Chiropractic College Neck Disability Index – CMCC NDI and the Short Form McGill Pain Questionnaire - SFMPQ) were translated into Zulu. This assisted in the formulation of specific and accurate tools that will enable researchers and professionals alike to extract the necessary information from the target population. All in all, the more information the health care professionals and government get from the patients, the more we can adequately address the health care needs of that population while maintaining cultural integrity.

Translations however pose inherent problems. Even if the words are translated accurately, the meaning of the words or phrases may be unclear as the meaning hinges upon interpretation by others (Scollen and Scollen, 1995: 6); this is because when words are taken out of context, they will lose their meaning (Baynham, 1995: 37) as the meaning will differ between cultures, even if the same words are used. Thus, although valid in English-speaking countries, these measures (CMCC NDI and SFMPQ) are not directly applicable elsewhere due to cultural differences among the nations and ethnic groups. In order to be appropriately used in a new context, they must be submitted to a complex process that includes translation of the instrument into a different language, followed by a detailed process of cultural adaptation and validation of its measurement properties (Falcao, Ciconelli and Ferraz, 2003). The translation should not be linguistic exclusively, but it must be culturally adapted to maintain the same measurement properties (Falcoao, Ciconelli and Ferraz, 2003). Consequently, with translation some validity will be lost as the questions themselves may not be understood and / or error will be introduced in the results of the questionnaires.

Therefore, by means of a focus group, one needs to determine the validity of the translation prior to accepting the data that is generated. When establishing validity, one is determining the degree to which a particular tool reflects reality. This process is vital in order to ensure that future research utilizing the particular tool is accurate (Bernard, 2000: 50) thus according to Guillemin Bombardier and Beaton (1993), guidelines for cross-cultural translations include: (1) translations and (2) back-translations by qualified people (3) committee review of those translations and back-translations (4) pre-testing for equivalence using adequate techniques (with bilingual or monolingual individuals) and (5) re-examination of the weighting scores, if relevant. However, as in this study, one could also utilize a process where data is collected using both sets of questionnaires (English and Zulu) to gather information from a bilingual representative portion of the population, in order to determine concurrent validity. By doing so, one is able to assess whether the responses to the English and Zulu questionnaires are similar and therefore measuring similar constructs.

Thus the aim of this study was to analyze and critique the Zulu translation of the CMCC NDI and SFMPQ in order to establish their concurrent validity with the English counterparts.

1.2. Aims and objectives.

Objective 1: The first objective of this prospective pilot investigation was to analyse and critique the Zulu translation of the CMCC NDI and SFMPQ in order to establish their face validity.

Hypothesis one:
Face validity will be established.

Objective 2: The second objective of this prospective pilot investigation was to analyse and critique the Zulu translation of the CMCC NDI and SFMPQ in order to establish their concurrent validity, ensuring that the translations are sensitive and specific enough to use as a tool in data collection when compared to their English counterparts.

Hypothesis two:
If the results are in agreement or within an acceptable or reasonable margin, the Zulu CMCC NDI and Zulu SFMPQ will be declared to have concurrent validity within the context of the Zulu speaking population of Kwa-Zulu Natal.

Objective 3: The third objective is to make recommendations for further improvement to the Zulu questionnaires.

Hypothesis three:
Changes will be necessitated to the Zulu translations of the SFMPQ and CMCC NDI.

Fourthly, to make recommendations for further studies and areas for improvement in terms of the use of these questionnaires as research tools amongst the Zulu speaking population of South Africa.

1.3. Rationale.

1. IsiZulu is the predominant language in Kwa-Zulu Natal (www. safrica.info. 2001) and is spoken by 8, 5 million people in South Africa. This makes it the most widely spoken first language in the country (www.linx.co.za. 2002). Approximately 8 million of these reside in Kwa-Zulu Natal (www.peopleteams.org. 2001).

2. There is no information to date on the incidence and prevalence of neck pain in our Zulu population in Kwa-Zulu Natal or South Africa. This study would serve to fuel research into the above-mentioned field as the necessary information can be drawn from the first language Zulu speaking population using validated assessment tools.

3. As yet there is no validated assessment tool to measure neck pain/cervical disability within the Zulu population.

4. As language is ambiguous by nature (Scollen and Scollen, 1995: 5) a questionnaire developed in a western culture has questionable construct validity when used in another culture, even if translated accurately.

1.4. Limitations.

The study assumes that the data on the questionnaires (Appendices: D and E) is accurate and represents the exact reality of the participants at the time of completion of the questionnaires.

1.5. Benefits.

Campbell and Mzaidume (2002: 229) conducted a study on the impact of HIV and AIDS in the mining community. They found that "among marginalized groups in poor countries, providing information about health risks changes the behaviour of, at most, one in four people- generally those who are more affluent and better educated".

This is especially important in that health interventions, such as condom distribution, did not prove successful because of community contexts that frowned on this practice (Campbell and Mzaidume, 2002).

These findings highlight the need for health interventions to be relevant to the specific social and cultural context they are addressing. Therefore this research will assist in providing the necessary and adequate measurement tools that are socially and culturally accepted, in order to provide accurate information to the health care sector, which can then make the needed health-care resources, regarding those suffering from neck pain available to the target populations, which in this case would be Zulu population.

1.6. Conclusion.

In order to present this area of research, chapter two will cover the basic anatomy of the cervical spine and the epidemiology of neck pain. 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 will also be presented in chapter four in order to contextualise the findings. Chapter five will contain 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 2

Literature Review

2.1. Introduction.

The goal of this chapter is to create an understanding of the basic anatomy of the cervical region of the spine, the nature of neck pain and the impact if has on the community, especially in the South African context.

2.2. Basic skeletal anatomy of the cervical region.

The various structures in the cervical region can all be involved in neck pain; therefore a basic understanding of what these structures are is necessary in order to fully understand the condition under study.

The structures involved include, but are not limited to:

- Anatomy of the spinal column
- Joints
- Muscles
- Ligaments
- Blood supply and
- Nerve supply

All of the above-mentioned structures have an important part to perform in respect of the functioning of the cervical spine.

The spine has many functions: to maintain the mechanism for erect posture and for permitting movements of the head, neck and the trunk in relation to each other (Bergmann, Peterson and Lawrence, 1993: 197 and Cramer and Darby, 1995: 17, 21).

In addition, the spinal column simultaneously provides stability to a collapsible cylinder, permits movements in all directions with the ability to return to a starting position, supports structures of considerable weight, provides attachments for muscles and ligaments, transmits weight onto the pelvis, and encases and protects the spinal cord while allowing transmission of neural information to and from the periphery (Bergmann, Peterson and Lawrence, 1993: 197). In this respect, the cervical spine has a precarious task of maintaining head posture while allowing for a great deal of mobility by means of the cervical facets allowing movement in all directions thereby allowing the cervical spine to be the most movable portion of the vertebral column (Bergmann, Peterson and Lawrence, 1993: 214). In addition, posture demands that the cervical spine carry the weight of the head and balance it at the end of a long lever, which makes the cervical spine especially vulnerable to traumatic forces. This is as a result of the extremely flexible neck balancing the head principally on the lateral masses of the atlas (Giles and Singer, 1998: 23 and Bland, 1994: 4). The remainder of the primary protecting structures are the muscles, ligaments and joint capsules which assist in maintaining the integrity of the posture which often results in them being damaged, as they are more susceptible to injury than the osseous structures of the cervical spine. As a result, the most common pathology is joint sprain with articular locking and accompanying muscle strain (Giles and Singer, 1998: 23 and Bland, 1994: 4).

However the above assumes that the cervical spine operates in isolation, which is not true. One example of the sources of support stem from the pelvis, where the pelvis helps to form the foundation for posture and the cervical spine-occipital complex is essentially the postural accommodation unit, which changes in respect of changes in the pelvic foundation (Bergmann, Peterson and Lawrence, 1993: 197).

Therefore, all structures must be interrelated and coordinated to allow for optimal function and co-ordination between the various motion units within the various regions of the spine, but also between the regions in terms of attaining total functional ability in order that the human frame can fulfil the tasks set out for it (Bergmann, Peterson and Lawrence, 1993: 197). From the above two paragraphs it can be seen that the cervical spine is an important part of the kinematic chain with symptoms potentially indicating localised mechanical derangement as well as more global mechanical derangements. Thus it's important to be able to quantify accurately the symptoms of the cervical spine to chart progression of the patient symptoms.

2.2.1. Anatomy of the spinal column.

Each region of the spine has its own unique characteristics in respect of the typical vertebra (Bergmann, Peterson and Lawrence, 1993: 199), which means that they have common descriptive parts that include a vertebral body, two pedicles, two lamina, four articular processes, two transverse processes and a spinous process (Bland, 1994: 58). There are however, variances between their basic structure giving each descriptive features or peculiarities. While typical vertebra may vary in size, their basic structure is the same (Moore and Dalley, 1999: 435).

A unique feature of the cervical vertebrae includes that of the uncinate process, which is a posterolateral edge that projects upward and articulates with a facet on the body of the vertebra above. These facets are known as the uncinate processes (Bland, 1994: 57-58) and it has the effect of limiting side or lateral flexion (Magee, 2002: 123). The superior and inferior surfaces of the vertebral bodies are typically described as being sellar or saddle-shaped (Cramer and Darby, 1995: 110). The anterior-inferior surface of the vertebral body shows a lip that projects downward and fits together with the concave superior surface of the intervertebral disc and occasionally the vertebra below which gives rise to the saddle effect that limits cervical lateral flexion and guides anterior to posterior movement in flexion and extension (Cramer and Darby, 1995: 110).

Cervical vertebrae form the bony skeleton of the neck and are located between the skull and thorax (Moore and Dalley, 1999: 438) and typical vertebrae are found from C3 to C6 (Bland, 1994: 58 and Cramer and Darby, 1995: 110), therefore leaving C0, C1 and C2 as the atypical vertebrae (Moore and Dalley, 1999: 439) and C7 is unique (Cramer and Darby, 1995: 110).

C1 is classified as being atypical, because part of the body of C1 is transferred to the body of C2. Part of the body that remains with C1, is represented by the anterior arch of C1 (Moore and Dalley, 1999: 439). The part that was transferred to C2 becomes the dens or the odontoid peg (Bland, 1994: 57).

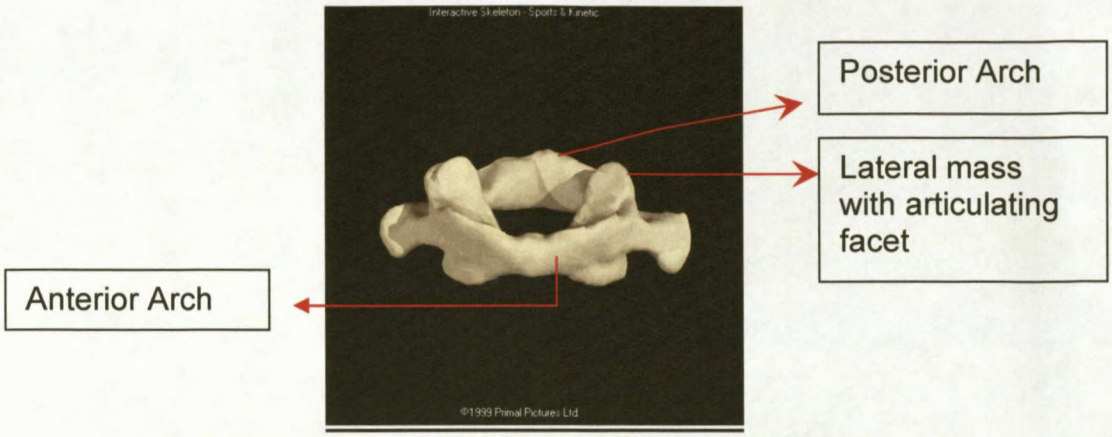

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Figure 2.1: C1 Vertebral body

The pedicles of the atlas (C1) are enlarged to form the lateral masses, with the superior facets being concave, facing superiorly and medially and are closer together anteriorly than posteriorly, where they receive the two large protuberances at the sides of the foramen magnum called the occipital condyles (Moore and Dalley, 1999: 439). The atlas lacks a true SP and vertebral body. In addition, the two large lateral masses are connected anteriorly by an anterior arch and posteriorly by the posterior arch (Moore and Dalley, 1999: 439). Each posterior arch, which corresponds roughly to the lamina of a typical vertebra, has a wide groove for the vertebral artery, vertebral veins and the first cervical nerve on its superior surface (Cramer and Darby, 1995: 122).

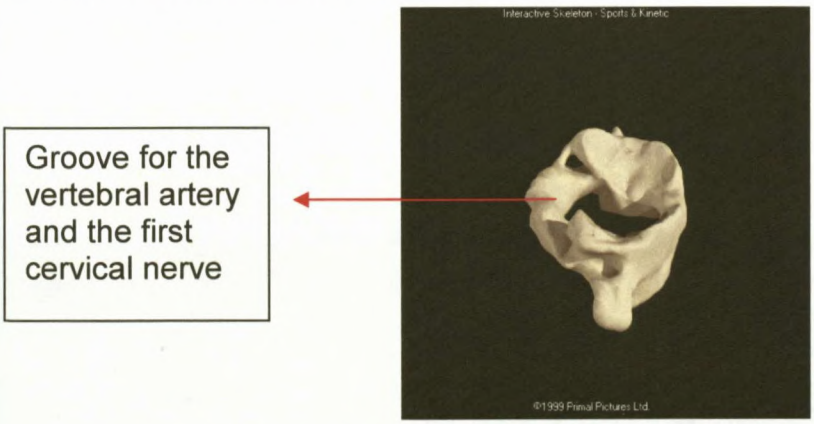

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Figure 2.2: C1 Vertebral body

The superior parts of the pedicles of the axis (C2) are enlarged to form the articular surfaces or superior facets on which the C1 rotates (Moore and Dalley, 1999: 439).

The distinguishing feature of the axis is the blunt tooth-like dens (odontoid process), which projects superiorly from its body (Bland, 1994: 57 and Cramer and Darby, 1995: 123). The dens, is held in its position by the transverse ligament of the atlas, which prevents horizontal displacement of the axis. In addition the C2 also has a large bifid spinous process (Moore and Dalley, 1999: 439) as well as a very large vertebral foramen (Cramer and Darby, 1995: 123).

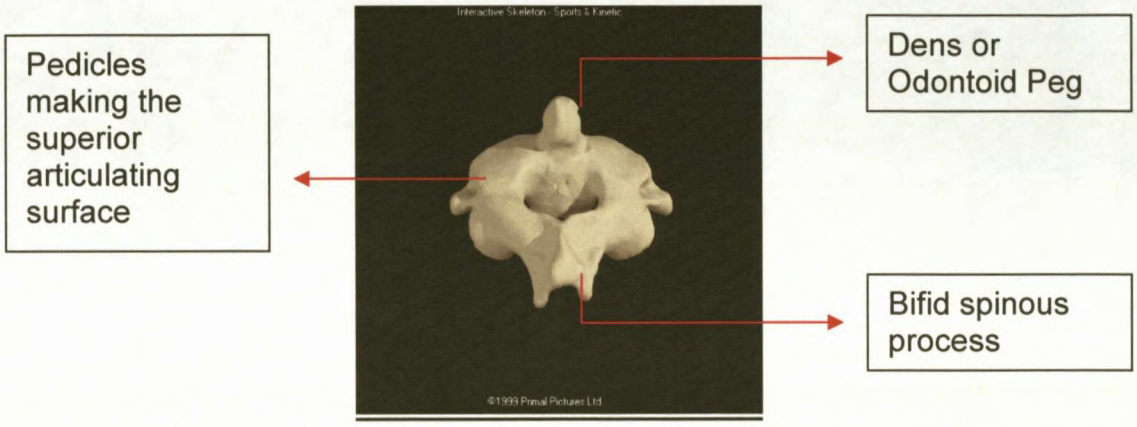

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Figure 2.3: C2 Vertebral body

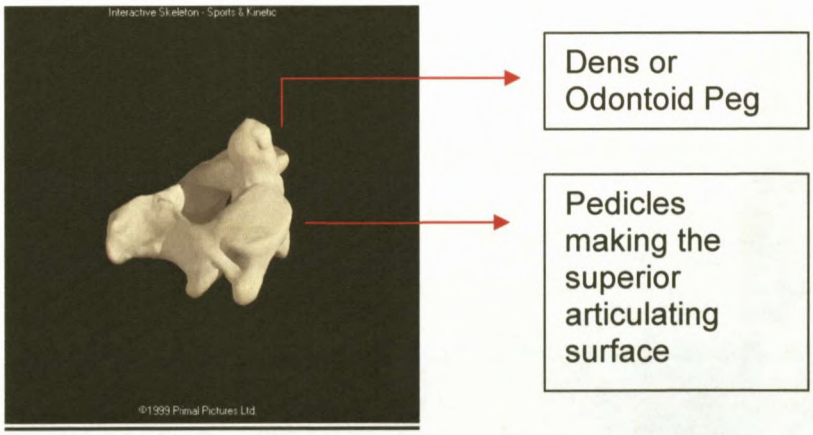

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Figure 2.4: C2 Vertebral body

The cranio-vertebral joints include the: atlanto-occipital joint, between the atlas and occipital bone of the skull, and the atlanto-axial joint, between the atlas and the axis (Moore and Dalley, 1999: 457). The atlanto-occipital joints are formed between the lateral masses of the atlas and the occipital condyles (Moore and Dalley, 1999: 459). The atlanto-axial joint consists of three joints, namely: two lateral joints and one medial joint.

These synovial joints are between the: inferior facets of the lateral masses of C1 and the superior facets of C2 and between the dens of C2 and the anterior arch of the atlas. The cartilage-covered surfaces are enclosed by a synovial capsule, which is supported by a fibrous capsule. There is no intervertebral disc present between C0, C1 and C2 (Moore and Dalley, 1999: 460; Bland, 1994: 59 and Magee, 2002: 124). The articulations of the above mentioned joints are important as they allow much of the flexion and extension that occurs in the cervical region and at least one half of the axial (left and right) rotation of the cervical spine (Cramer and Darby, 1995: 127).

C7 vertebra is atypical because it has a longer spinous process, which is prominent at the base of the neck (Bland, 1994: 57). The SP is bifid (Cramer and Darby, 1995: 126) and it has transverse foramina that transmit small accessory vertebral veins (Moore and Dalley, 1999: 438 and Cramer and Darby, 1995: 127). The vertebral artery enters the foramen of the transverse process of C6 and ascends through the transverse foramina of the upper cervical vertebrae to enter the skull (Bland, 1994: 49). The vertebral body shape is similar to that of the typical vertebrae with regards to the direction and shape of the facet joints (i.e. the superior facets are directed superiorly and posteriorly, while the inferior facets are directed inferiorly and posteriorly) (Moore and Dalley. 1999: 439, 997).

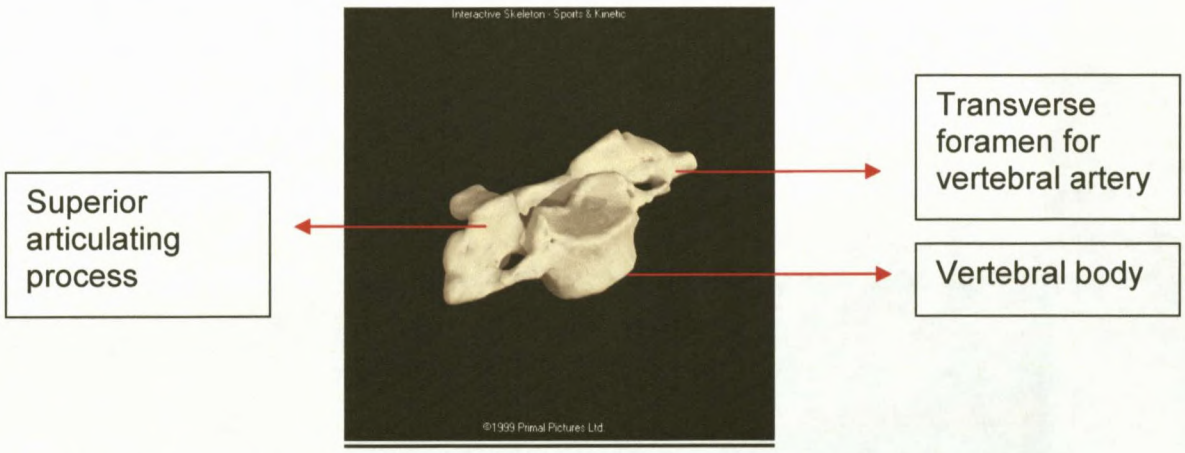

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Figure 2.5: C7 Vertebral body

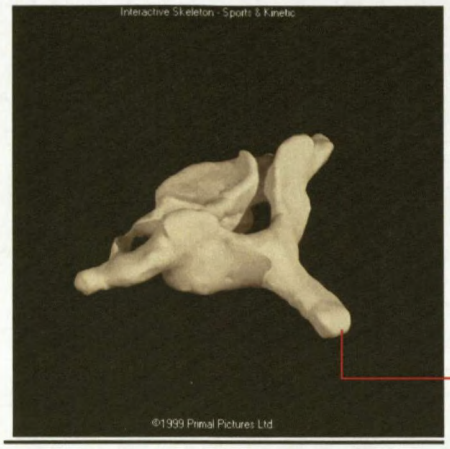

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Figure 2.6: C7 Vertebral body

With respect to the typical vertebrae, they are wider than they are high with large triangular vertebral foramina through which the vertebral arteries enter from the foramina of the transverse process of C6 and ascend through the foramina to enter the skull (Bland 1994: 49). The cervical vertebrae are rather small and are more or less rectangular in shape when viewed from above. Their transverse (side to side) diameter increases from C2 – C7, this allows the lower vertebrae to support the greater weights they are required to carry (Cramer and Darby, 1995: 110).

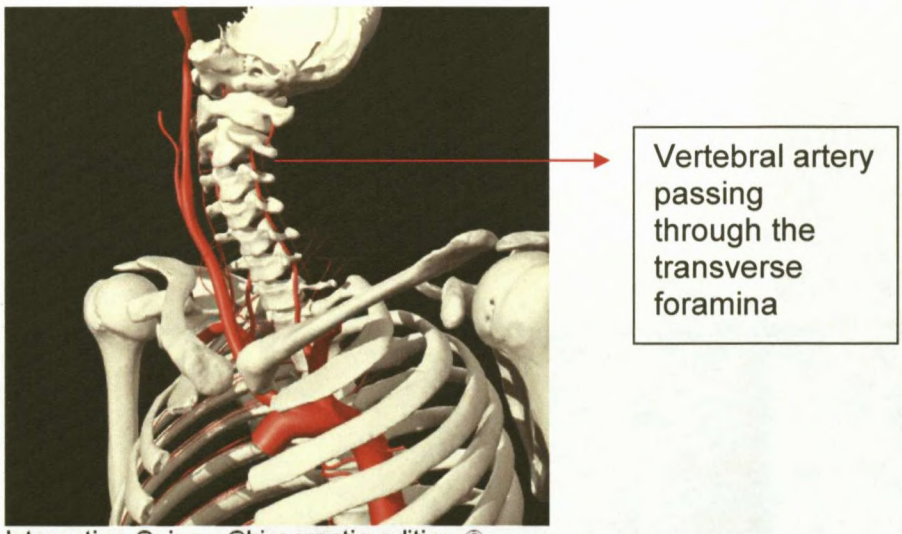

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Figure 2.7: Vertebral artery

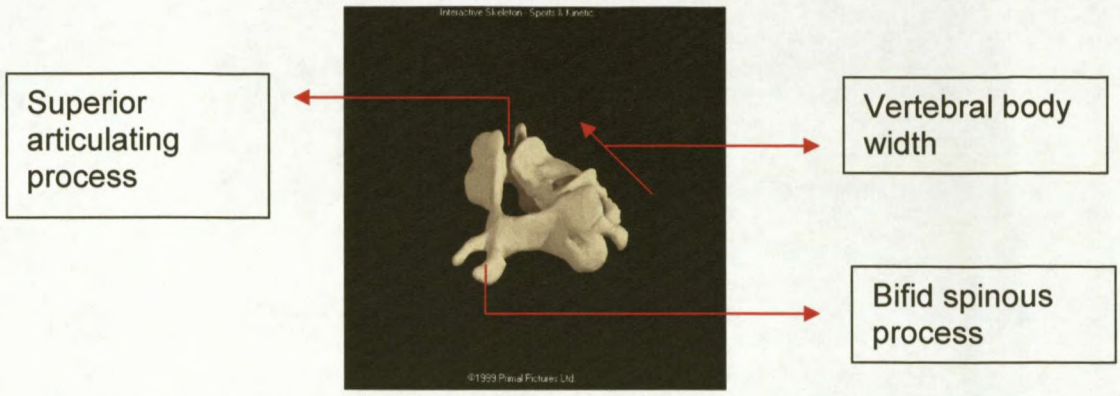

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Figure 2.8: C5 Vertebral body

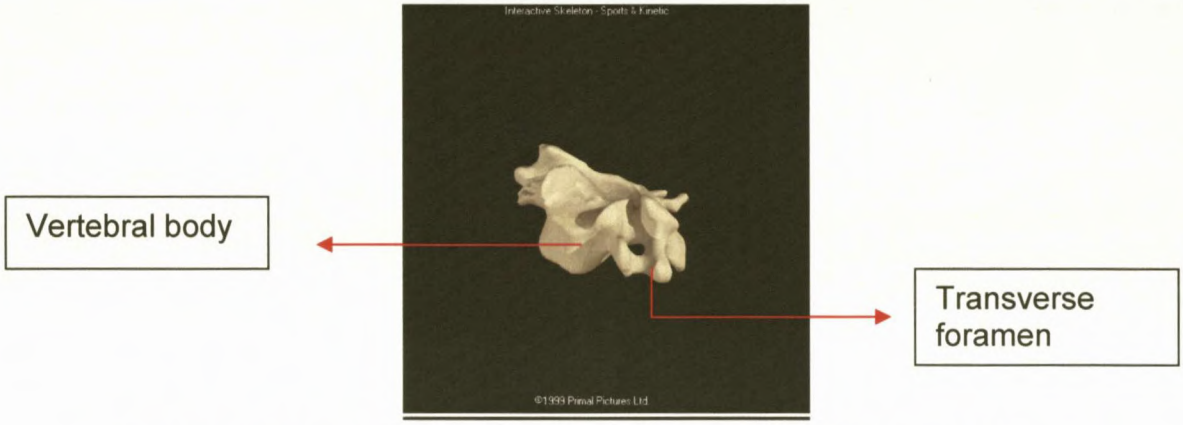

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Figure 2.9: C5 Vertebral body

Even though the vertebrae have variances in their outer appearances, essentially the vertebral body is composed of an outer dense bony ring (cortex) and an inner 'spongy' medulla of bone (Magee, 2002: 124). The medulla consists of vertical and horizontal 'struts' of bone, which leave hollow channels in between for blood to permeate. The dense outer cortex is protective in function, the inner trabeculae of the spongiosa however, are specifically arranged in order to dissipate the vertical forces placed on it evenly throughout the entire vertebra (Borenstein, Weisel and Boden, 1995: 3). There are horizontal and vertical trabeculae and then those that extend into the posterior elements of the neural arch. These trabeculae dissipate forces and counter-act specific forces placed on the posterior elements by structures attaching to them (Bogduk and Twomey, 1997: 9).

When the facet joints are injured or diseased, this causes pain along the distribution patterns of the dermatomes and spasm in the muscles derived from the associated

myotomes (Moore and Dalley, 1999: 455). This is as a result of the joint capsules that are richly innervated with proprioceptive and pain receptors (Bland, 1994: 53).

All structures must be interrelated and coordinated to allow for optimal function and co-ordination between the various motion units within the various regions of the spine, but also between the regions in terms of attaining total functional ability in order that the human frame can fulfil the tasks set out for it (Bergmann, Peterson and Lawrence, 1993: 197). Two adjacent vertebrae form the basis for the development of a functional unit of the spine (motion segment), which is the smallest component capable of performing the characteristic roles of the spine (Bergmann, Peterson and Lawrence, 1993: 197 and Cramer and Darby, 1995: 31). The motion segment (or functional unit) then comprises of the two adjacent vertebrae and their associated structures, both intrinsic and extrinsic, forming a complete set of articulations. This unit is further divided into an anterior (disc and vertebral body) and posterior (facet joints and posterior musculature) portion (Bergmann, Peterson and Lawrence, 1993: 197), which act to support the weight of the human frame (Cramer and Darby, 1995: 21).

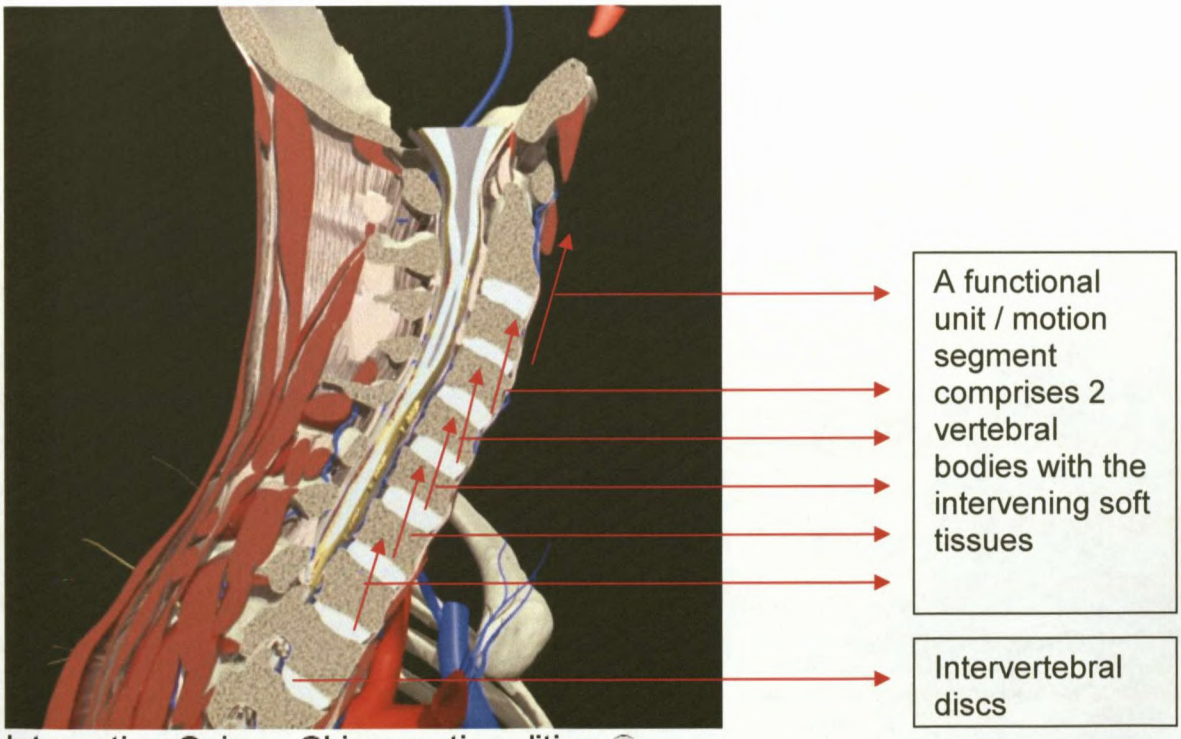

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Figure 2.10: Cervical Spine

The articulations of the vertebral bodies are cartilaginous joints and are connected by fibrocartilaginous intervertebral discs (Bergmann, Peterson and Lawrence, 1993: 197 and Cramer and Darby, 1995: 21). In the cervical and lumbar spines, these discs are approximately one third the thickness of the body of the corresponding vertebrae. This articulation forms the anterior portion of the vertebral motion unit, which has as its chief function weight bearing, although it also provides some shock absorption. The joint formed between two consecutive vertebral bodies is termed a secondary cartilaginous joint or a symphysis. This type of joint is created to provide strength, shock absorption (Moore and Dalley, 1999: 23) and helps to properly assimilate compressive loads (Cramer and Darby, 1995: 31). An intervertebral disc is made up of: a fibrous outer section (annulus fibrosis), a more viscous (nucleus pulposus) inner section (Giles and Singer, 1997: 134) and the vertebral (cartilage) end plate (Cramer and Darby, 1995: 32).

The posterior elements of the vertebra, or vertebral arch, comprises of: pedicles, laminae superior and inferior articular processes, two transverse processes and a spinous process (Bogduk and Twomey, 1997: 7 and Cramer and Darby, 1995: 22). Therefore the main functions of the posterior elements are as follows: the laminae and pedicles protect the spinal cord; the articular processes (superior and inferior) help determine spinal movement by the orientation of the facets; the transverse and spinous processes aid movement by acting as lever arms upon which the muscles of the spine can act (Cramer and Darby, 1995: 24).

The two remaining joints of the articulations of the vertebral bodies comprise of the adjacent neural arches, which connect via bilateral zygapophyseal (facet) joints. These zygapophyseal joints are synovial type joints, enclosed within a joint capsule, lined with a synovial membrane (Bland, 1994: 51) and lubricated with synovial fluid, which allows for maximum movement (Moore and Dalley, 1999: 23). With respect to the posterior elements, the zygapophyseal or facet joints are paired, freely movable joints located between the superior and inferior articular processes of adjacent vertebrae. These joints allow a guiding, gliding action of motion, which depends on the facing of the articular processes (Bergmann, Peterson and Lawrence, 1993: 199). Furthermore, the facets play a significant role in load bearing, though this varies between the facets and the disc depending on the position of the spine.

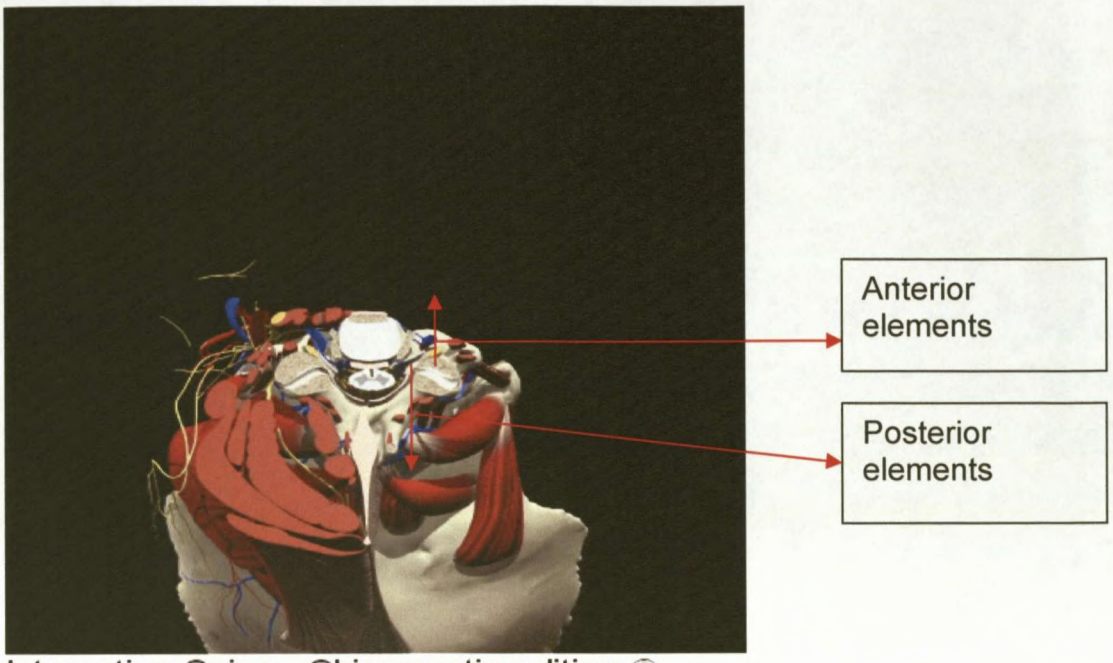

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Figure 2.11: Segments of the motion unit

Loads will be borne more by the facets when the spine is in extension or rotation than flexion (Bergmann, Peterson and Lawrence, 1993: 199). This is principally as a result of the orientation of the joint, were the superior articular process of the joint is directed forward and downward at an angle of forty-five degrees, while the inferior articular process faces backwards and upwards, also at an angle of forty-five degrees (Bland, 1994: 53).

The pedicles join the vertebral body to the anterior and posterior portions, forming the neural arch, which consists of the pedicles and lamina on either side (Borenstein, Weisel and Boden, 1995: 3). The pedicles project laterally and backward and the laminae are angled medially. The spinous processes are short and bifid and the articular pillars extend from the lamina-pedicle junction to the cartilage lined facet (inferior and superior) joints (Moore and Dalley, 1999: 438- 439). The spinal cord is housed and protected by this arch (Borenstein, Weisel and Boden, 1995: 3).

The transverse processes are not usually considered to be part of the posterior elements because they have a different embryological origin, which is similar to the pedicles. The transverse processes also constitute a point of attachment and a lever of motion for the motion segment, which has an effect on both the anterior and posterior portions (Bogduk and Twomey, 1997: 7).

Thus the three joints formed at the junction of any two adjacent vertebrae (Bogduk and Twomey, 1997: 9) are:

(1)	Between the vertebral bodies and
(2and 3)	Between the superior articular facets of the vertebra below and with the inferior articular facets of the one above, on either side.

In conclusion, the anterior and posterior portions constitute an intervertebral joint (motion segment or functional unit), which is made up of three joints; two posterior joints and the disc forming a three joint complex in all the spinal regions except the upper cervical spine (Bergmann, Peterson and Lawrence, 1993: 199).

According to Moore and Dalley (1999: 453), symptom-producing intervertebral disc protrusions occur in the cervical region almost as often as in the lumbar region. The most commonly ruptured discs are those between C5/C6 and C6/C7. As degenerative changes occur, the cervical intervertebral discs thin out because of dehydration, and the uncinate processes approach the bevelled inferior surface of the cervical vertebra superiorly. The result is encroachment of the intervertebral foramina, inflammation of the surrounding nerve roots, and neck pain.

A forcible hyper flexion-extension injury (whiplash injury) of the cervical region may rupture the intervertebral disc as well as severely stretch surrounding muscles and ligaments (Moore and Dalley, 1999:454). Severe hyperextension is most likely to injure the posterior elements of the vertebra- the vertebral arches and their processes. Fractures of these elements may radiate pain to the back of the neck and scapular regions because the same spinal sensory ganglia and spinal cord segments receiving impulses from the vertebrae are also involved in supplying the levator scapulae, rhomboid and deep neck muscles (Moore and Dalley, 1999: 462).

2.2.2. Muscles.

A high degree of finely coordinated muscle balance is required to support and move the head and neck (Bland, 1994: 69). Most body weight is anterior to the vertebral column, with the consequence that many strong muscles attached to the spinous and transverse processes are necessary to support and move the vertebral column.

The three groups of muscles in the back are (Moore and Dalley, 1999: 467, 470, 475):

- ☑ The superficial group, part of the extrinsic group of muscles, which include the: Trapezius, Levator Scapulae and Rhomboid muscles.
- ☑ Intermediate groups, part of the extrinsic group of back muscles (which produce and control limb and respiratory movements respectively) and
- ☑ The deep group that includes the true or intrinsic back muscles (that specifically act on the vertebral column, producing its movements and maintaining posture) as well as the sub-occipital and deep neck muscles.

2.2.2.1. Superficial extrinsic back muscles.

The superficial extrinsic back muscles (trapezius, levator scapulae and rhomboids) connect the upper limbs to the trunk and the control limb movements. These muscles, although allocated in the back region, for the most part receive their innervation from the ventral rami of the cervical nerves and act on the upper limb (Moore and Dalley, 1999: 476).

Table 2.1 as adapted from Moore and Dalley (1999: 691) details the attachments, innervation and main action of these muscles.

Table 2.1 Superficial Extrinsic Back Muscles

Muscle.	Proximal Attach.	Distal Attach.	Innervation.	Main Action.
Trapezius.	Medial third Superior Nuchal Line; External Occipital Protuberance, Nuchal Ligament and SP of C7-T12 vertebrae.	Lateral third of Clavicle, Acromion & Spine of Scapula.	Spinal root of Accessory Nerve (CN XI) (motor) & Cervical nerves (C3 and C4) (pain & proproiception).	Elevates, rotates & retracts scapula.
Levator Scapulae.	Posterior tubercles of TVPs of C1-C4 vertebrae.	Superior part of medial border of Scapula.	Dorsal Scapular (C3, C4) and Cervical nerves.	Elevates scapula and tilts its glenoid cavity inferiorly by rotating scapula.
Rhomboid Major and Minor.	Minor: Nuchal Ligament & SP of C7 & T1 vertebrae. Major: SPs of T2-T5 vertebrae.	Medial border of Scapula from level of spine to inferior angle.	Dorsal Scapular Nerve (C4, C5).	Retracts scapula and rotates it to depress glenoid cavity; fix scapula to thoracic wall.

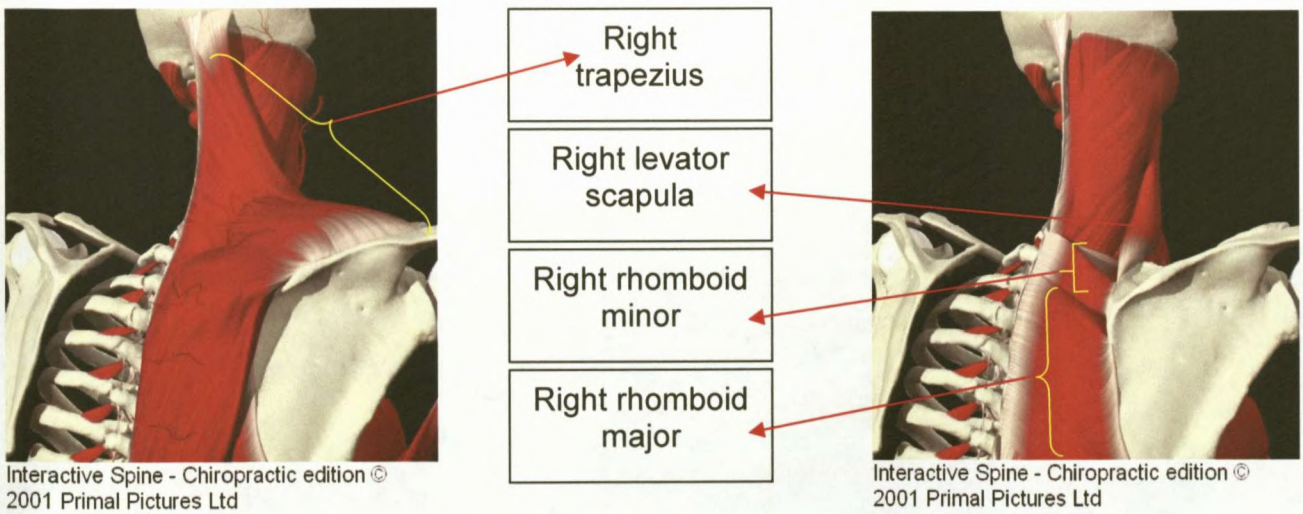

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Figure 2.12 and 2.13: Superficial Extrinsic back muscles

2.2.2.2. Intermediate extrinsic back muscles.

The intermediate extrinsic back muscles (serratus posterior) are superficial respiratory muscles. The serratus posterior superior lies deep to the rhomboids and the serratus posterior inferior lies deep to the latissimus dorsi. Both, serratus superior and inferior muscles are innervated by the intercostal nerves (Moore and Dalley, 1999: 467).

Table 2.1 as adapted from Moore and Dalley (1999: 85) details the attachments, innervation and main action of these muscles.

Table 2.2 Intermediate Extrinsic Back Muscles

Muscle.	Proximal Attach.	Distal Attach.	Innervation.	Main Action.
Serratus Posterior Superior.	Ligamentum Nuche, SPs of C7 – T3 vertebrae.	Superior borders of 2^{nd} – 4^{th} ribs.	2^{nd} – 5^{th} Intercostal Nerves.	Elevate ribs.

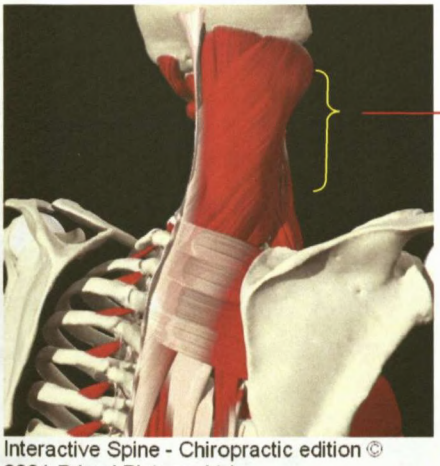

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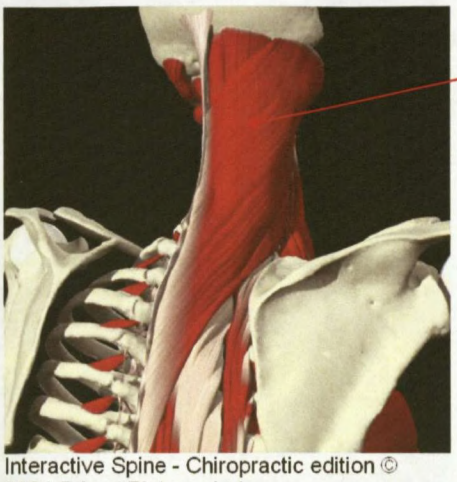
Figure 2.14: Intermediate Extrinsic back muscles

2.2.2.3. Deep intrinsic back muscles.

Table 2.3 as adapted from Moore and Dalley (1999: 470) details the attachments, innervation and main action of these muscles.

Table 2.3 Deep Intrinsic Back Muscles

Muscle	Origin	Insertion	Nerve supply	Main Action
Superficial layer				
Splenius.	Arises from Ligamentum Nuche and SPs of C7-T3 and T4 vertebra.	Splenius Capitus: fibres run superolaterally to mastoid process of Temporal bone and lateral third of superior Nuchal line of Occipital bone.	Dorsal rami of spinal nerves.	◦ Acting alone: laterally bend and rotate head to side of active muscles. ◦ Acting together: extend head and neck.
Intermediate layer				
Erector Spinae.	Arises by a broad tendon for the posterior part of the Iliac crest, posterior surface of the sacrum, Sacral and inferior lumber spinous processes and the Supraspinous Ligament.	◦ Iliocostalis- Lumborum, Thoracis and Cervicis: fibres run superiorly to angle of lower ribs and cervical TVPs. ◦ Longisimus- Thoracis, Cervicis and Capitus: fibres run superiorly to ribs between tubercles and angles, to TVPs in thoracic and cervical regions, and to Mastoid process of Temporal bone. ◦ Spinalis- Thoracis, Cervicis and Capitus: fibres run superiorly to SPs in the upper thoracic region to the skull.	Dorsal Rami of spinal nerves.	◦ Acting bilaterally: extend vertebral column and head. ◦ Acting unilaterally: laterally bend vertebral column.



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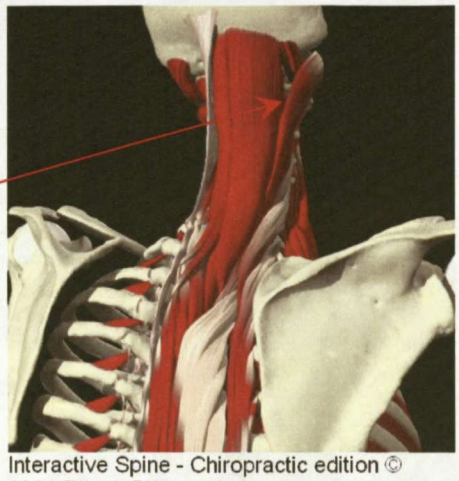

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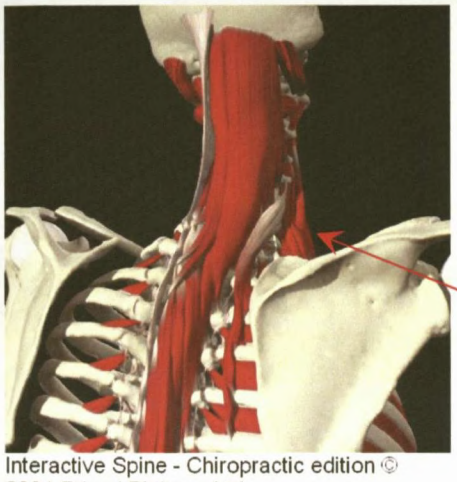

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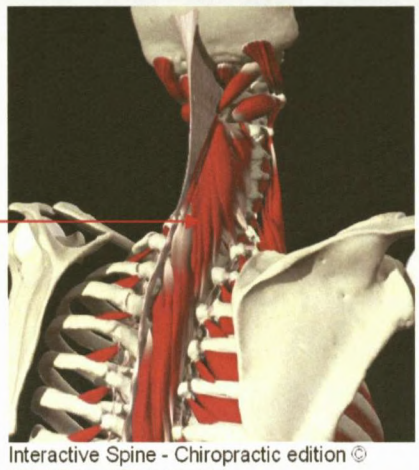

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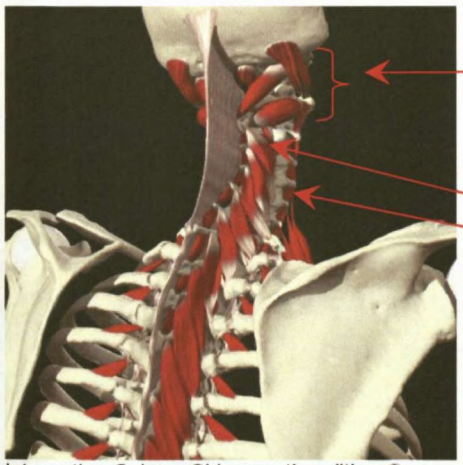

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Figure 2.15 – 2.19: Deep Intrinsic Back Muscles

Table 2.3 Deep Intrinsic Back Muscles (continued)

Muscle	Origin	Insertion	Nerve supply	Main Action
Deep layer				
Transversospinal	TVPs: ◦ Semispinalis arises from TVPs of C4-T12 vertebrae. ◦ Multifidus arises from Sacrum and Ilium, TVPs of T1-T3 and articular processes of C4-C7. ◦ Rotatores arise from the TVPs of vertebrae.	SPs: ◦ Semispinalis- Thoracis, Cervicis and Capitus: fibres run superomedially to Occipital bone and SPs in the thoracic and cervical regions, spanning 4-6 segments. ◦ Multifidus- fibres pass superomedially to SPs of vertebrae above, spanning 4-6 segments. ◦ Rotatores: pass superomedially to attach to junction of lamina and TVPs or SPs of vertebrae above their origin, spanning 1-2 segments.	Dorsal rami of Spinal nerves.	◦ Extend head and thoracic and cervical regions of vertebral column and rotate them contralaterally. ◦ Stabilises vertebrae during local movements of vertebral column. ◦ Stabilises vertebrae and assist with local extension and rotary movements of vertebral column; may function as organs of proproiception.
Minor Deep layer				
Interspinalis	Superior surfaces of SP of cervical and lumbar vertebrae.	Inferior surfaces of SP of vertebrae superior to vertebrae of origin.	Dorsal rami of Spinal nerves.	Aid in extension and rotation of vertebral column.
Intertransversarii	TVPs of cervical and lumbar vertebrae.	TVPs of adjacent vertebrae.	Dorsal and Ventral rami of Spinal nerves.	Aid in laterally bending of vertebral column; acting bilaterally to stabilise vertebral column.

2.2.2.4. Sub-Occipital and Deep Neck Muscles.

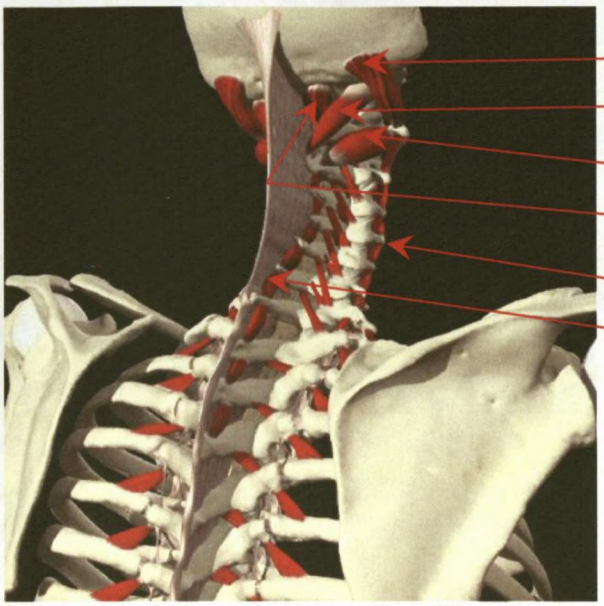

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Figure 2.20: Deep Intrinsic Neck Muscles

The sub-occipital region is the triangular area inferior to the occipital region of the head, including the posterior aspects of C1 and C2 vertebrae (Moore and Dalley, 1999: 476). The sub-occipital muscles serve to balance the skull on the upper end of the spine (Bland, 1994: 70). The four small muscles in this region, two rectus capitus posterior and two obliquus muscles, are innervated by the dorsal ramus of C1, the sub-occipital nerve. These are mainly postural muscles and are considered to act on the head, directly or indirectly.

Table 2.4 as adapted from Moore and Dalley (1999: 475-477) details the attachments, innervation and main action of these muscles.

Table 2.4 Sub-occipital Neck Muscles

Muscle	**Attachment- Origin**	**Attachment-Insertion**	**Innervation**	**Action**
Rectus Capitus Posterior Major	SPs of C2	Inserts into the lateral part of the Inferior Nuchal Line and Occipital bone.	Dorsal ramus of C1, sub-occipital nerve	Atlanto-Occipital Joint Extension.
Rectus Capitus Posterior Minor	Posterior tubercle of the Posterior Arch of C1	Inserts into the medial part of the Inferior Nuchal Line.	Dorsal ramus of C1, sub-occipital nerve	Atlanto-Occipital Joint Extension
Obliquus Capitus Inferior	SP of C2	Inserts onto the TVP of C1.	Dorsal ramus of C1, sub-occipital nerve	Atlanto-Occipital rotation ipsilaterally.
Obliquus Capitus Superior	TVP of C1	The Occipital bone between the Superior and Inferior Nuchal Lines.	Dorsal ramus of C1, sub-occipital nerve	Atlanto-Occipital extension & lateral bending.

There are three superficial and lateral neck muscles: platysma, SCM (sternocleidomastiod) and trapezius (described previously with the superficial extrinsic back muscles).

Table 2.5 as adapted from Moore and Dalley (1999: 1002) details the attachments, innervation and main action of these muscles.

Table 2.5 Superficial and Lateral Neck Muscles

Muscle	**Sup attachment**	**Inf Attachment**	**Innervation**	**Main action**
Platysma	Inferior border of mandlibe, skin, and subcutaneous tissue of lower face	Fascia covering superior parts of anterior chest wall	Cervical branch of facial nerve	Draws corners of mouth inferiorly and widens it as in expressions of sadness and fright; draws the skin of neck superiorly when teeth are clenched
SCM	Lateral surface of mastoid process of temporal bone and lateral half of superior Nuchal line	Sternal head: anterior surface of manubruim of sternum Clavicular head: superior surface of medial third of clavicle	Spinal root of accessory nerve (motor) and C2 and C3 nerves (pain and proproiception)	Tilts head to one side, laterally; flexes neck and rotates it so faces is turned superiorly toward opposite side; acting together: the muscles flex the neck so the chin is thrust forward

To facilitate description of cervical anatomy, each side of the neck is divided into two triangles, anterior and posterior, by the obliquely placed SCM.

Table 2.6 as adapted from Moore and Dalley (1999: 1016) details the attachments, innervation and main action of these muscles.

Table 2.6 Muscles of the Anterior Triangle

Muscle	Origin	Insertion	Innervation	Main Action
Suprahyoid				
Mylohyoid	Mylohyoid line of the mandible	Body of hyoid bone	Mylohyoid nerve, a branch of inferior alveolar nerve CN V (trigeminal nerve)	Elevates hyoid bone, floor of mouth and tongue during swallowing & eating
Geniohyoid	Inferior mental spine of mandible		C1 via Hypoglossal nerve	Pulls hyoid bone anterosuperiorly, shortens floor of mouth & widens pharynx
Stylohyoid	Styloid process of temporal bone		Cervical branch of facial nerve	Elevates & retracts hyoid bone thereby elongating floor of mouth
Digastric	Anterior belly: digastric fossa of mandible Posterior belly: mastoid notch of temporal bone	Intermediate tendon to body & greater horn of hyoid bone	Anterior belly: mylohyoid nerve, a branch of inferior alveolar nerve Posterior belly: facial nerve	Depresses mandible; raises hyoid bone & steadies it during swallowing & speaking
Infrahyoid				
Sternohyoid	Manubrium of sternum & medial end of clavicle	Body of hyoid bone	C1-C3 via a branch of ansa cervicalis	Depress hyoid bone after it has been elevated during swallowing
Omohyoid	Superior border of scapula near suprascapular notch	Inferior border of hyoid bone		Depresses, retracts & steadies hyoid bone
Sternothyroid	Posterior surface of manubrium & sternum	Oblique line of thyroid cartilage	C2-C3 via a branch of ansa cervicalis	Depresses hyoid bone and larynx
Thyrohyoid	Oblique line of thyroid cartilage	Inferior border of body & greater horn of hyoid bone	C1 via hypoglossal nerve	Depresses hyoid bone & elevates larynx

The posterior triangle is the area of the neck bounded by the posterior border of the SCM, the anterior border of the trapezius and clavicle; it wraps around the lateral surface of the neck like a spiral (Moore and Dalley, 1999: 1004 and Sinnatamby, 2000: 324).

The anterior triangle of the neck is bounded by the anterior border of the SCM, the anterior midline of the neck and the mandible (Moore and Dalley, 1999: 1012 and Sinnatamby, 2000: 324). In the anterolateral part of the neck, the hyoid bone provides attachments for the muscles superior to it (suprahyoid muscle) and the muscles inferior to it (infrahyoid muscles) (Moore and Dalley, 1999: 1015 and Sinnatamby, 2000: 327).

There are also anterior and lateral vertebral or pre-vertebral muscles, which lie in the floor of the anterior and posterior triangles of the neck. The anterior vertebral muscles relate to the anterior triangle and the lateral vertebral muscles relate to the posterior triangle of the neck (Moore and Dalley, 1999: 1025).

In Myofascial Pain Syndrome, myofascial pain due to trigger points is a prevalent cause of pain in all parts of the body and was reported as a source of pain in numerous medical specialities. In myofascial pain due to trigger points, the presenting complaint, which is usually a referred symptom, may be located in or about normal muscular a non-muscular structures. In the head and neck region, the patient may complain of such things like headaches, neck pain, toothache, sinus or temporomandibular joint pain. Yet clinical evaluation of these areas does not yield any evidence of local pathological changes. Head and neck pain is most likely caused by trigger points in the following muscles: trapezius, multifidi, levator scapulae, infraspinatus, SCM and temporalis muscles, to name a few (Travell & Simons, 1999: 240).

Table 2.7 as adapted from Moore and Dalley (1999: 1026) details the attachments, innervations and main action of these muscles.

Table 2.7 Pre-vertebral Muscles and muscles of the Posterior Triangle of the Neck

Muscle	Sup attachment	Inf. attachment	Innervation	Main action
Anterior				
Longus colli	Anterior tubercle of C1; bodies of C1-C3 & TVPs of C3-C6	Vertebral bodies of C5-T3, TVPs of C3-C5	Ventral rami of C2-C6 spinal nerves	Flexes neck with rotation to opposite side if acting unilaterally
Longus capitus	Basilar part of occipital bone	Anterior tubercle of C3-C6 TVPs	Ventral rami of C1-C3 spinal nerves	Flexes head
Rectus capitus anterior	Base of skull, just anterior to occipital condyles	Anterior surface of lateral mass of C1	Branches from loop between C1 & C2 spinal nerves	
Rectus capitus lateralis	Jugular process of occipital bone	TVP of C1		Flexes head & helps to stabilize it
Lateral				
Splenius capitus	Inferior half of Ligamentum nuchae & SP of superior 6 thoracic vertebrae	Lateral aspect of mastoid process & lateral third of superior Nuchal line	Dorsal rami of middle cervical spinal nerves	Laterally flexes & rotates head & neck to same side; acting bilaterally, they extend head & neck
Levator scapulae	Posterior tubercles of TVPs of C1-C4 vertebrae	Superior part of medial border of scapula	Dorsal scapular nerve C5 & cervical spinal nerves C3 & C4	Elevates scapula & tilts Glenoid cavity inferiorly by rotating scapula
Posterior scalene	Posterior tubercles of TVPs of C4-C6	External border of 2nd rib	Ventral rami of cervical spinal nerves C7 & C8	Flexes neck laterally; elevates 2nd rib during forced inspiration
Middle scalene		Superior surface of 1st rib, posterior groove for Subclavian artery	Ventral rami of cervical spinal nerves	Flexes neck laterally; elevates 1st rib during forced inspiration
Anterior scalene	TVP of C4-C6	1st rib	Cervical spinal nerves C4-C6	Elevates 1st rib; laterally flexes & rotates neck

2.2.3. Ligaments.

The major ligaments of the cervical spine include: (Moore and Dalley, 1999: 457, 459-460)

- Transverse ligament of the atlas
- Alar Ligament
- Atlanto-Occipital Membrane
- Nuchal Ligament
- Anterior Longitudinal Ligament (ALL)
- Posterior Longitudinal Ligament (PLL)
- Ligamentum Flavum
- Interspinous ligaments
- Supraspinous ligaments
- Intertransverse ligaments

2.2.3.1. Transverse ligament of the atlas.

The transverse ligament of C1, in figure 2.21, attaches to the small tubercles on the medial side of each lateral mass of the atlas. It also arches across the posterior aspect of the neck of the odontiod process, securing it against the arch of the atlas. This ligament is wide in the middle and narrow on its ends and is reinforced by the small longitudinal band (the cruciform ligament). Extensions of this ligament travel superiorly to the basi-occipital bone inside the foramen magnum and inferiorly to the posterior aspect of the body of the axis (Moore and Dalley, 1999: 459-460). It also holds the axis in its proper position, thereby preventing compression of the spinal cord during flexion of the head and neck (Cramer and Darby, 1995: 131).

2.2.3.2. Alar ligament.

The ligament extends from the sides of the odontoid process to the medial aspect of the occipital condyles (runs superiorly and laterally) (Cramer and Darby, 1995: 132). It secures the odontoid process against the lateral alar masses and is tight with head flexion and rotation (Moore and Dalley, 1999: 460).

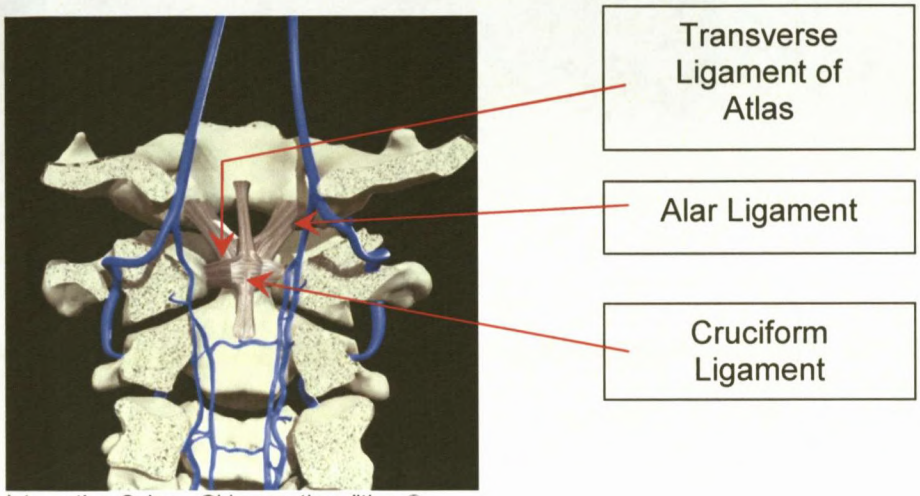

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Figure 2.21: Ligaments

2.2.3.3. Atlanto-occipital membrane.

This membrane has anterior and posterior portions. The posterior portion is a fibro-elastic membrane attached from the posterior arches of C1 to the posterior margins of the foramen magnum (Moore and Dalley, 1999: 459 and Cramer and Darby, 1995: 129).

The anterior portion is also a fibre-elastic membrane attached from the anterior and superior aspect of the arch of the atlas to the anterior rim of the foramen magnum. It's continuous with the capsular ligaments and is strengthened by the ALL (Moore and Dalley, 1999: 460; Bland, 1994: 53 and Cramer and Darby, 1995: 133).

2.2.3.4. Nuchal ligament.

This ligament runs on the tips of the SPs from the EOP and the posterior border of foramen magnum to the C7 SP (it is extended inferiorly as the supra-spinous ligament). It has a high elastin content to prevent buckling and fraying and forms an inter-muscular septum in the neck and consists of two portions: funicular (posterior) and lamellar (anterior). It assists in head position and controlling head movements (Moore and Dalley, 1999: 457 and Cramer and Darby, 1995: 135).

2.2.3.5. Anterior longitudinal ligament (ALL).

The ALL extends from the anterior tubercle of C1 and the occipital bone anterior to the foramen magnum to the pelvic surface of the sacrum. This strong, broad band adheres tightly to the vertebral bodies (Bland, 1994: 53) and connects the anterolateral aspects of the vertebral bodies and the IVD's (Moore and Dalley, 1999: 451 and Cramer and Darby, 1995: 134).

2.2.3.6. Posterior longitudinal ligament (PLL).

The PLL runs from the occipital bone down the posterior portion of the vertebral bodies. It is a somewhat narrow structure that has lateral extensions and covers part of the IVD. The PLL is also thickest in the thoracic spine, while equally thin in the cervical and lumbar regions. In the lumbar spine, the PLL tapers, leaving the posterolateral borders of the disc uncovered and unprotected, with important clinical ramifications. Fibres of the PLL attach to the IVD itself (Bergmann, Peterson and Lawrence, 1993: 198; Bland, 1994: 53 and Cramer and Darby, 1995: 134).

The tectorial membrane, whose fibres blend with the dura mater, (Bland 1994: 53) is the continuation of PLL (Cramer and Darby, 1995: 130) across the central atlanto-axial joint through the foramen magnum to the central floor of the cranial cavity. It runs from the body of C1 to the internal surface of the Occipital bone and covers the alar and transverse ligaments (Moore and Dalley, 1999: 460).

2.2.3.7. Ligamentum flavum.

The ligamentum flavum, in figure 2.22, is comprised of paired strong highly elastic ligamentous structures that connect adjacent lamina (Bergmann, Peterson and Lawrence, 1993: 199 and Cramer and Darby, 1995: 134). They stretch laterally to the facet joints, enter into the fibrous composition of the capsule and lie at the same level as the intervertebral discs. Their function: supporting the neck in the erect position, aiding the muscles to extend the flexed neck, limiting motion of the facet joints and restraining abrupt movements between the vertebrae (Bland, 1994: 55).

2.2.3.8. Interspinous and Supra-spinous ligaments.

Adjoining spinous processes from C2/3 to L4/5 (Cramer and Darby, 1995: 135) are united by weak interspinous ligaments and strong supra-spinous ligaments. The interspinous ligaments attach the root of one spinous process to the apex of another. The supra-spinous ligament connects the apices of the spinous processes from C7 to the sacrum (Moore and Dalley, 1999: 457).

2.2.3.9. Intertransverse ligaments.

The intertransverse ligaments, in figure 2.22 are relatively thin and run from TVP to TVP (Cramer and Darby, 1995: 135). Support and stability for the posterior joints come from the small segmental ligaments and joint capsule (Bergmann, Peterson and Lawrence, 1993: 199).

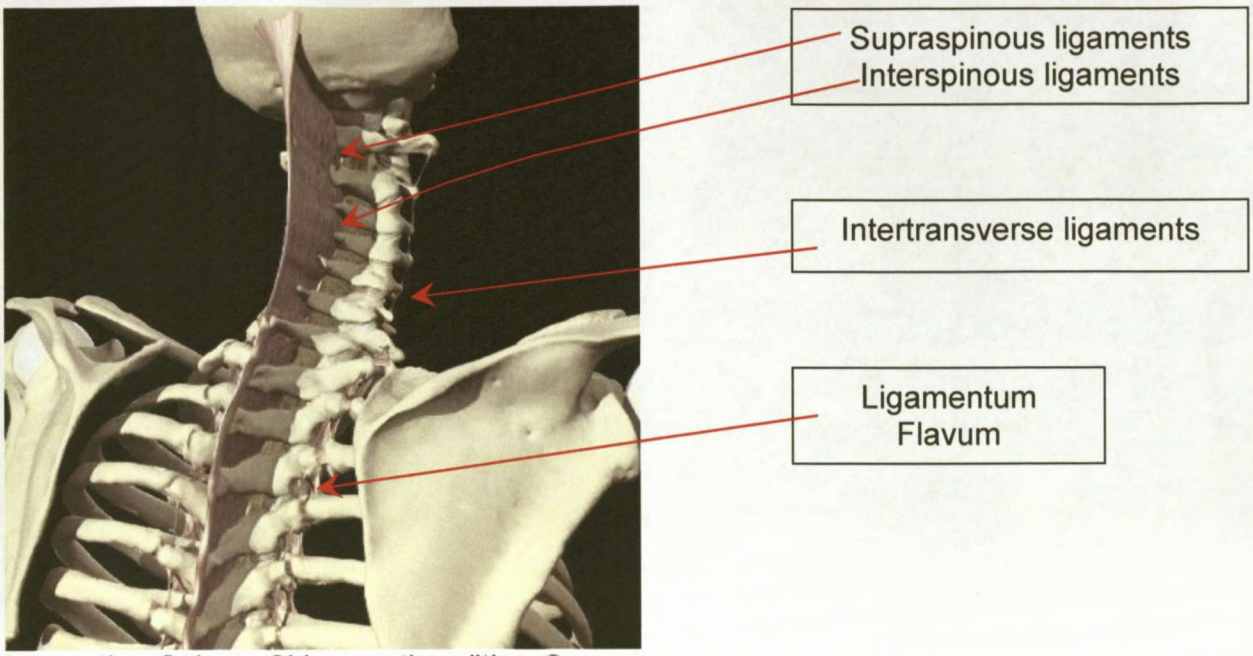

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Figure 2.22: Ligaments

The most sensitive structures that produce pain are: the periosteum (covering of the bone) and the ligaments. It is important to note that in the scale of pain sensitivity (which part of the body hurts more when injured), the periosteum ranks first, followed by ligaments, tendons, fascia (the connective tissue that surrounds muscle), and finally muscle (http://www.getprolo.com 2001). All pain receptors in the skin and other tissues are free nerve endings, and they are widespread in the above-mentioned tissues. Most pain fibres can be excited by multiple stimuli. However, some fibres are more likely to respond to excessive mechanical stretch, others to extremes of heat or cold and still others to specific chemicals in the tissues. The nerve endings in the ligaments respond to mechanical stretch and chemicals such as histamines, acids and proteolytic enzymes (Guyton, 1992: 357-358).

2.2.4. Blood supply of the cervical spine.

2.2.4.1 The sub-occipital region.

The occipital artery, which arises from the external carotid artery, runs posteriorly and superiorly, medial to the digastric muscle and the mastoid process. It runs posteriorly and superiorly under the splenius capitus muscle and the sternocleidomastoid muscle attachments, turning superiorly to lie with the greater occipital nerve. It spreads out from this point to supply the scalp, back of the head as far as the vertex of the scalp (Moore and Dalley, 1999: 866).

2.2.4.2. The deep cervical arteries.

The vertebral artery is the first branch from the subclavian artery, proceeding to the transverse foramina of C6 to C2 (Cramer and Darby, 1995: 137), lying directly in front of the cervical nerves and medial to the intertransverse muscles (Bland, 1994: 66). The artery gives off spinal branches that pass into the foramina to supply ligament, dura and bone. It then runs up through the foramen magnum into the cranial cavity to supply various structures of the brain.

The deep cervical arteries arise from the costo-cervical trunk of the subclavian arteries. They then passes posteriorly between the first rib and C7 transverse process to ascend in the back of the neck to the back of the skull where the deep cervical arteries anastamose with both the occipital and vertebral arteries. The trunk passes postero-superiorly and divides into the superior intercostal and deep cervical arteries, which supply the 1st two intercostal spaces and posterior deep cervical muscles, respectively (Moore and Dalley, 1999: 1029).

Other internal tissues that have widespread free nerve endings are the arterial walls, the falx and the tentorium of the cranial vault. Tugging on the venous sinuses; damaging the tentorium or stretching the dura can all cause intense pain. Almost any type of traumatising, crushing or stretching stimulus to the blood vessels of the dura can cause a headache. A very sensitive structure is the middle meningeal artery.

Prolonged tension/stress causes reflex vasospasm of some of the arteries of the head, including some of the arteries that supply the brain itself. A host of processes can cause the vessels to dilate and pulsate intensely can cause the actual pain of migraine headaches (Guyton, 1992: 363).

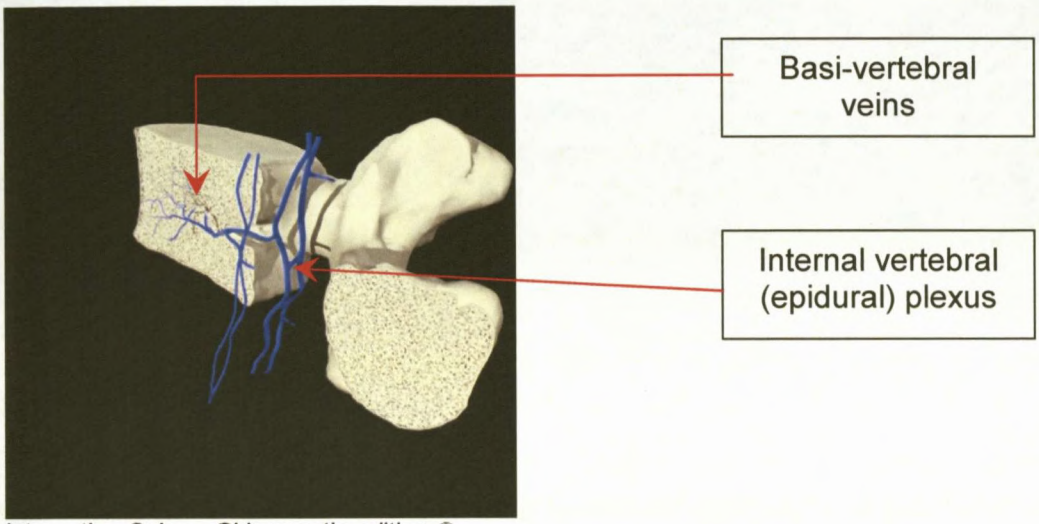

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Figure 2.23: Venous drainage

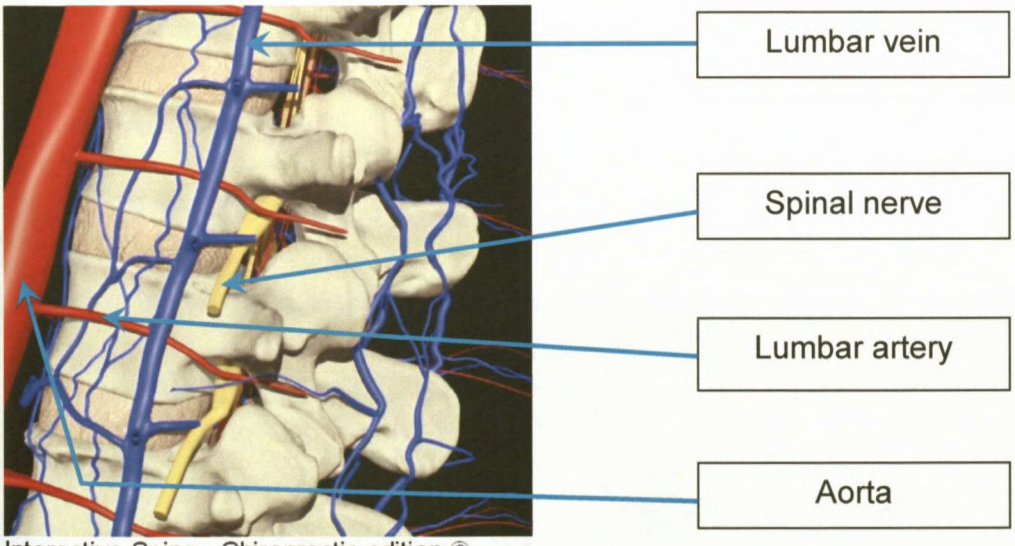

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Figure 2.24: Neurovascular structures of the lumbar spine

2.2.5. Nerve supply.

2.2.5.1. Spinal cord and nerve roots.

The spinal cord and nerve roots are cushioned and suspended in the subarachnoid space and the CSF (Bland, 1994: 62). Fibrofatty tissues and the venous plexus of the epidural space isolate the cord from the movements of the lamina. The largest region of the cord is from C3 – T2 (Bland, 1994: 63). The vertebral canal is largest at C1-3 where rotary movements have the potential of decreasing the space available to the cord. Although there are seven cervical vertebrae, there are eight cervical nerve roots (Magee, 2002: 124). Nerve roots are composed of a posterior root, which emerges from the dorsolateral sulcus of the cord, called the dorsal or posterior ramus (Bland, 1994: 63). Anterior roots emerge from ventrolateral aspect of the cord and are called the anterior or ventral ramus. As the nerve roots come directly off the spinal cord, each root invested in a root sleeve. Around the area of the IVF, root ganglia are formed. Beyond the ganglia, the two roots merge to form the composite spinal nerve with its anterior and posterior primary rami, each with contributions from both the anterior and posterior roots (Bland, 1994: 64).

The posterior rami wind backward to supply skin, fascia, and muscle: C2 and C3 supply the occipital nerve and the medial region of the back of the head, and C4 and C5 supply the back of the neck. The anterior rami pass forward, the upper four rami unite to form the cervical plexus and the lower four rami and T1 form the brachial plexus (Cramer and Darby, 1995: 142).

The cervical plexus supplies muscular branches to the SCM, trapezius and levator scapulae muscles; the sensory branches supply the mastoid region, ear, lower cheek, anterolateral aspect of the neck, and skin above and below the clavicle. The brachial plexus supplies the upper limbs and most muscles of the shoulder girdle (Bland, 1994: 64 – 65).

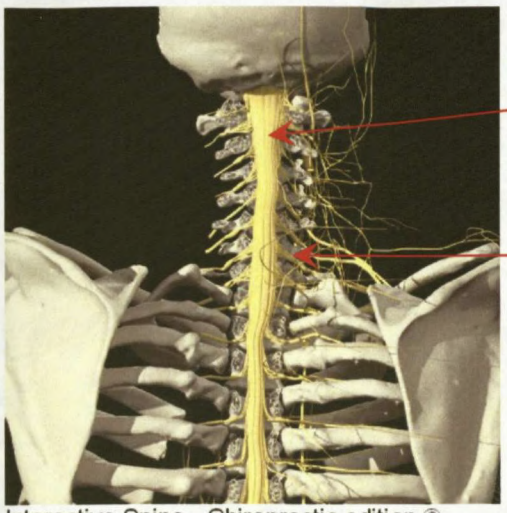

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Figure 2.25: Nerves

2.2.5.2. The greater occipital nerve (sensory).

This nerve originates from the dorsal ramus of C2. It curves around the inferior border of the inferior oblique muscles to ascend superiorly and medially through the semispinalis capitus muscle to emerge laterally to the ligamentum flavum, below the superior nuchal line. It passes between the attachment of the trapezius and SCM into the scalp. It supplies the skin over the neck and up to the vertex or the skull's coronal suture. Terminal branches provide sensory branches to the occipital and transverse facial arteries (Cramer and Darby, 1995: 142). It is the nerve most frequently involved in the sensory disorders of the region (Moore and Dalley, 1999: 477).

2.2.5.3. The third cervical nerve (sensory).

This nerve originates from the posterior ramus of C3 to supply the skin of the upper ½ of the back of the head and neck (Moore and Dalley, 1999: 477) and it assists the greater occipital nerve in its sensory innervation of the sub-occipital region (Cramer and Darby, 1995: 142).

2.2.5.4. The lesser occipital nerve (sensory).

Formed by the ventral ramus of C2 and C3 nerves, it supplies the skin of the neck and the scalp posterosuperior to the auricle (Moore and Dalley, 1999: 477, 1011).

2.2.5.5. The sub-occipital or first cervical nerve (motor).

The first cervical nerve is formed by the dorsal ramus of C1 (Cramer and Darby, 1995: 142). It supplies the rectus capitus and longisimus capitus muscles, and joins the hypoglossal nerve, which it travels with to supply the genioglossus and external muscles of the larynx. The posterior ramus of the nerve passes posteriorly to supply the head and neck extensors, infrahyoid, rectus capitus posterior major and minor, and longus capitus (Moore and Dalley, 1999: 475) and sub-occipital muscles (Cramer and Darby, 1995: 142).

Neuropathic pain results from dysfunction in the nervous system. It's believed to be sustained from aberrant somatosensory processes in the peripheral nervous system, the central nervous system or both. Pain may involve the efferent function of the sympathetic nervous system (sympathetically maintained pain) or indentifiable peripheral pathology (e.g. nerve compression) or central nervous system pathology (e.g. stroke or spinal cord injury). (Beers and Berkow, 1999: 1363) This pain is often described as a burning or lacinating pain (Beers and Berkow, 1999: 1371) occurring within the regions supplied by the sub-occipital or first cervical nerve, thus often resulting in neck pain.

2.3. Neck pain.

Neck pain, stiffness and restriction of movements are frequent consequences of trauma and degenerative disorders of the cervical spine (Haslett et al; 1999: 820).

2.3.1. Aetiology.

The zygapophyseal joints are of clinical interest because they are close to the IVFs through which the spinal nerves emerge from the vertebral canal. When these joints are injured or diseased from arthritic processes, the related spinal nerves are affected.

This causes pain along the distribution patterns of the dermatomes and spasms in the muscles derived from the associated myotomes (Moore and Dalley, 1999: 455). Cervical pain (neck pain) may have several causes, including inflamed lymph nodes, muscular strain and protrusion of IVD's (Moore and Dalley, 1999: 995).

2.3.1.1. Causes of neck pain.

Other causes of neck pain include but are not limited to [taken from Haslett et al; 1999: 820]:

- Mechanical: postural; whiplash injury; disc prolapse; cervical spondylosis and thoracic outlet / neuro-vascular syndromes.
- Inflammatory: infections; ankylosing spondylitis; juvenile idiopathic arthritis; rheumatoid arthritis and polymyalgia rheumatica.
- Metabolic: osteoporosis; osteomalacia and paget's disease.
- Neoplastic: metastases, myeloma, reticulosis and intrathecal tumors.
- Other: torticollis and fibromyalgia.
- Referred pain: angina pectoris, aortic aneurysm, pancoast tumor, the diaphragm, the pharynx, cervical lymph nodes, the teeth, acromioclavicular joints and the shoulder.

2.3.2. Epidemiology.

Transient episodes of acute neck pain and stiffness occur in 40-50% of all adults, within an increasing incidence in those over the age of 45 years. Many attacks appear to be caused by awkward sleeping postures and most resolve spontaneously within 1-4 days. Neck pain of mechanical origin is less common that low back pain as a cause of industrial disability but assembly line workers and heavy manual labourers are at particular risk (Haslett et al; 1999: 820).

More prolonged neck pain and stiffness lasting up to 2-3 months is a frequent sequel of 'whiplash' hyper flexion/extension injuries in up to 50% of all serious car collisions, even in the absence of fractures or nerve root injuries (Haslett et al; 1999: 820).

Neck pain is a common health problem that is associated with significant disability in the general population, consequently, very little is known about the natural history of neck pain. To our knowledge, the only population-based incidence cohort study of neck pain suggests that 17.9% of adults develop an episode of neck pain every year (Cote et al; 2004).

Musculoskeletal pain disorders such as neck pain are common public health problems among today's working population in industrialized countries. It not only has an economic impact, but also produces a lot of pain and suffering to people. The lifetime prevalence of neck pain in adults has been reported to range from 26 to 71%, increasing with age up to the age of 60–70 and it is believed that neck pain is significantly more common among women than men (Stahl et al; 2004).

Cross-sectional studies consistently report that the prevalence of neck pain increases with age and that it is higher in women; these findings are supported by Croft et al; (2001) cited in Cote et al; (2004), who found that the incidence of neck pain increased slightly with age and peaked between the ages of 30 and 45 years.

However, much less is known about the age and gender-specific course of neck pain. The higher prevalence of chronic neck pain in older individuals and in women suggests that neck pain varies with age and gender (Cote et al; 2004).

2.4. Effects of neck pain on the economy.

IsiZulu is spoken as a first language by 8, 5 million people in South Africa, making it the most frequently spoken language in the country (www.linx.co.za, 2002). Therefore in the health care sector, as in all facets of society, it is imperative that the needs of this population group be addressed. This however has not been the case as there are no validated research tools that exist that are able to access the information required to allow for improved health care.

According to Ferrari and Russell (2003) neck pain is second only to low back pain as the most common musculoskeletal disorder in population surveys and primary care, and like low back pain, it poses a significant health and economic burden, being a frequent source of disability.

Luime et al; (2005) however, states that shoulder and neck pain are common problems in the general population, with 1-year prevalence varying from 7% to 47% for shoulder complaints and from 16% to 61% for neck complaints and that shoulder and neck complaints may result in sick leave, loss of productivity, and inability to carry out household and leisure time activities.

In terms of being age-specific, there are reports (Stahl et al; 2004) that in the last decade, neck pain has become a growing health problem among adolescents. Reports of WHO Cross-National Study support these findings. The prevalence of neck pain increases with age and symptoms are more common among girls than boys analogously to adult population (Cote et al; 2004). In preadolescence, no difference between genders was found in either the occurrence of neck pain, or in other musculoskeletal pain symptoms (Mikkelsson et al; 1997 as cited in Stahl et al; 2003). In adolescence, however, neck pain was significantly more common among girls (13–16-year-olds). Hartvigsen, Christensen and Frederiksen (2004) report back pain and neck pain are common, intermittent symptoms in old age and that those musculoskeletal disorders are associated with general poor physical health in old age. It's also been found that pain in the neck is common and often associated with disability among adults of working age (Walker-Bone et al; 2004). It would nevertheless seem that neck pain irrespective of age and gender is responsible for a high rate of disability and thus also presents as a high economic burden (Ferrari and Russell, 2003).

It is known that neck symptoms have a multifactorial etiology. Several physical risk factors have been identified, with repetitive movements and prolonged computer work as the most prominent until now. Also, neck symptoms were associated with personal characteristics, such as coping style, type -A personality, high job demands and introversion (Van den Heuvel et al; 2005).

While most individuals with acute neck pain do not seek health care, those that do, account for a disproportionate amount of health care costs. Chronic pain also brings with it the spectre of litigation (e.g. whiplash issues) and disability claims (Ferrari and Russell, 2003). Furthermore, in the setting of the whiplash syndrome, neck pain accounts for significant costs to society in terms of insurance and litigation, and days lost from work.

The Quebec Task Force on Whiplash-Associated Disorders found, for example, that 12% of whiplash patients in Quebec remained in chronic pain one year after their collision. Yet these 12% accounted for 47% of costs of all whiplash injuries in terms of treatment and lost wages (Ferrari and Russell, 2003).

In this respect, road traffic accidents on the South African road and street networks rate amongst the highest in the world. In the order of 10 000 persons lose their lives annually while about 40 000 are seriously injured and 110 000 slightly injured in 500 000 accidents. These accidents cost the country more than R 13 billion per annum. In December 2002 more than 1200 people (nearly 40 per day) were killed as a result of road trauma in South Africa. Analysis of this trauma has shown:

- Most collisions occur at night and on weekends;
- Pedestrians make up almost 40% of all road trauma victims;
- Over 12% of all victims are children with the most at risk group being aged between 6 and 12 (http://new.hst.org.za/news/index.php/20040502/)

In addition selected national figures from surveys of road users indicated that:

- The age groups responding to the survey consisted of 6% under 16 years of age, 29% between 16 and 25, 34% between 26 and 40, 20% between 41 and 55, and 11% over 55 years of age

- The split between residential areas shows 32% rural response with 68% residing in the metropolitan areas.

- Racial groups represented were 36% black, 18% coloured, 16% Asian and 31% white.

- Incomes group surveyed 11% no income, 35% low income, 44% middle income and 9% high income. 1% would not respond to this question.

- Travel information revealed that 37% did not drive a vehicle with 79% travelling on three or more days per week. 58% used motorcars as their primary method of travel, with 28% using mini bus taxies, 9% pedestrians and 4% on motorcycles.

- This trend was consistent in most Provinces with KZN and Eastern Cape having the closest balance of motor vehicle and taxi usage (http://new.hst.org.za/news/index.php/20040502/).

It would therefore seem that in South Africa one could expect a higher incidence of neck pain in all population groups.

This is further compounded by research indicating that in 1998 just under 80% of pedestrian casualties were Coloured and African pedestrians and those between 20-40 years of age. Pedestrians constitute the road user group that is socio-economically the worst off. Below is a profile of pedestrians who were accident victims and whose claims from the Road Accident Fund were paid out. This profile provides information on the type of injury, as well as the gender, population group and age distribution of pedestrians.

In 1998, drivers constituted the largest group of road accident victims in South Africa – 37% of the total. This was followed closely by passengers (36%) and then by pedestrians (24%). The age distribution of drivers shows that road accident casualties mainly occur in the younger age groups, with approximately 35% of them involving the age group of 20 to 29. (http://www.transport.gov.za/library/docs/raf/annexC-%.pdf).

Nearly two thirds (61%) of the pedestrians were injured slightly and moderately serious, while a quarter was seriously injured. Almost two thirds (62%) of the pedestrians were men. Africans constituted the largest group (three quarters –75%), while Coloureds, Whites and Indians comprised 15%, 6% and 4% of this group respectively. More than half (52%) of the accident victims in this group were between 20 and 49 years old, while more than a third (36%) were under the age of 20 and children under the age of 10 make up a substantial portion (10%) of pedestrian victims. (http://www.transport.gov.za/library/docs/raf/annexC-7.pdf)

Amongst the injuries incurred from accidents, (http://www.transport.gov.za/library/docs/raf/s14-36A.pdf) orthopedic injuries, neck injuries, minor soft tissue and whiplash injuries and the like where symptoms are moderate and a full recovery takes place within at most two years.

It is estimated that the cost of automobile collisions to individuals, commerce, communities and the country is in the region of R38 billion annually. As a developing country and continent, we cannot afford to spend this amount of money on road trauma, when we have so many other developmental needs in education, health, housing and social upliftment. What is just as frightening is that around twenty people are permanently disabled on our roads every day. This means that more than seven thousand people are left maimed each year by poor attitude and behavior on our roads. Seven thousand families each year have to cope with a permanent reminder of an incident, which changed their lives forever (http://arrivealive.co.za/document2004-CrashBook-N).

When one considers the similarity between locally published and international studies with regard to neck pain, it stands to reason that in South Africa, with the higher percentage of road accidents and injuries, the locally reported neck pain is of traumatic origin. However, no statistics are available in this regard and even less is available statistically with respect to different ethnic groups.

Chapter 3

Materials and Methods

3.1. Introduction.

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

The primary data was the data collected from the questionnaires/participant responses and the data obtained once the statistical analysis was complete. Secondary data is the data in the literature, Internet, books, journals etc. with which to compare the outcome of the results in the research study.

3.2. Study design.

This was a prospective, quantitative validity assessment study that compared the English versions of the CMCC NDI and the SFMPQ to their Zulu counterparts to assess their validity. This was achieved by recruiting bilingual (i.e. speakers of both English and isiZulu) subjects with neck pain, requesting them to fill in both the English and the Zulu questionnaires at the Durban Institute of Technology Chiropractic Day Clinic.

3.3. Advertising/ Recruitment.

A non-probability convenience sampling technique was used to attract participants. The study was limited to bilingual participants. Advertisements (Appendix C) were placed at the Durban Institute of Technology Chiropractic Day Clinic, Durban Institute of Technology Campus and local newspapers, as these were the most convenient method. There was a screening process (telephonic and through the use of only English adverts) to determine that the participant could read and understand English.

3.4. Telephonic interview.

The purpose of the telephonic screen was to ensure that the patient understood and fitted into the criteria necessary for the study to take place. Potential participants were asked if they could read and write English and Zulu, what their mother tongue was and if they suffered from neck pain. They were also asked questions in terms of their symptomatology e.g. the nature of their neck pain.

3.5. Sampling.

3.5.1. Sample size.

3.5.1.1 Participants.

Fifty participants were involved in the study once they had been screened via telephonic interview to ensure that they fitted into the inclusion criteria for this study. All fifty people answered all four questionnaires, and English responses were compared with Zulu responses, thus we had a paired analysis, which effectively doubled the statistical power compared with an independent groups' analysis. Thus any p values (where available) with high significance ($p < 0.001$), would indicate that the agreement observed could not be due to chance. This is as a result of the fact that chance is likely in studies that are underpowered due to small sample size. Thus the result would hold greater statistical validity as this study was not underpowered for its objectives.

In addition, if this is considered as a pilot study, statistical power is not of great concern, as pilot studies are concerned with testing the methods and tools (questionnaires) rather than drawing statistical conclusions. However, this study has the ability to draw viable statistical conclusions, based on its strength (T. Esterhuizen. Biostatistician at UKZN. Personal communication. 2005, 2006).

3.5.1.2. Questionnaires.

In this study the first two hundred valid questionnaires (fifty English CCMC NDI, fifty Zulu CMCC NDI, fifty English SFMPQ and fifty Zulu SFMPQ) were used to gather information from the neck pain sufferers.

3.5.2. Sample allocation.

There was no group allocation as it was mandatory that each participant complete each of the 4 questionnaires - the two English and the two Zulu questionnaires.

3.5.3. Sample method.

3.5.3.1 Participants.

A non-probability purposive sampling technique was used to attract participants as this supported the need for bilingual participants in this study. This supported the fact that the study was limited to bilingual participants, because they had a literacy and understanding of the contexts of the questions in both the English and Zulu questionnaires and thus would respond similarly to the questions posed and any differences could be isolated to the manner in which the translation was done and questionnaire presented.

3.5.3.2. Questionnaires.

The participants needed to answer all the questions on each of the four questionnaires (four per participant) regardless of the order in which the questionnaires were set out in, so long as they answered one English CMCC NDI, one English SFMPQ, one Zulu CMCC NDI and one Zulu SFMPQ.

Purposive sampling through self-selection was used when the Zulu CMCC NDI, Zulu SFMPQ and English versions were data captured. On data capture, the selection process for the questionnaires was based on the amount of data omitted from the questionnaires. Any information omitted made the questionnaire invalid.

This procedure increased the stability and consistency of the information gathered from the questionnaire and minimized the human reactivity (Mouton, 1996: 141), which could bias the results.

3.5.4. Sample characteristics.

Through the telephonic interview as well as an initial consultation, the participants were assessed by means of lingual interaction as well as a case history, physical and cervical regional examination to ensure that:

3.5.4.1. Patient inclusion criteria.

1. The participants spoke 1st language isiZulu and 2nd language English to accurately interpret the questions.
2. The participants were able to read and understand Zulu and English in order to participate in the study and because patient inclusion criteria number 1 and 2 are proposed guidelines for cross-cultural adaptations to questionnaires according to Guillemin, Bombardier and Beaton (1993).
3. Those who participated in the combined scale validation who were 18 years or older. For ease of consent and because the prevalence of neck pain increases with age (Cote, Cassidy and Carroll, 2003).
4. The participant's neck pain was of mechanical origin and fell within the treatment capabilities of primary contact practitioners (i.e. the participant would be able to receive care from a General Practitioner or Chiropractor). All participants with visible pathology or neck pain of excruciating nature or radicular pain were excluded as they were assumed to necessitate specialist intervention e.g. an orthopaedic assessment and referred for such (Giles and Baker, 1998: 126).

3.5.4.2. Patient exclusion criteria.

1. Participants were excluded if they were under the age of 18, as they would have required parental/guardian consent.
2. Participants were excluded if the required secondary, tertiary or quantenary care for their neck pain. This by implication indicates that all participants with visible pathology or neck pain of excruciating nature or radicular pain were excluded as they were assumed to necessitate specialist intervention and referred for such (Giles and Singer, 1998: 126).
3. Participants were excluded if: they had participated in face validity testing of the Zulu questionnaires i.e. were members of the focus group or were part of the pilot testing so as not to bias the results (Mouton, 1996: 130 and Baynham, 1995: 37).

3.5.4.3. Inclusion and exclusion of questionnaires.

Two hundred questionnaires (fifty participants answered four questionnaires each) were used in the data capturing process as the participants had answered all the questions correctly in order for the questionnaires to be valid.

3.6. Procedure for data collection.

3.6.1. Study protocol and design.

3.6.1.1 Questionnaires and their validity.

The act of measurement is an essential component of scientific research, whether in the natural, social, or health sciences (Streiner and Norman, 1995: 1). Pain measurements are the most challenging and difficult areas of subjective health measurements and it can be argued that pain is a private and internal sensation that cannot be directly observed or measured, but whose measurement depends wholly on the subjective response of the person experiencing it (Streiner and Norman, 1995: 2). Therefore, there are many methods of gathering this type of data, ranging from the methods of observation to in-depth interviews and questions to active interventions with data sheets (Streiner and Norman 1995: 16-17).

The questionnaire however, is by far the most common and widely used technique of data collection because it can be used in any setting whether formal or informal (Streiner and Norman 1995: 4).

In this respect and according to Korporaal (2002: 30), there are certain set principles that need to be incorporated into the development of each new questionnaire that will be used as a research tool. These are:

- Inclusion of the research question into the questionnaire
- Inclusion of indicators that have been established through consultation with the literature, to ensure that any possible relation can be detected
- Inclusion of hypothesised relationships, which are being tested (measure of the test variables)
- Inclusion of simple language concepts to allow for understanding and ease of completion of the questionnaire by the participant in the research process (demographic variables)

3.6.1.2. Validity of the questionnaires.

Notwithstanding the above-mentioned criteria by Korporaal, validity with respect to questionnaire design also needs to be addressed, as research tools for the English speaking population exist, one could assume that the translated version (Zulu) would be applicable and readily usable, however with translation there are inherent problems.

In terms of questionnaires, when one establishes validity, one is determining the degree to which a particular tool reflects reality, in particular cultural reality (Mouton, 1996: 130). Even if words are translated accurately, the meaning of a phrase or combination of words may be unclear. This may be as a result of the fact that meaning is not only determined by words or phrases, but also in their interpretation by others (Scollen and Scollen, 1995: 6). This occurs because when words are taken out of context they will loose their meaning (Baynham, 1995: 37) thus meaning will differ between cultures, even if the same words are used.

Consequently, with translation some validity will be lost as the questions themselves may not be understood and error/bias will be introduced in the results of the questionnaire.

Guillemin, Bombardier and Beaton (1993) therefore suggested a standardised guideline for the translation of questionnaires from English to another mother tongue. These guidelines are divided into 5 sections, namely:

- Translations, translators should preferably translate into their mother tongue
- Back-translation by qualified people should also translate into their mother tongue
- Committee review of those translations and back-translations (bilingual individuals are of value to such committees and their input is likely to result in measures better adapted in terms of idioms and colloquialisms than that which will be produced by higher educated people)
- Pre-testing for equivalence using adequate techniques (with bilingual or monolingual individuals where the final version is submitted in order to detect possible discrepancies, as would be the case in piloting the questionnaire)
- Re-evaluation of the weighting scores, if relevant (using judgement, the cross-cultural validity (statistical analysis) of the weighting of items is re-examined by experts, who may be health care professionals, patients or lay people)

Based on the above, and in order to utilize a questionnaire as an assessment tool in research, the questionnaire needs to fulfil certain requirements and these include the concepts of face validity, content validity, construct validity, and criterion validity. Therefore a discussion on the validity of the CMCC NDI and SFMPQ follows.

The choice of the questionnaires lay in the fact that the SFMPQ, which was derived from the McGill Pain Questionnaire (MPQ) (Melzack, 1975), is a useful measurement that takes 2-5 minutes to administer. The data obtained from this scale provides information on sensory, affective and overall intensity of pain. This scale has been found to be valid and reliable (Melzack, 1987).

The CMCC NDI is a scale that is widely used and has been proved valid and reliable (Vernon and Mior, 1991). From a psychometric perspective, the CMCC NDI is the scale most widely validated among different patient populations (Pietrobon et al; 2002). Concurrent validity has been established in the CMCC NDI and it has been shown to demonstrate a high degree of test-retest reliability as well as internal consistency (Vernon and Mior, 1991 and Pietrobon et al; 2002).

When utilizing these questionnaires as a base for translation, the construct validity and content validity of the CMCC NDI and SFMPQ remain intact, as they have been established in the English versions of the questionnaires. In addition a focus group ensured that the meanings/concepts/constructs of these questionnaires were apparent in the Zulu translations developed for the focus group.

3.6.1.3. Questionnaire identification for purposes of this study.

It has been said that there is little information that is more important than gaining insight into a patient's activity intolerance, pain level, general health status, and psychometric barriers to recovery, all of which can be gathered by "subjective" measures such as questionnaires (Yeoman's, 2000: 30).

The McGill Pain Questionnaire was selected as a pain perception tool (Yeoman's, 2000: 31) and the CMCC NDI as a spine-related, condition specific questionnaire (Yeoman's, 2000: 32).

The MPQ, introduced in 1975, has been widely utilized and considered a "gold standard" as a pain assessment tool (Vernon, 1996 as cited in Yeoman's, 2000: 64). The choice of the questionnaires lay in the fact that the SFMPQ, which was derived from the MPQ (Melzack, 1975), is a useful measurement that takes 2-5 minutes to administer. The main component of the SFMPQ consists of fifteen descriptors (eleven sensory and four descriptive), which are all rated on an intensity scale: as zero is equivalent to none or no pain, one is equivalent to mild pain, two is equivalent to moderate pain and three is equivalent to severe pain (Melzack, 1987).

With respect to the CMCC NDI, it has stable psychometric properties, which provides an objective means of assessing how neck pain in individuals affects activities of daily living (Hains, Waalen and Mior, 1998 and Pietrobon et al; 2002) and was also developed to measure self-perceived disability from neck pain (Hoving et al; 2003). This scale is widely used and has been proved valid and reliable (Vernon and Mior, 1991) as well as appearing to be sensitive to the levels of the severity of the complaint and to changes in severity in the course of treatment, therefore this instrument is able to measure change over time (Yeoman's, 2000: 10).

3.6.1.4. The focus group.

Once the choice of questionnaires was made, the English questionnaires were translated into Zulu by a member of the focus group (an individual who teaches English to Zulu speaking learners); this is known as forward translation. Once the forward translation process was completed, a focus group was then assembled. Streiner and Norman (1993: 16) describe a focus group as a discussion in which a small group of informants (six to twelve people), guided by a facilitator, in order to talk freely and spontaneously about themes considered important to the investigation. The participants were selected from a target group whose opinions and ideas were of importance to the research and the interests of the researcher with respect to the study. Combining both practical and substantive considerations helps to clarify the basis for the rule-of-thumb-size that specifies a range between six to ten people focus group. Below six, it may be difficult to sustain a discussion and above ten, it may be difficult to control one (Morgan, 1997: 43).

The focus group for this study consisted of nine participants, some from health-care professions, some lay persons, excluding the researcher and a camera operator / witness. Sessions are usually tape-recorded and an observer (recorder) also takes notes on the discussion (Silverman, 2001:162). The members of the focus group were bilingual, from a variety of backgrounds, and represented those that would have a vested interest in the results that the questionnaire would ultimately capture.

This composition was necessary to maintain homogeneity in terms of the agenda of the group (language) because it was vital for the groups' ability to share a discussion on the research topic (Morgan, 1997: 38) as well as comply with Guillemin, Bombardier and Beaton (1993) suggestions for a standardised guideline for the translation of questionnaires from English to another mother tongue.

The point most relevant from the Guillemin, Bombardier and Beaton (1993) guidelines was that by allowing bilingual individuals having their input in the committee review (of the forward and back translations), this would result in the questionnaires becoming better adapted in terms of idioms and colloquialisms than if the questionnaires were produced by academics only.

3.6.1.5. Focus group procedure.

This study's participants were enlisted via word of mouth and advertising, with 9 respondents coming forward and expressing interest in the focus group. This focus group was taped/recorded and transcribed for inclusion in the mini-dissertation. Streiner and Norman (1995: 16) also suggest sessions are usually tape-recorded and an observer (recorder) also takes notes on the discussion as this becomes a public record in support of the questionnaire development (Silverman, 2001: 16).

Before commencing the focus group each participant was required to read a:

- ❖ Letter of information [Appendix F (I)],
- ❖ Sign a confidentiality statement [Appendix F (III)] and
- ❖ Sign an Informed Consent Form [Appendix F (II)].

A registration process is common practice to verify that participants meet the screening requirements for the focus group (Morgan, 1998: 16) this is done for two reasons:

- ☑ Firstly, one is to verify that participants are reasonably representative of those you want in the focus group, and
- ☑ Secondly, to aid in analysis, as there may be a factor in the background of a participant that may help explain a certain view.

The English questionnaires (Appendix D) were then given to each member of the focus group to read. The forum of the meeting was stated and the members then entered a discussion initiating the comparisons of the English questionnaires to the translated versions in Zulu. Each participant was then able to analyse and comment on how accurately (or inaccurately) each of the Zulu questions reflected the basic meaning of the English questions and vice versa (Guillemin, Bombardier and Beaton, 1993). Once the process of subjecting the English questionnaires to the translation and back-translation process was complete, the face validity testing was also completed. The process of forward translation occurred when the English questionnaires were translated to Zulu. The process of back-translation occurs when the newly translated Zulu versions were translated back into English to ensure that the different forms of validity remain intact. The suggested changes were made and thus the Zulu CMCC NDI and Zulu SFMPQ (Appendix E) were formed by consensus agreement within the focus group.

In order to achieve this, the questions were discussed in sequential order. If inconsistencies were found or changes proposed, a unanimous vote was needed to have a change instituted. At the end of the discussion a chance was given for any comment on the questionnaire, or on translation in general. However, the participants made no further comments and all agreed that the changes effected were accurate. This is in line with the "review committee" recommended by Guillemin, Bombardier and Beaton (1993), which may modify or eliminate irrelevant, inadequate and ambiguous items and may generate substitutes better fitting the cultural target situation while maintaining the general concept of the deleted items (Guillemin, Bombardier and Beaton, 1993).

This focus group was necessary so that once the language pre-test with the focus group was done, the questionnaires were finalised and then ready to be piloted and subsequently used as tools for data collection.

3.6.1.6. Pilot study.

A pilot procedure followed the focus group. This entailed having ten persons (not involved in the focus group or respondents of the actual study) complete the questionnaires as though they were respondents in the actual study. After completion of the questionnaires the pilot respondents completed a pre-research questionnaire which isolated problems/errors or omissions with respect to the grammar, sentence structure, ambiguity or other linguistic parameters, as well as problems of a more logistical nature (e.g. time, appropriateness of procedure utilized).

No changes were made to these pre-research questionnaire.

3.6.1.7. Discussion of the final questionnaires.

This study therefore, used the face validated Zulu translations of the CMCC NDI and SFMPQ. The data collected from the Zulu questionnaires (Appendix E) was compared to results gleaned from the English version of the questionnaires (Appendix D). The data was generated using participants with neck pain, which is within the scope of the CMCC NDI and SFMPQ.

The final set of questionnaires consisted of the same basic questions in Zulu. The questionnaires were the same in terms of what is measured e.g. pain, but different in terms of how it is questioned based on the cultural context of the target population.

The questions on the Zulu CMCC NDI and Zulu SFMPQ were re-arranged in order to overcome participants simply answering corresponding questions from the English CMCC NDI and English SFMPQ, from memory. This, in conjunction with the 45-minute break helped facilitate a true reflection of the participant's condition as well as the perception of the questions and the responses.

According to Smith (1975) cited in Mouton (1996: 153), the researcher has to accept the fact that there is a natural decay in the ability to remember events that have positive correlations with:

(1) The length of time that has elapsed since the occurrence of the event;
(2) The irregular occurrence of the event;
(3) The relative unimportance of the event and
(4) Decreased accessibility to relevant data relating to the event.

Re-arranging the order of the questions and having a forty-five minute break increased the stability and consistency of the information gathered from the questionnaire and minimized the human reactivity (Mouton, 1996: 141-143), which could have biased the results.

If it is assumed that memory decay has taken place after completion of the first set of questionnaires and the case history, then it can be assumed that the participants would not have been able to correlate the concept of the questions from the English versions to the Zulu versions. Therefore, memory decay will assist in minimizing the level of human reactivity and minimizing the bias of the results.

3.7. Data collection.

The Zulu CMCC NDI and Zulu SFMPQ along with their English counterparts were used to gather information from Zulu/English neck pain sufferers. Before participating in the study, but after their eligibility had been assessed by means of the inclusion and exclusion criteria, subjects read and signed both an Letter of Information (Appendix A) and Informed Consent Form (Appendix B), so that ethically, they had a basic understanding of the methodology of the study.

The participants then answered the two English and two Zulu questionnaires (Appendix D and Appendix E). The Zulu questionnaires were handed out first and collected after each participant had completed them. The researcher then proceeded with the patient case history (+/- forty-five minutes) after which the participant completed the two English questionnaires.

Once all four questionnaires were completed, the participant was given a free assessment, which included a physical examination and a regional examination of the cervical spine. Thereafter one free optional treatment was administered.

Although the consultation was not part of the research, it was performed by the researcher at the D.I.T. Chiropractic Day Clinic as an incentive for participating in the study.

3.7.1. Data collection frequency.

The data collection process in terms of each participant completing each of the four questionnaires occurred only once, as it was not necessary to collect the data over a period of time.

3.8. Statistical analysis.

The data collected was then to be taken for data capturing purposes. The descriptive statistics were analysed using the SPSS package version 11.5 (November 2002) (Esterhuizen, T. Biostatistician at UKZN, Personal communication in 2005 and 2006). The data generated will be represented by means of graphs, bar graphs and tables for visual communication.

Inferential statistics were completed using Graphpad software (Esterhuizen, T. Biostatistician at UKZN, Personal communication in 2005 and 2006) in order to analyse the intra-rater agreement between the English and Zulu Questionnaire responses (http://graphpad.com/quickcalcs/Kappa2.cfm). The weighted Kappa statistic was used to measure the inter-rater agreement as the categories were ordinal. SPSS version 11.5 (November 2002) was used to perform the cross-tabulations and calculate p values for the Kappa statistics. The p values were applied as per the level of confidence as set at 95% or α =0.05.

If there was a significant correlation between the two versions of the questionnaires, concurrent validity could be claimed.

Chapter 4

Results and Discussion of Results

4.1. Introduction.

4.2. Data.

The primary data was collected using the translated Zulu questionnaires and the secondary data includes information accessed from books, journals and the Internet.

4.3. Key terms.

MPQ	–	McGill Pain Questionnaire
SFMPQ	–	Short Form McGill Pain Questionnaire
NDI	–	Neck Disability Index
E	–	English.
Z	–	Zulu.

4.4. The questionnaire: SFMPQ.

The MPQ, introduced in 1975, has been widely utilized and considered a "gold standard" as a pain assessment tool (Vernon, 1996 as cited in Yeoman's, 2000: 64). The choice of the questionnaires lay in the fact that the SFMPQ [Appendix D (i)], which was derived from the MPQ (Melzack, 1975), is a useful measurement that takes 2-5 minutes to administer. The data obtained from this scale provides information on sensory, affective and overall intensity of pain (Yeoman's, 2000: 64). This scale has been found to be valid and reliable (Melzack, 1987).

There was generally an over-all good level of agreement between responses to the English and Zulu questionnaires (Table 1, see page 90). Strength of agreement for the individual items ranged from "fair" to "very good".

Percentage agreement ranged from 68% to 94%. For items where a p value was available (i.e. where there was a symmetric two-way table (see page 17) between the English and Zulu responses), there was a highly significant level of agreement ($p < 0.001$), which implied that in the population there was significantly greater agreement than expected by chance alone.

4.5. The questionnaire: CMCC NDI.

The NDI [Appendix D (ii)] has stable psychometric properties, which provides an objective means of assessing the disability of patients suffering from neck pain (Hains, Waalen and Mior, 1998 and Pietrobon et al; 2002) and was also developed to measure self-perceived disability from neck pain (Hoving et al; 2003). This scale is widely used and has been shown to be valid and reliable (Vernon and Mior, 1991) as well as appearing to be sensitive to the levels of the severity of the complaint and to changes in severity in the course of treatment, therefore this instrument is able to measure change over time (Yeoman's, 2000: 10).

With this scale there was a good level of intra-rater agreement, with 90% of items having a "good" strength of agreement (Table 17, see page 122). Item 7 had a "very good" agreement between the English and Zulu questionnaires. Where p values were available, the significance of agreement was very high and could not have arisen purely by chance.

4.6. The outcomes relative to the first objective.

The first objective of this prospective pilot investigation was to analyze and critique the Zulu translation of the CMCC NDI and SFMPQ (Appendix E) in order to establish their face validity.

Hypothesis one: Face validity will be established.

As research tools for the English speaking population exist, one can assume that the translated version (Zulu) would be applicable and readily usable, however with translation there are inherent problems.

Even if words are translated accurately, the meaning of a phrase or combination of words may be unclear. Meaning is not only determined by words or phrases, but also in their interpretation by others (Scollen and Scollen, 1995: 6) this is because when words are taken out of context they will loose their meaning (Baynham, 1995: 37) thus meaning will differ between cultures, even if the same words are used. Consequently, with translation some validity will be lost as the questions themselves may not be understood and error / bias will be introduced in the results of the questionnaire.

4.6.1. Discussion on types of validity.

When establishing validity, one is determining the degree to which a particular tool reflects reality (Mouton, 1996: 125). Validity should be viewed as the "best approximation of the truth" (Mouton, 1996: 109). It should also be emphasized that 'validity' is an epistemic criterion, which means that it is the quality of the elements (data, statements, hypotheses, theories and methods) of knowledge. In order to utilize a questionnaire as an assessment tool in research, the questionnaire needs to fulfill certain requirements and these include the concepts of face validity, content validity, construct validity, and criterion validity.

4.6.1.1. Face validity.

Face validity, the simplest type of validity, is determined by agreement between researchers and those focus group participants with a vested interest in the questionnaire, that on the face of the questionnaire, the tool seems valid when assessing the desired qualities. The terms face validity and content validity, are technical descriptions of the judgement that a scale looks reasonable (Streiner and Norman, 1995: 5-6).

4.6.1.2. Content validity.

Content validity is a closely related concept to face validity, consisting of a judgement whether the instrument samples all the relevant or important content. Face and Content validity consist of judgements by experts whether the scale

appears appropriate for the intended purpose. 'Content relevance' and 'content coverage' are argued to be more accurate descriptors than content validity (Streiner and Norman, 1995: 20).

These concepts arose from achievement testing, where students were assessed to determine if they had learned the material in a specific content area; final examinations are the prime example. With this in mind, each item on the test should relate to one of the course objectives (content relevance). Items, which aren't related to the content of the course, introduce error in measurement in that they discriminate among students on some level other than the one purportedly tapped by the test. Conversely, each part of the syllabus should be represented by one or more questions (content coverage). If not, then students may differ in some important respects, but this would not be reflected in the final score (Streiner and Norman, 1995: 21).

Thus, according to Streiner and Norman (1995: 146-147), a measure that includes a more representative sample of the target behaviour lends itself to more accurate inferences; that is, inferences, which hold true under a wide range of circumstances. If there are important aspects of the outcome that are missed by the scales, then we are likely to make some inferences which will prove to be wrong; our inferences (not the instruments) are thus invalid. Therefore, the higher the content validity of a measure, the broader the inferences become that we can validly draw about the item under a variety of conditions and in different situations (Streiner and Norman, 1995: 147).

4.6.2. Discussion on the transcript of the focus group.

During September 2003, nine people came together to form a focus group for this research project. The participants came from various backgrounds, some from health-care professions, some lay persons, excluding the researcher and a camera operator/witness. The session was recorded on a videotape (Silverman, 2001:162) and an observer (recorder) also took notes on the discussion.

The members of the focus group were bilingual, from a variety of backgrounds, and represented those that had a vested interest in the results that the questionnaire would ultimately capture.

The transcript is the written account of the actual discussions that took place amongst the members of the focus group. This focus group was recorded on a videotape and transcribed for inclusion in the mini-dissertation. Streiner and Norman (1995: 16) also suggest that sessions are recorded and an observer (recorder) also takes notes on the discussion as this becomes a public record in support of the questionnaire development (Silverman, 2001: 16).

Once the preliminaries were taken care of (signing of the Letter of Information, Informed Consent Form and the Confidentiality Statement – Appendix F), the English questionnaires (Appendix D) were then given to each member of the focus group to read. The forum of the meeting was stated and the members then entered a discussion initiating comparisons of the English questionnaires and the Zulu questionnaires. Each participant then analyzed and commented on how accurately (or inaccurately) each of the Zulu questions reflected the basic meaning of the English questions and vice versa (Guillemin, Bombardier and Beaton, 1993). Once the process of subjecting the English questionnaires to the translation and back-translation process was complete, the face validity testing was also completed. The suggested changes were made and thus the Zulu CMCC NDI and Zulu SFMPQ (Appendix E) were formed by consensus agreement within the focus group.

> Hypothesis one: Face validity was established. This hypothesis was accepted.

With regards to the Zulu SFMPQ, there were minor grammatical changes made to the originally translated questionnaire. With the Zulu CMCC NDI, changes to the original questionnaire included those of a grammatical, cultural and contextual nature in order for the questionnaires and the study to move onto the next phase.

4.7. The outcomes relative to the second objective.

The second objective of this prospective pilot investigation was to analyse and critique the Zulu translation of the CMCC NDI and SFMPQ (Appendix E) in order to establish their concurrent validity, ensuring that the translations are sensitive and specific enough to use as a tool in data collection when compared to their English counterparts.

Hypothesis two:

If the results were in agreement or within an acceptable/reasonable margin, the Zulu CMCC NDI and Zulu SFMPQ (Appendix E) could be declared to have concurrent validity within the context of the Zulu speaking population of Kwa-Zulu Natal.

4.7.1. Construct validity.

Construct validity measures how accurately answers to questions in a scale reflect theoretical predictions of a particular construct, in this case neck / cervical pain.

An instrument has high construct validity if there is a close fit between the construct it supposedly measures and actual observations made with the instrument (Bernard, 2000: 51), in other words, if it allows you to infer that a unit of analysis (a person, a country, etc.) has a complex trait and if it supports predictions that are made from theory.

Attributes such as height and weight are readily observable or can be measured. Once we move away from the realm of physical attributes into more 'psychological' ones like anxiety, intelligence or pain, we begin dealing with more abstract variables, ones that cannot be directly observed (Streiner and Norman, 1995: 150-151). Thus these factors are only hypothesized manifestations in terms of observable behavior and these proposed underlying factors are referred to as hypothetical constructs.

A construct can be thought of as a mini-theory to explain the relationships among various behaviors or attitudes (Streiner and Norman, 1995: 151).

Thus, construct validation is an on-going process of learning more about the construct, making new predictions, and then testing them. Albert Einstein (Streiner and Norman, 1995: 152) once said that there have been hundreds of experiments supporting his theory of relativity, but it would take only one non-confirmatory study to disprove it. Therefore, content and criterion validity can often be established with one or two studies. However, we are often able to make many different predictions based on our construct, thus there is no single experiment which can unequivocally 'prove' a construct (Streiner and Norman, 1995: 152) and most often the construct is shown to be untrue or disproved.

4.7.2. Concurrent/Criterion validity.

According to Nunnally (1978) as cited in Mouton (1996: 128), concurrent/criterion validity is relevant when the purpose is to use an instrument to estimate some important form of behavior external to the measuring instrument itself, the latter being referred to as a criterion.

An example from everyday life is when the number of matriculation distinctions is used as a predictor of academic achievement at university. If a high correlation were to be found between the number of distinctions and tertiary academic achievements, the former could justifiably be regarded as a good predictor of the latter. This is an example of 'predictive' validity, were a criterion is employed to determine whether the measurement can be used to predict a future situation validly (Streiner and Norman, 1995: 148).

Streiner and Norman (1995: 147-148) also explain that the traditional definition as being that of a correlation of a scale with some other measure or trait under study or a 'gold standard' which has been widely accepted in the field. He believes that criterion validity is divided into two types: concurrent and predictive validity.

- ☑ With concurrent validity, we correlate the new scale with the criterion measure, both of which are given at the same time. For example, we could administer a new scale for neck pain and the CMCC NDI (an accepted measure for neck pain) during the same interview or within a short time of each other.

- ☑ In predictive validity, the criterion will not be available until some time in the future. An example of this would be in diagnostic tests, where one must await the further progression of a disease to confirm or disconfirm our predictions. Predictive validity falls under this category as well. If a tool can predict a future situation accurately it has predictive validity.

Concurrent/criterion validity is measured when a particular tool produces similar results when compared with another tool already known to be trustworthy (Mouton, 1996: 128). An instrument has high concurrent/criterion validity if there is a close fit between the measures it produces and the measures produced by some other instrument that is known to be valid, (Bernard: 2000: 51) this is the gold standard test.

Construct validity and content validity of the CMCC NDI (Vernon and Norman, 1991and Hoving et al; 2003) and of the SFMPQ (Melzack, 1987) remain intact, as they have been established in the English versions of the questionnaires. The focus group facilitated the process whereby the meaning of these questionnaires was apparent in the Zulu translations that were used in this study.

4.7.3. The Kappa coefficient.

Streiner and Norman (1995: 114) state that there has been considerable debate in the literature regarding the most appropriate choice of the reliability coefficient. Cohen's kappa (Cohen 1960) is frequently used.

There are many situations in medicine, which only have two levels - presence or absence, dead or alive, normal or abnormal. A straightforward approach is to calculate simple agreement: the proportion of the responses in which the two observations agreed (Streiner and Norman, 1995: 116). Although straightforward, this measure is very strongly influenced by the distribution of positives and negatives. If there is a preponderance of either normal or abnormal cases, there will be a higher agreement by chance alone than related to the construct in question (Streiner and Norman, 1995: 116).

The Kappa coefficient explicitly deals with this situation by examining the proportion of responses in the two agreement cells (yes / yes, no / no) in relation to the proportion of responses in these cells, which would be expected by chance, given the marginal distributions. However, we would expect that a certain number of agreements would arise by chance alone but Kappa corrects for chance agreement by using a statistical formula.

For example, (Streiner and Norman, 1995: 116) suppose we were to consider a judgment by two observers of the presence or absence of a Babinski Response (splaying of toes when sole of foot is scratched or scraped) on a series of neurological patients. The data can be displayed in a 2 x 2 contingency table.

Table 4.1 Contingency table for two observers

		Observer 2		
		Present	**Absent**	**Total**
Observer 1	**Present**	20	15	35
	Absent	10	55	65
	Total	30	70	100

The overall agreement is simply (20 + 55) / 100 = 75%. However, we would expect that a certain number of agreements would arise by chance alone. Specifically, we can calculate the expected agreement for the marginals; the top left cell would have (35 x 30) / 100 = 10.5 expected observations, and the bottom right cell would have (70 x 65) / 100 = 45.5 expected ones. Kappa corrects for the chance agreement in the following manner:

$$X = \frac{Po - Pe}{1.0 - Pe}$$

Po is the observed proportions of agreements, and Pe is the proportions expected by chance. In this case:

$$X = \frac{\left[\frac{75}{100} - \frac{10,5 + 45,5}{100}\right]}{1,0 - \frac{10,5 + 45,5}{100}} = 0,43$$

Therefore, instead of a raw agreement of 0.75, we then have a chance-correlated agreement of 0.43. In circumstances where the frequency of positive results is very low or very high, it's very easy to obtain very impressive figures for agreement although agreement beyond chance is virtually absent (Streiner and Norman, 1995: 117).

Suppose the same observers were assessing muscle strength, which is conventionally done on a six point scale from zero meaning flaccid to five meaning normal strength. In this case, a display of agreement would involve a 6 x 6 contingency table (Streiner and Norman 1995: 117).

Since the coefficient spoken of above considers only total agreement and does not provide partial credit for responses, which differ only by one or two categories, it would be inappropriate for scaled responses.

However, an extension approach, called weighted kappa (Cohen 1986 cited in Streiner and Norman, 1995: 117) does consider partial agreement. Weighted

Most studies related to inter-rater research don't mention a p value, although this is critical in determining the significance of the agreements between questions obtained in this study by virtue of the support that these results have in terms of the sample size and power of the study (T. Esterhuizen. Biostatistician at UKZN. Personal communication, 2005 and 2006).

4.8. Discussion of the outcomes relative to concurrent validity: SFMPQ.

4.8.1. Kappa statistics.

Table 1: Kappa statistics for agreement between English and Zulu questionnaires for the SFMPQ [Appendix D (i) and E (i)]

Item	% of agreement	Weighted Kappa	Strength of agreement	p value
Throbbing	78%	0.691	Good	<0.001
Shooting	90%	0.556	Moderate	
Stabbing	88%	0.756	Good	<0.001
Sharp	84%	0.808	Very good	<0.001
Cramping	80%	0.681	Good	<0.001
Gnawing	78%	0.510	Moderate	<0.001
Hot burning	76%	0.526	Moderate	<0.001
Aching	68%	0.591	Moderate	<0.001
Heavy	76%	0.672	Good	<0.001
Tender	68%	0.524	Moderate	<0.001
Splitting	78%	0.343	Fair	
Tiring	78%	0.722	Good	<0.001
Sickening	94%	0.803	Very good	<0.001
Fearful	84%	0.641	Good	
Punishing	90%	0.655	Good	

The kappa statistic is worked out on the agreement of the **level** of response for each type of pain. The % of agreement is where both English and Zulu responses were identical in **level** (i.e. if they put a 4 for English they also put a 4 for Zulu).

4.8.2. Cross tabulations.

Figures 1-16 show the frequencies of responses to each question by language.

Tables 2 to 16 below show the frequencies of responses to the individual English and Zulu questions cross - tabulated. The cells along the diagonal show where participants agreed (concordant responses – as highlighted in yellow) in the English and Zulu questionnaires and cells above and below the diagonal show discordant responses.

In the tables, the numbers located next to the words (e.g. 1, 2 or 3) denotes the levels of pain on the SFMPQ as:

- ☑ 0 refers to no pain;
- ☑ 1 refers to mild levels of pain;
- ☑ 2 refers to moderate levels of pain and
- ☑ 3 referred to severe levels of pain.

As part of the inclusion criteria of this study, participants were included if they were symptomatic. Therefore, it's to be expected that all responses would indicate anything other than the 1st option, which in the questionnaire was a zero rating.

Some tables have missing "data" on the cross-tabulation tables of responses, see page 94, Table 3 as an example. For "Shooting Z" (Z = Zulu), there are columns zero to two and for "Shooting E" (E = English) there are columns zero to three. This occurs because there were no responses to that particular question, as per the example, in the third Zulu column.

Table 2: Cross-tabulation of responses to English (E) and Zulu (Z) questions for the SFMPQ on throbbing pain

		Throbbing Z				Total
		0	1	2	3	
Throbbing E	0	20	2	4	1	27
	1	1	8	0	1	10
	2	0	1	6	0	7
	3	0	0	1	5	6
Total		21	11	11	7	50

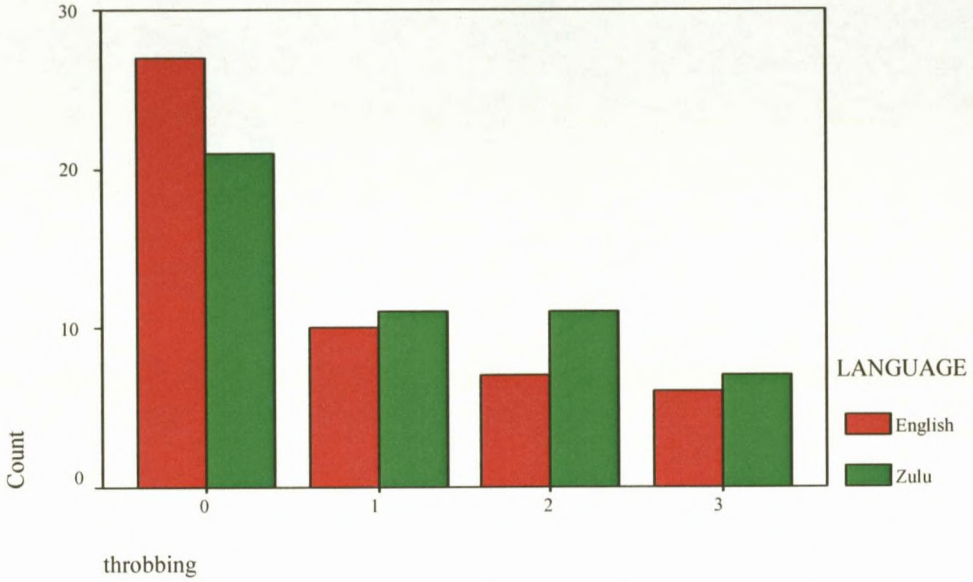

Figure 1: Bar chart of frequency of responses to throbbing pain on SFMPQ by language

The extract from table 1 as shown below, the level of agreement was good, supported by the p value (< 0.001) indicating that there is support for an agreement greater than by chance alone. This indicates that the words used in the translation seemed to have been correctly and repeatedly identified in both questionnaires.

Throbbing	78%	0.691	Good	<0.001

From the highlighted diagonal boxes above, when the numbers were added up, there are thirty-nine agreements out of the total of fifty, which reflected an over-all good level of agreement supported by a p value.

In column zero, the English column is markedly higher so it would appear that the phrases in Zulu might not represent what is stated in the English phrases (i.e. the English phrases may have been better understood or descriptive of the pain than the Zulu counterpart). As the opposite occurs in columns one to three, we can say that the English concepts may be indicative of pain in terms of a lesser descriptor, as compared to the Zulu concepts, which identified only greater degrees of pain related to throbbing. Therefore it is suggested that the sliding scale identified conceptually was correct.

During discussions in the focus group (Appendix G, page 193), the words "throbbing pain" were understood during the translation process. The only change instituted was grammatical. Because the requirements of construct and contextualization were met through the focus group, it would stand to reason that the responses should reflect a high level of agreement.

Thus it is suggested that another precise Zulu word could be inserted as long as the word carries the same concept as the Zulu word – "obunkenkethayo", currently in the questionnaire. This subtle difference may then pronounce cultural understanding of the pain grading that seems restricted at present.

Table 3: Cross-tabulation of responses to English (E) and Zulu (Z) questions for the SFMPQ on shooting pain

		Shooting Z			Total
		0	1	2	
Shooting E	0	41	3	0	44
	1	0	2	0	2
	2	1	0	2	3
	3	1	0	0	1
Total		43	5	2	50

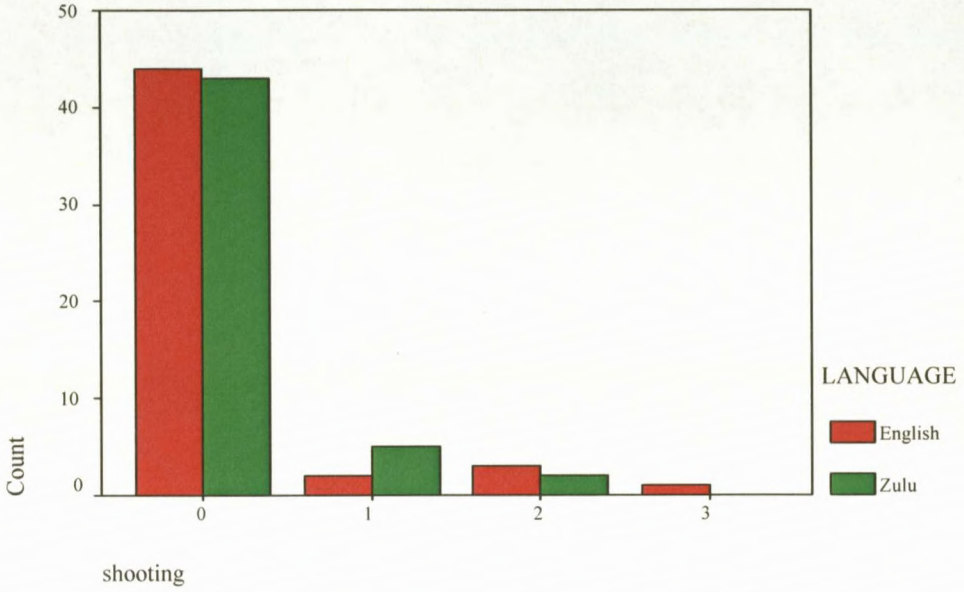

Figure 2: Bar chart of frequency of responses to shooting pain on SFMPQ by language

The extract from table 1 as shown below, the level of agreement was moderate, but there is no associated p value, which if present would indicate that there is support for an agreement greater than by chance alone. It happened that the English rating contained a category that was not found in the Zulu rating and as a result no p value is available for these mismatched pairs.

Shooting	90%	0.556	Moderate	

From the highlighted diagonal boxes above, when the numbers were added up, there are forty-five agreements out of the total of fifty, which reflected an over-all moderate level of agreement.

In column zero, the number of responses is high and there is a very minor difference in heights of the columns; this could mean that most participants answered this question and understood the concept well. In column one, the Zulu bar is higher so it would appear that the term in English may not represent what is stated in the Zulu term (i.e. the Zulu term may have been better understood). As the opposite occurs in the second column, we can say that the English concept may have been better understood as that stated in Zulu. Alternatively, the concept as identified in the English and Zulu responses differs ever so slightly with regard to the conceptual understanding. However in the third column, where the matching Zulu bar is missing; this could indicate that the higher ranges of severity in terms of the word used is better understood conceptually in English than Zulu.

During discussions in the focus group (Appendix G, page: 193), there was an explanation of the meaning of "shooting pain" when translated into Zulu and back-translated into English. From the discussion, a new word was incorporated into the questionnaire. Thus having met the requirements of construct and contextualization through the focus group, it would stand to reason that the responses should be both uniform.

Therefore it is suggested that another more precise Zulu word could be inserted as long as the word carries the same concept as the Zulu word – "obuchachamba", currently in the questionnaire. This subtle difference may then pronounce cultural understanding of the pain grading that seems restricted.

Table 4: Cross-tabulation of responses to English (E) and Zulu (Z) questions for the SFMPQ on stabbing pain

		Stabbing Z				Total
		0	1	2	3	
Stabbing E	0	36	2	1	0	39
	1	0	4	0	0	4
	2	0	0	2	2	4
	3	1	0	0	2	3
Total		37	6	3	4	50

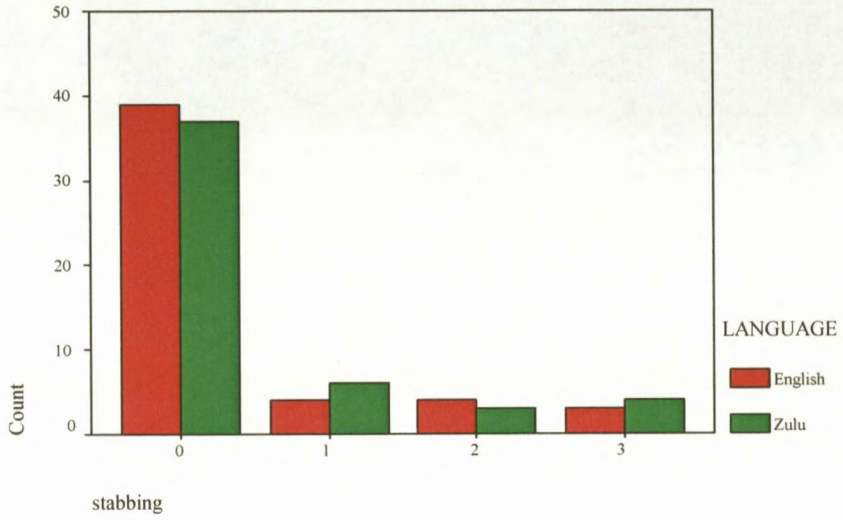

Figure 3: Bar chart of frequency of responses to stabbing pain on SFMPQ by language

The extract from table 1 as shown below, the level of agreement was good, supported by the p value (< 0.001) indicating that there is support for an agreement greater than by chance alone. This indicates that the word utilized in the translation seems to have been correctly and continually identified in both questionnaires.

Stabbing	88%	0.756	Good	<0.001

From the highlighted diagonal boxes above, when the numbers were added up, there are forty-two agreements out of the total of fifty, which reflected an over-all good level of agreement also supported by a p value.

In columns zero to four, the difference in terms of the number of responses is marginal. The columns seem fairly consistent when graded. The marginal differences imply that the concepts of the words used in either language are fairly congruent and well understood.

During discussions in the focus group (Appendix G, page: 193), the words "stabbing pains" were understood when translated into Zulu and back-translated into English. The only change instituted was grammatical.

With high levels of agreement, and a p value, it can be suggested that another more precise Zulu word could be inserted as long as the word carries the same concept as the Zulu word – "obugwazayo", currently used. The participants in this study grasped the concept or the meaning of the word but the problem may have arisen with the association of severity which may fall back on cultural interpretations, e.g. stabbing pains may be worse than shooting pains.

The researcher is therefore of the opinion that this question, and the previous two questions of the questionnaire, can be used in future cross-cultural quantitative research as the concepts seemed to have been very reasonably understood.

Table 5: Cross-tabulation of responses to English (E) and Zulu (Z) questions for the SFMPQ on sharp pain

		Sharp Z				Total
		0	1	2	3	
Sharp E	0	29	1	1	0	31
	1	3	6	1	0	10
	2	0	0	4	0	4
	3	0	0	2	3	5
Total		32	7	8	3	50

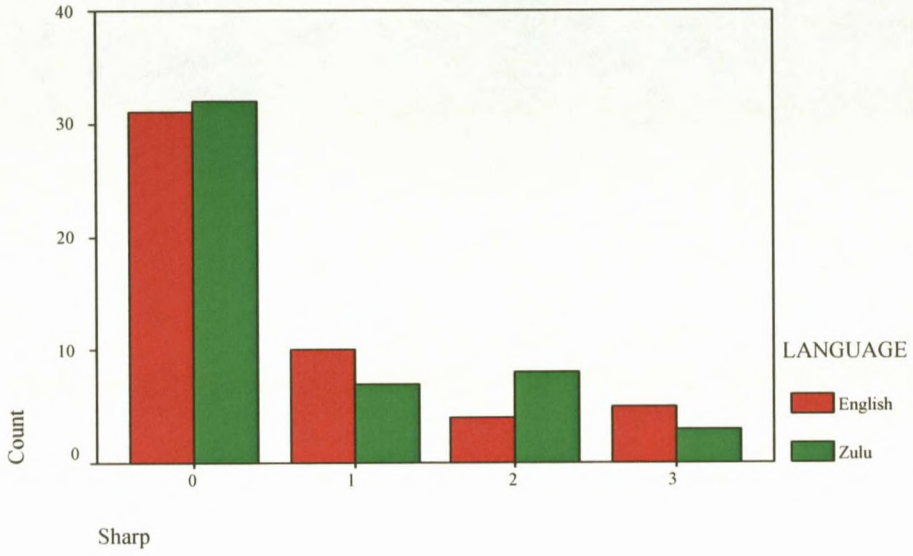

Figure 4: Bar chart of frequency of responses to sharp pain on SFMPQ by language

The extract from table 1 as shown below, the level of agreement was very good, supported by the p value (< 0.001) indicating that there is support for an agreement greater than by chance alone. This indicates that the word utilized in the translation seems to have been correctly and repeatedly identified in both questionnaires.

Sharp	84%	0.808	Very good	<0.001

From the highlighted diagonal boxes above, when the numbers were added up, there are forty-two agreements out of the total of fifty, which reflected a very good level of agreement.

In column zero, the numbers of responses are high and there is a very minor difference in heights of the columns. This could mean that most participants answered this question and understood the concept well.

In column one, the English bar is higher so it would appear that the term in Zulu may not represent what is stated in English (i.e. the English term may have been a better descriptor). As the opposite occurs in the second column, we can say that the Zulu concepts may have been better understood than those stated in English. In the third column, we see the pattern of column one repeated where the English term may have been better understood but not as well in Zulu.

It therefore stands to reason that there is a problem with grading the severity of this type of pain as the respondent would either not have that pain (as many responses are seen in the zero column) and that if one did experience this type of pain then it would be severe, but how severe the severity really is, is the conceptual difference between the language response.

During discussions in the focus group (Appendix G, page: 193 - 194), the words "sharp pain" were understood when translated into Zulu and back-translated into English. Again, the only change instituted was grammatical.

With high levels of agreement, and a p value, it can be suggested that another more precise Zulu word could be inserted as long as the word carries the same concept as the Zulu word – "obuhlabayo", currently used. This section of the questionnaire could therefore be used in future cross-cultural quantitative research –as the concepts seemed to be very reasonably understood.

Table 6: Cross-tabulation of responses to English (E) and Zulu (Z) questions for the SFMPQ on cramping pain

		Cramping Z				Total
		0	1	2	3	
Cramping E	0	26	1	2	0	29
	1	3	7	1	0	11
	2	2	1	5	0	8
	3	0	0	0	2	2
Total		31	9	8	2	50

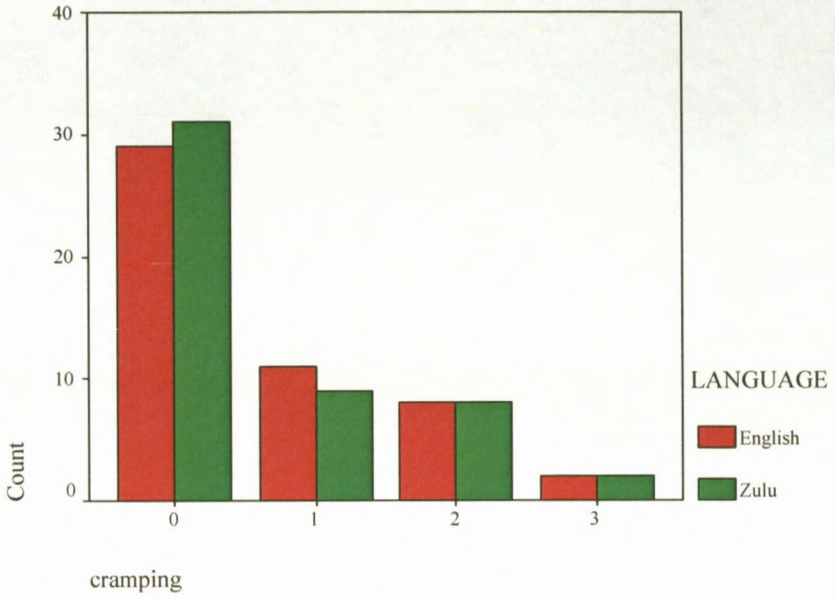

Figure 5: Bar chart of frequency of responses to cramping Pain on SFMPQ by language

The extract from table 1 as shown below, the level of agreement was good, supported by the p value (< 0.001) indicating that there is support for an agreement greater than by chance alone. This indicates that the word utilized in the translation seems to have been correctly and repeatedly identified in both questionnaires.

Cramping	80%	0.681	Good	<0.001

From the highlighted diagonal boxes above, when the numbers were added up, there are forty agreements out of the total of fifty, which reflected an over-all good level of agreement.

In column zero, the numbers of responses are high and there is a very slight difference in heights of the columns. This could mean that most participants answered this question and understood the concept well. In column one, the English bar is higher so it would appear that the English terms might have been better understood. In columns two and three we see the equal heights of the columns, which means the words used were congruent (i.e. that which was implied in Zulu version meant the same in English and vice versa).

During discussions in the focus group (Appendix G, page: 194), the words "cramping pains" were understood when translated into Zulu and back-translated into English. The change instituted was grammatical.

So with high levels of agreement, and a p value, no other changes in the researchers' opinion would be necessary. Therefore, this section of the questionnaire could be used in future cross-cultural quantitative research, as the concepts seemed to have also been well understood.

Table 7: Cross-tabulation of responses to English (E) and Zulu (Z) questions for the SFMPQ on gnawing pain

		Gnawing Z				Total
		0	1	2	3	
Gnawing E	0	33	4	3	0	40
	1	0	3	1	1	5
	2	0	0	3	1	4
	3	1	0	0	0	1
Total		34	7	7	2	50

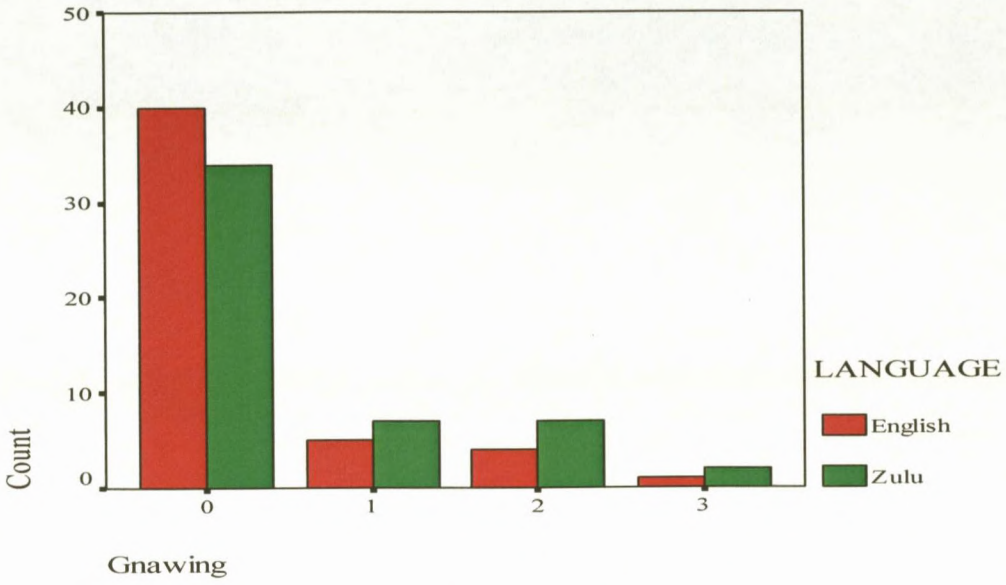

Figure 6: Bar chart of frequency of responses to gnawing pain on SFMPQ by language

The extract from table 1 as shown below, the level of agreement is moderate, supported by the p value (< 0.001) indicating that there is support for an agreement greater than by chance alone. This indicates that the word utilized in the translation seems to have been acceptably and repeatedly identified in both questionnaires.

Gnawing	78%	0.510	Moderate	<0.001

From the highlighted diagonal boxes above, when the numbers were added up, there are thirty-nine agreements out of the total of fifty, which reflected an over-all moderate level of agreement.

In column zero, the numbers of responses are high again and there is a striking difference in heights of the columns; this could mean that most participants answered this question and better understood the concept in English. Column one to three reflected a higher Zulu bars indicating that the concepts in terms of severity of the condition relating to gnawing pain could have been better represented in the Zulu language. This means that the explanation given or words used to explain this type of pain when relating it to severity on a scale was more accurate/descriptive than what was stated in English. In addition, it may also imply that within certain cultures, the words utilized imply that there is already a baseline association with the severity of the condition under discussion.

This is especially true when one bears in mind the discussions in the focus group (Appendix G, page: 194, 196), where there was an extensive explanation of the meaning of gnawing pain. From the discussion, a new word was incorporated into the questionnaire and the problem with understanding the idea relating to the severity of gnawing pain in English is evident in the results from columns one to three.

Thus it is suggested that either a more precise English words could be inserted as long as the word carries the same concept as the Zulu word – "obuhlezibukhona", currently in the questionnaire. This subtle difference may then pronounce cultural understanding of the pain grading that seems restricted in this instance.

So with high levels of agreement, and a p value, no other changes in the researchers' opinion would be necessary. Therefore, this section of the questionnaire can be used in future cross-cultural quantitative research, as the concepts seemed to be understood.

Table 8: Cross-tabulation of responses to English (E) and Zulu (Z) questions for the SFMPQ on hot-burning pain

		Hot-burning Z				Total
		0	1	2	3	
Hot-burning E	0	31	2	2	0	35
	1	5	3	1	0	9
	2	1	0	2	0	3
	3	1	0	0	2	3
Total		38	5	5	2	50

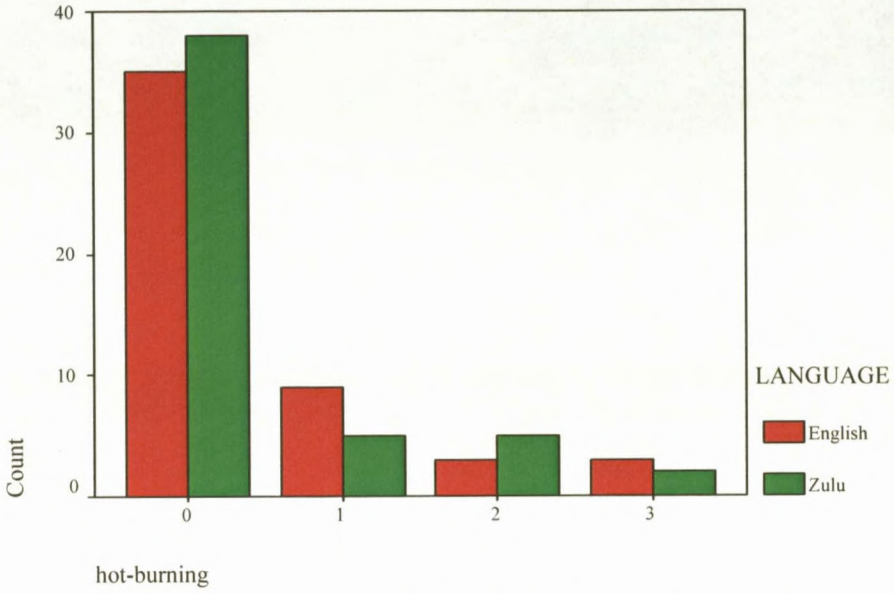

Figure 7: Bar chart of frequency of responses to hot-burning pain on SFMPQ by language

The extract from table 1 as shown below, the level of agreement was moderate, supported by the p value (< 0.001) indicating that there is support for an agreement greater than by chance alone. This indicates that the words used in the translation seemed to have been suitably and repetitively identified in both questionnaires.

Hot burning	76%	0.526	Moderate	<0.001

From the highlighted diagonal boxes above, when the numbers were added up, there are thirty-eight agreements out of the total of fifty, which reflected an over-all moderate level of agreement.

In column zero, the numbers of responses are high and there is a notable difference in heights of the columns; this could mean that most participants answered this well and were more likely to have grasped the concept to a greater degree in Zulu. In columns one and three, the English bar is higher so it would appear that the English terms may have been better understood, while in column two we see that the Zulu bar is a bit higher. Thus even though the word seems to be associated with the same concept in both languages, the degree to which it reflects the level of pain experienced seems to indicate lesser agreement. In terms of understanding severity relating to this type of pain, from the results, that the respondents identified the severity more closely with particular words – either English or Zulu and thus made their choices based on this association.

The focus group (Appendix G, page: 194), discussed the words "hot-burning pain" during the translation process and the only change instituted was grammatical. Therefore conceptually the respondents should have identified the correct words and severity associations. Therefore it could be suggested that either another more precise Zulu word could be inserted as long as the word carries the same concept as the Zulu word – "obushisayo", currently in the questionnaire, if the future research requires increased precision, however for the purposes of research clarity the difference was not such that it affected the significance (p-value) adversely.

Table 9: Cross-tabulation of responses to English (E) and Zulu (Z) questions for the SFMPQ on aching pain

		Aching Z				Total
		0	1	2	3	
Aching E	0	18	3	0	2	23
	1	5	7	1	0	13
	2	2	0	7	0	9
	3	0	0	3	2	5
Total		25	10	11	4	50

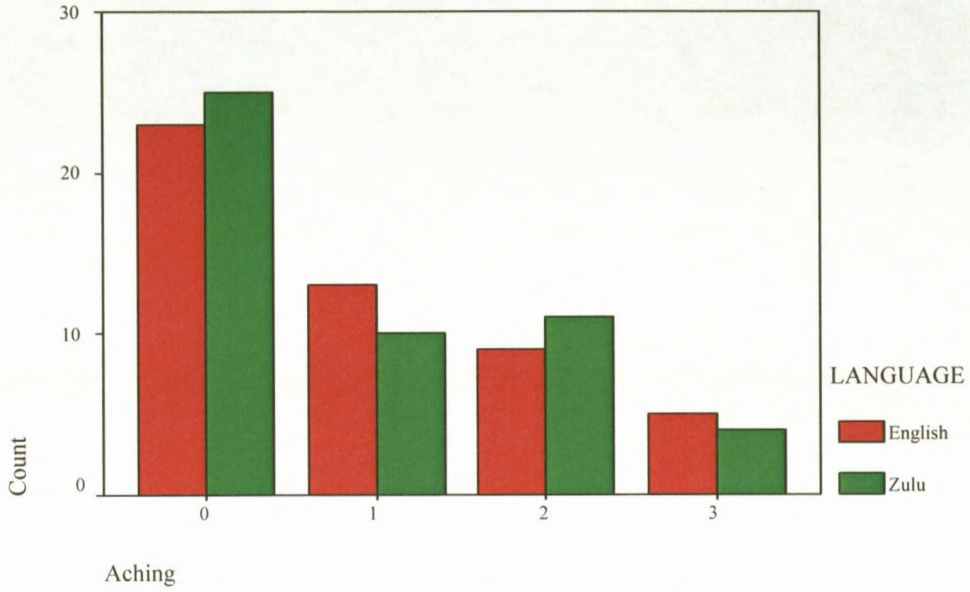

Figure 8: Bar chart of frequency of responses to aching pain on SFMPQ by language

The extract from table 1 as shown below, the level of agreement was moderate, supported by the p value (< 0.001) indicating that there is support for an agreement greater than by chance alone. This indicates that the word utilized in the translation seems to have been correctly and repeatedly identified in both questionnaires.

Aching	68%	0.591	Moderate	<0.001

From the highlighted diagonal boxes above, when the numbers were added up, there are thirty-four agreements out of the total of fifty, which reflected an over-all moderate level of agreement, supported by a p value.

In column zero, the numbers of responses are high and there is a marginal difference in heights of the columns; this could mean that most participants answered this question and had a better understanding of the concept in Zulu; this would also apply to column two. In columns one and three, the English bar is higher so it would appear that the English terms may have been better understood. The difference in responses as seen in the graph would indicate that the Zulu word in the first left column has a greater consistency at being graded by the participant, whereas the English word seems to waiver in its consistency indicating that the word is not associated with a set structure of pain recording. Thus even though the word seems to be associated with the same concept in both languages, the degree to which it reflects the level of pain experienced seems to indicate lesser agreement. Overall, the levels or agreement seem similar.

The focus group (Appendix G, page: 194) discussed the words "aching pain" during the translation process and the change instituted was grammatical.

Thus it is suggested that another more precise Zulu word could be inserted as long as the word carries the same concept as the Zulu word – "obuqaqambayo", currently in the questionnaire if the future research requires increased precision, however for the purposes of research clarity the difference was not such that it affected the significance (p-value) adversely.

So with moderate levels of agreement, and a p value, no other changes would be necessary. Therefore, it is of the researchers' opinion that this section of the questionnaire can be used in future cross-cultural quantitative research as the concepts seemed to be well understood.

Table 10: Cross-tabulation of responses to English (E) and Zulu (Z) questions for the SFMPQ on heavy pain

		Heavy Z				Total
		0	1	2	3	
Heavy E	0	27	4	2	0	33
	1	2	4	0	1	7
	2	1	0	4	0	5
	3	0	0	2	3	5
Total		30	8	8	4	50

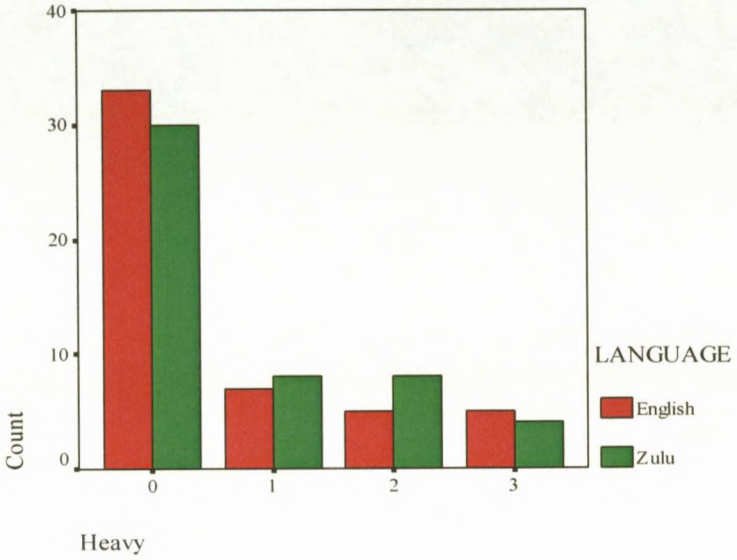

Figure 9: Bar chart of frequency of responses to Heavy pain on SFMPQ by language

The extract from table 1 as shown below, the level of agreement was good, supported by the p value (< 0.001) indicating that there is support for an agreement greater than by chance alone. This indicates that the word utilized in the translation seems to have been correctly and repeatedly identified in both questionnaires.

Heavy	76%	0.672	Good	<0.001

From the highlighted diagonal boxes above, when the numbers were added up, there are thirty-eight agreements out of the total of fifty, which reflected an over-all good level of agreement.

In column zero, the numbers of responses are high again and there is an obvious difference in heights of the columns; this could mean that most participants answered this question and better understood the concept in English. Column one and two reflect higher Zulu bars indicating that the concepts in terms of grading of severity of the condition relating to heavy pain was better represented in the Zulu language. This means that the explanation given or words used to explain this type of pain when relating it to severity on a scale was more accurate/descriptive than what was stated in English. In the third column, the difference in heights of the columns is negligible and it means that at the higher end of the severity scale, the perceptions matched up well.

During discussions in the focus group (Appendix G, page: 194), the word "heavy pain" was understood when translated into Zulu and back-translated into English. The only change instituted was grammatical. Thus having met the requirements of construct and contextualization through the focus group it would stand to reason that the responses should be both uniform and reflect a high level of agreement.

Thus it is suggested that a more precise Zulu words could be inserted as long as the word carries the same concept as the Zulu word – "obusindayo", currently in the questionnaire. This subtle difference may then pronounce cultural understanding of the pain grading.

So with high levels of agreement, and a p value, no other changes are necessary. Therefore, this section of the questionnaire can be used in future cross-cultural quantitative research as the concepts seemed to be reasonably understood.

Table 11: Cross-tabulation of responses to English (E) and Zulu (Z) questions for the SFMPQ on tender pain

		Tender Z				Total
		0	1	2	3	
Tender E	0	22	5	3	0	30
	1	3	5	1	0	9
	2	1	1	6	0	8
	3	1	0	1	1	3
Total		27	11	11	1	50

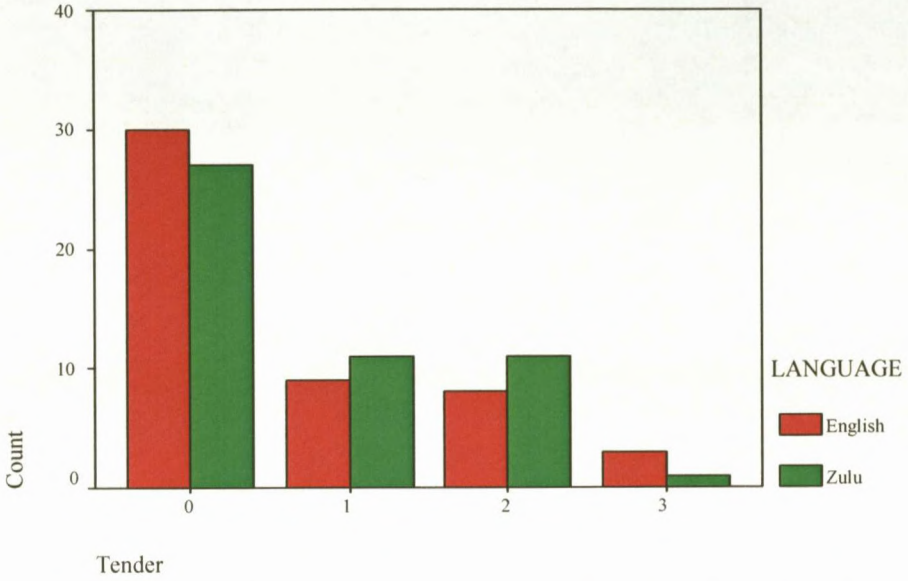

Figure 10: Bar chart of frequency of responses to tender pain on SFMPQ by language

The extract from table 1 as shown below, the level of agreement was moderate, supported by the p value (< 0.001) indicating that there is support for an agreement greater than by chance alone. This indicates that the word utilized in the translation seems to have been correctly and repeatedly identified in both questionnaires.

Tender	68%	0.524	Moderate	<0.001

From the highlighted diagonal boxes above, when the numbers were added up, there are thirty-four agreements out of the total of fifty, which reflected an overall moderate level of agreement.

In column zero, the numbers of responses are high again and there is an apparent difference in heights of the columns; this could mean that most participants answered this question and again the concept was more clearly understood in English. Column one and two reflect higher Zulu bars indicating that the concepts in terms of grading of severity of the condition relating to tender pain was better represented in the Zulu language. This means that the explanation given or words used to explain this type of pain when relating it to severity on a scale was more accurate/descriptive than what was stated in English. In the third column, the difference in heights of the columns is also noticeable and it means that at the higher end of the severity scale, the perceptions did not matched up as well.

During discussions in the focus group (Appendix G, page: 195), the words "tender pain" was understood when translated into Zulu and back-translated into English. The only change instituted was grammatical. Therefore, having met the requirements of construct and contextualization through the focus group it would stand to reason that the responses should be both uniform and reflect a high level of agreement.

Thus it is suggested that a more precise English and/or Zulu words could be inserted as long as the word carries the same concept as the Zulu word – "obubekezelekayo", currently in the questionnaire. This subtle difference may then pronounce cultural understanding of the pain grading that seems restricted in this instance.

So with high levels of agreement, and a p value, and the above mentioned changes would be necessary. Therefore, it's the researchers' opinion that this section of the questionnaire can be used in future cross-cultural quantitative research as the concepts seemed to be well understood.

Table 12: Cross-tabulation of responses to English (E) and Zulu (Z) questions for the SFMPQ on splitting pain

		Splitting Z				Total
		0	1	2	3	
Splitting E	0	34	4	3	3	44
	1	0	2	0	0	2
	2	1	0	3	0	4
Total		35	6	6	3	50

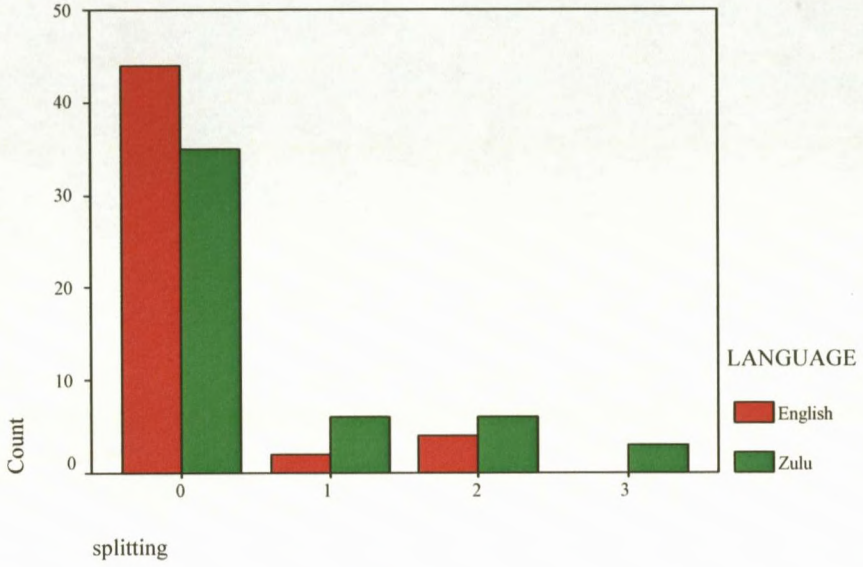

Figure 11: Bar chart of frequency of responses to splitting pain on SFMPQ by language

The extract from table 1 as shown below, the level of agreement was fair, but there is no associated p value, which if present would indicate that there is support for an agreement greater than by chance alone. It happened that the Zulu rating contained a category that was not found in the English rating and as a result no p value is available for these mismatches.

Splitting	78%	0.343	Fair	

From the highlighted diagonal boxes above, when the numbers were added up, there are thirty-nine agreements out of the total of fifty, which reflected a fair level of agreement.

In column zero, the numbers of responses are high again and there is a very clear distinction in heights of the columns; this could mean that most participants answered this question and again the concept was much more clearly understood in English. Column one and two reflect higher Zulu bars indicating that the concepts in terms of grading of severity of the condition relating to splitting pain were better represented in the Zulu language. This means that the explanation given or words used to explain this type of pain when relating it to severity on a scale was more accurate/descriptive than what was stated in English. In the third column, where the matching English bar is missing; this could indicate that the higher ranges of severity in terms of the word used, is understood in Zulu but not as well in English.

During discussions in the focus group (Appendix G, page: 195), the words "splitting pain" was understood when translated into Zulu and back-translated into English. No changes were instituted, thus having met the requirements of construct and contextualization through the focus group it would stand to reason that the responses should be both homogeneous and reflect a high level of agreement.

Thus it is suggested that more precise English and/or Zulu words should be inserted as long as the word carries the same concept as the Zulu word – "obusabalalayo", currently in the questionnaire. This subtle difference may then pronounce cultural understanding of the pain grading that seems restricted in this instance.

With fair levels of agreement and no p value, the above-mentioned changes would be necessary to implement. Therefore, this section of the questionnaire should be readdressed, possibly removed from questionnaire or not utilized in future cross-cultural quantitative research.

Table 13: Cross-tabulation of responses to English (E) and Zulu (Z) questions for the SFMPQ on tiring-exhausting pain

		Tiring-exhausting Z				Total
		0	1	2	3	
Tiring-exhausting E	0	29	3	2	0	34
	1	1	2	0	0	3
	2	1	1	5	1	8
	3	0	0	2	3	5
Total		31	6	9	4	50

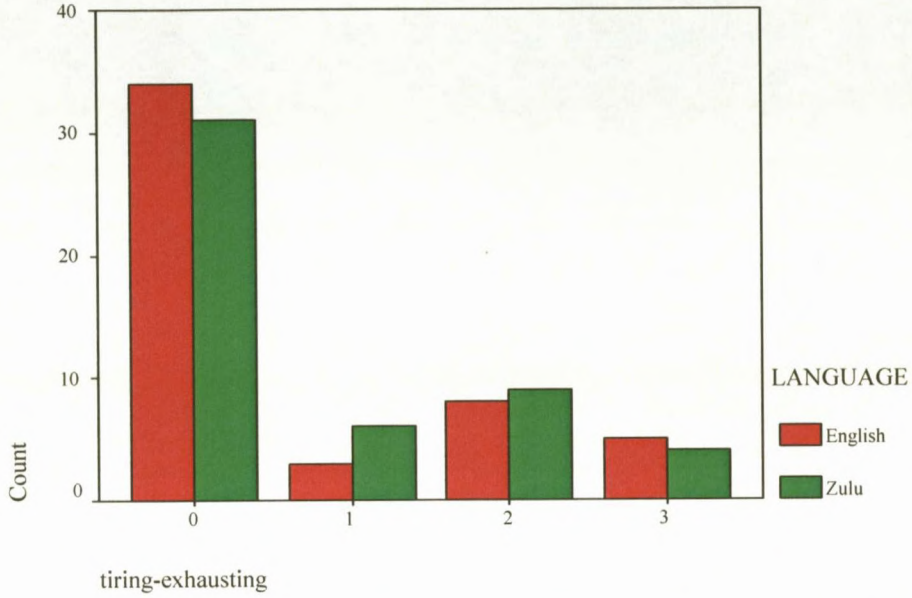

Figure 12: Bar chart of frequency of responses to tiring pain on SFMPQ by language

The extract from table 1 as shown below, the level of agreement was good, supported by the p value (< 0.001) indicating that there is support for an agreement greater than by chance alone. This indicates that the word utilized in the translation seems to have been correctly and repeatedly identified in both questionnaires.

Tiring	78%	0.722	Good	<0.001

From the highlighted diagonal boxes above, when the numbers were added up, there are thirty-nine agreements out of the total of fifty, which reflected an over-all good level of agreement.

In column zero, the numbers of responses are high again and there is a difference in heights of the columns; this could mean that as previously, most participants answered this question and again the concept was slightly more understood in English. Column one and two also reflect higher Zulu bars indicating that the concepts in terms of grading of severity of the condition relating to tiring pain were better represented in the Zulu language. This means that the explanation given or words used to explain this type of pain when relating it to severity on a scale was more accurate/descriptive than what was stated in English. In the third column, the difference in heights of the columns is slight and it means that at the higher end of the severity scale, the perceptions matched up relatively well.

During discussions in the focus group (Appendix G, page: 195), the word "tiring-exhausting pains" was understood when translated into Zulu and back-translated into English. No change was instituted. Thus having met the requirements of construct and contextualization through the focus group it would stand to reason that the responses should be both uniform and reflect a high level of agreement.

Thus it is suggested that a more precise English and/or Zulu words could be inserted as long as the word carries the same concept as the Zulu word – "obukhanthazayo", currently in the questionnaire. This subtle difference may then pronounce cultural understanding of the pain grading that seems restricted in this instance.

So with high levels of agreement, a p value, and the above-mentioned changes, this section of the questionnaire can be used in future cross-cultural quantitative research as the concepts seemed to be very well understood.

Table 14: Cross-tabulation of responses to English (E) and Zulu (Z) questions for the SFMPQ on sickening pain

		Sickening Z				Total
		0	1	2	3	
Sickening E	0	41	1	0	0	42
	1	0	2	0	0	2
	2	1	0	3	0	4
	3	0	1	0	1	2
Total		42	4	3	1	50

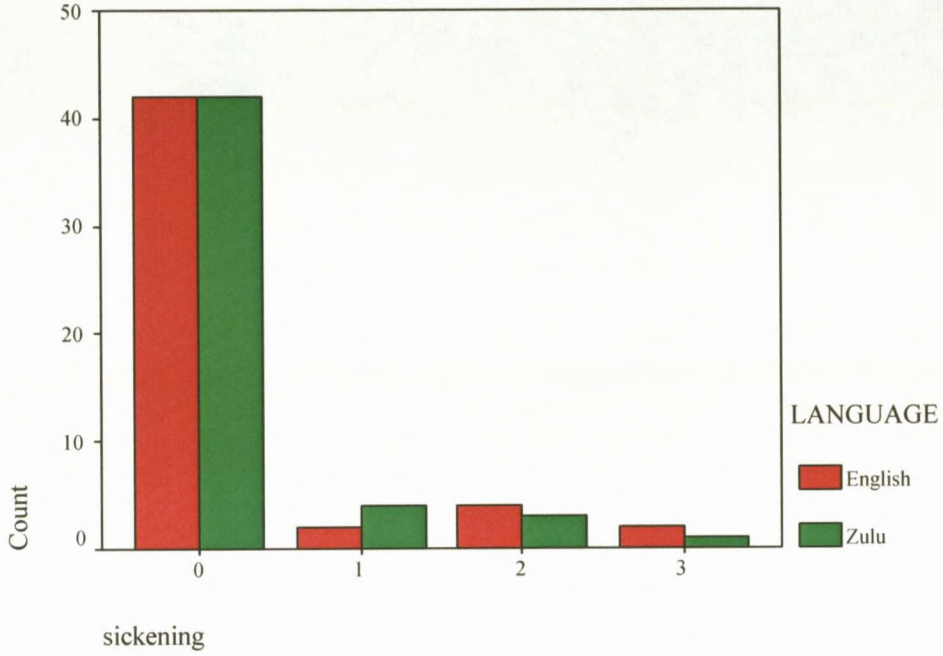

Figure 13: Bar chart of frequency of responses to sickening pain on SFMPQ by language

The extract from table 1 as shown below, the level of agreement was very good, supported by the p value (< 0.001) indicating that there is support for an agreement greater than by chance alone. This indicates that the word utilized in the translation seems to have been correctly and repeatedly identified in both questionnaires.

Sickening	94%	0.803	Very good	<0.001

From the highlighted diagonal boxes above, when the numbers were added up, there are forty-seven agreements out of the total of fifty, which reflected a very good level of agreement, supported by a p value.

In column zero, the number of responses is high and there is no difference in heights of the columns; this means that most participants answered this question and understood the concept extremely well in both languages. In column one, the Zulu bar is slightly higher so it would appear that the terms in English may not represent what is stated in the Zulu terms i.e. the Zulu terms may have been better understood. As the opposite occurs in the second and third columns, we can say that the English concepts may have been better understood as those stated in Zulu.

The focus groups' discussion (Appendix G, page: 195), of the words "sickening pain" was well understood during the translation process and there were no change made to those words. Consequently, having met the requirements of construct and contextualization through the focus group it would stand to reason that the responses should be both uniform and reflect a high level of agreement.

With very good levels of agreement and a p value the researcher does not believe that any adjustments should be made to this question. However, this section of the questionnaire would be good to use in future cross-cultural quantitative research.

Table 15: Cross-tabulation of responses to English (E) and Zulu (Z) questions for the SFMPQ on fearful pain

		Fearful Z			Total
		0	1	2	
Fearful E	0	39	1	0	40
	1	3	0	0	3
	2	1	2	3	6
	3	0	0	1	1
Total		43	3	4	50

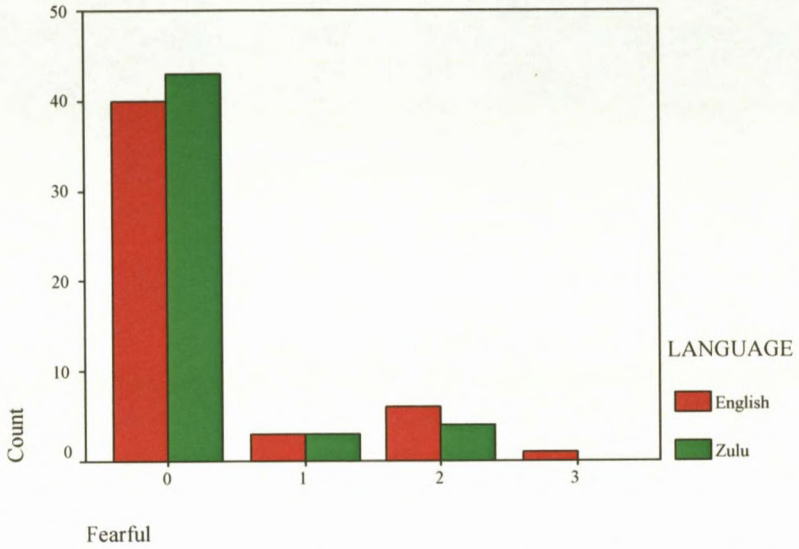

Figure 14: Bar chart of frequency of responses to fearful pain on SFMPQ by language

The extract from table 1 as shown below, the level of agreement was good, but there is no associated p value, which if present would indicate that there is support for an agreement greater than by chance alone. It so happened that the English rating might contain a category that was not found in the Zulu rating or vice versa and as a result no p value is available for these mismatches.

Fearful	84%	0.641	Good	

From the highlighted diagonal boxes above, when the numbers were added up, there are forty-one agreements out of the total of fifty, which reflected an over-all good level of agreement.

In column zero, the numbers of responses are high and there is a minor difference in heights of the columns; this could again as previously mean that most participants answered this question and had a better understanding of the concept in Zulu at that level of severity. In column one, no difference in column height means that the ideas represented at that level were congruent and perfectly well understood. In column two, because the English bar is higher it would appear that the English terms might have been better understood. And in the third column, where the matching Zulu bar is missing; this could indicate that the higher ranges of severity in terms of the word used is understood in English but not as well in Zulu.

The focus group (Appendix G, page: 195), discussed the words "fearful pain" during the translation process and no changes were made. Because the requirements of the focus group of contextualization were met, the responses reflected a high level of agreement.

It is suggested that another or more precise English and/or Zulu words could be inserted as long as the word carries the same concept as the Zulu word – "obusabisayo", currently in the questionnaire.

So with good levels of agreement, no p value, and the institution of the above-mentioned suggestions, then the researcher believes that this section of the questionnaire can be used in future cross-cultural quantitative research as the concepts seemed to have been understood.

Table 16: Cross-tabulation of responses to English (E) and Zulu (Z) questions for the SFMPQ on punishing-cruel pain

		Punishing-cruel Z				Total
		0	1	2	3	
Punishing-cruel E	0	42	1	1	1	45
	2	1	0	1	1	3
	3	0	0	0	2	2
Total		43	1	2	4	50

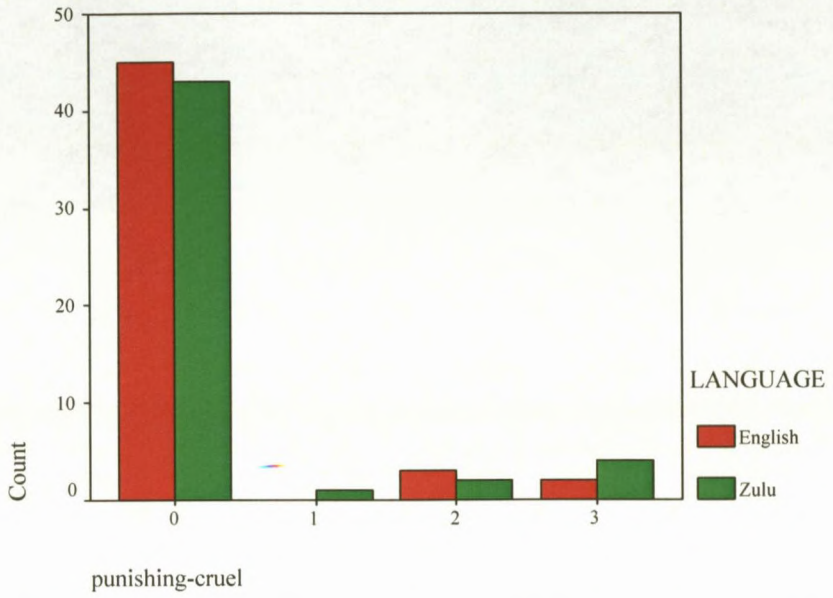

Figure 15: Bar chart of frequency of responses to punishing-cruel pain on SFMPQ by language

The extract from table 1 as shown below, the level of agreement was good, but there is no associated p value, which if present would indicate that there is support for an agreement greater than by chance alone. It also happened that the Zulu rating might contain a category that was not found in the English rating and as a result no p value is available for these mismatches.

Punishing	90%	0.655	Good	

From the highlighted diagonal boxes above, when the numbers were added up, there are forty-five agreements out of the total of fifty, which reflected an over-all good level of agreement.

In column zero, the numbers of responses are high again meaning that as previously, most participants answered this question and for columns zero to three there is a very small difference in heights of the columns. For columns zero and two, we see that the concepts were slightly better understood in English. Column three reflects a small difference in that the higher Zulu bar is higher, indicating that the concepts in terms of grading of severity of the condition relating to tiring pain were better represented in the Zulu language. This means that the explanation given or words used to explain this type of pain when relating it to severity on a scale was more accurate / descriptive than what was stated in English.

During discussions in the focus group (Appendix G, page: 195), the words "punishing-cruel pain" was understood when translated into Zulu and back-translated into English. No changes were instituted. Thus, having met the requirements of construct and contextualization through the focus group, it would stand to reason that the responses should be both uniform and reflect a high level of agreement.

Thus it is suggested that a more precise English and/or Zulu word could be inserted as long as the word carries the same concept as the Zulu word – "obunesihluku", currently in the questionnaire. This subtle difference may then pronounce cultural understanding of the pain grading that seems restricted in this instance. So with a good percentage and high levels of agreement, no p value, and the above-mentioned changes, this section of the questionnaire can be used in future cross-cultural qualitative research as the concepts seemed to be relatively well understood.

4.8.3 Summary.

For the SFMPQ, because the English ratings sometimes contained a category that was not found in the Zulu rating or vice versa (and as a result no p value is available for these mismatches) these results imply that the words of shooting, splitting, fearful and punishing-cruel had problems in the respondents identifying them correctly in both questionnaires, which would in turn imply that these words need to be revisited in the questionnaire.

On the basis that four out of fifteen sections needed revision, the Zulu SFMPQ is recommended as a tool to be utilized based on the outcomes of this research, pending adjustments to the above-mentioned sections.

4.9. Discussion of the outcomes relative to concurrent validity: CCMC NDI

4.9.1. Kappa statistics

Table 17: Kappa statistics for agreement between English and Zulu questionnaires for the CCMC Neck Disability Index

Item	% of agreement	Weighted Kappa	Strength of agreement	p value
Section 1 – Pain intensity	78%	0.755	Good	<0.001
Section 2 – Personal care	77.55%	0.662	Good	
Section 3 – Lifting	83.67%	0.729	Good	
Section 4 – Reading	78%	0.713	Good	
Section 5 – Headaches	66%	0.646	Good	<0.001
Section 6 – Concentration	82%	0.787	Good	
Section 7 – Work	88%	0.830	Very good	
Section 8 – Driving	72%	0.767	Good	
Section 9 – Sleeping	80%	0.786	Good	<0.001
Section 10 - Recreation	80%	0.691	Good	

Tables 18 to 27 show the cross tabulations of responses to each question in English and Zulu. The cells along the diagonal show where participants agreed (concordant responses – as highlighted in yellow) in the English and Zulu questionnaires and cells above and below the diagonal show discordant responses. Some tables have missing "data" at the cross-tabulation tables of responses, see page 126, Table 19 as an example. For "Z2" (Z = Zulu, 2 denotes the section/question), there are columns two to five and for "E2" (E = English, 2 denotes the section/question) there are columns two to six. This occurs because there were no responses to that particular question, as per the example, in the sixth Zulu column.

Figures 16-25 below show the frequency of responses to each question on the CCMC neck disability index scale by language.

The kappa statistic is worked out on the agreement of the **level** of response for each type of pain. The % of agreement is where both English and Zulu responses were identical in **level** (i.e. if they put a 4 for English they also put a 4 for Zulu).

4.9.2. Cross Tabulations.

As part of the inclusion criteria of this study, participants were included if they were symptomatic. It was expected that the majority of the responses would indicate anything other than the 1st option, which in the questionnaire was a zero rating.

Each section of both questionnaires has five blocks (for section one and section eight) and six blocks (for sections two to ten) of which one must be ticked as the most appropriate response. In the bar graphs, the column number one will correspond to the first block of that section. See figure 19 on page 130, there is no English column at the sixth column. Therefore if a column number is missing not "missing" then one can assume that there were no responses allocated to that particular block (T. Esterhuizen. Biostatistician at UKZN. Personal communication. 2005 and 2006).

Table 18: Cross-tabulation of responses to English (E) and Zulu (Z) questions for the CCMC Neck Disability Index on Section 1 (Pain Intensity)

		Z1				Total
		1	2	3	4	
E1	1	14	2	1	0	17
	2	0	11	1	0	12
	3	0	3	12	0	15
	4	0	1	3	2	6
Total		14	17	17	2	50

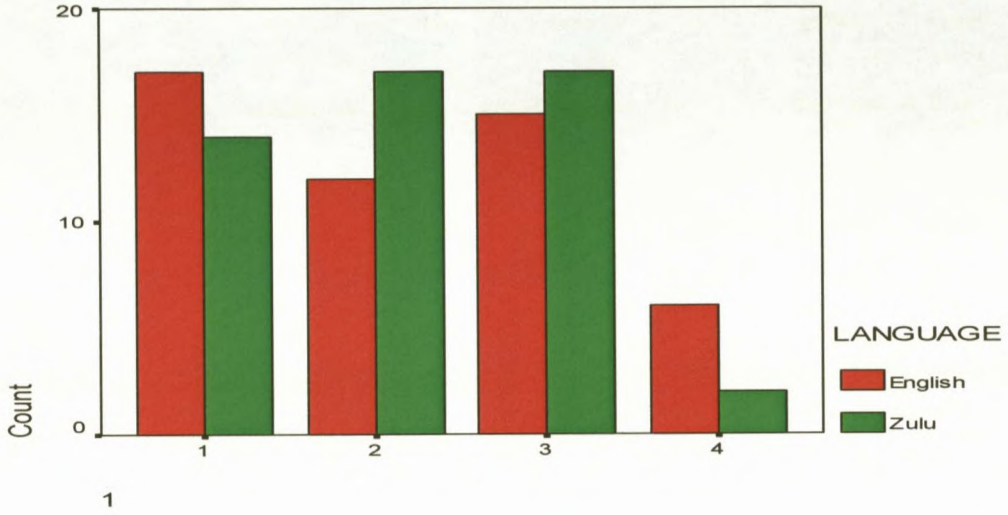

Figure 16: Bar chart of frequency of responses to section 1(pain intensity) on CCMC by language

The extract from table 17 as shown below, the levels of agreement are good, supported by the p value (< 0.001) indicating that there is support for an agreement greater than by chance alone. This indicates that the words / phrases utilized in the translation seemed to have been correctly and repeatedly identified in both questionnaires.

Section 1 – Pain intensity	78%	0.755	Good	<0.001

From the highlighted diagonal boxes above, when the numbers were added up, there are thirty-nine agreements out of the total of fifty, which reflected an over-all good level of agreement. In column one and four, the English columns are higher so it would appear that the phrases in Zulu may not represent what is stated in the English phrases i.e. the English phrases may have been better understood. As the opposite occurs in the second and third columns, we can say that the English concepts may not have been as well understood as those stated in Zulu.

In the fourth column, there is a great difference in responses, which could indicate that the higher ranges of severity (outside of mild, moderate and severe) of the condition is understood in English but not as well in Zulu.

During the discussion of the focus group (Appendix G, pages: 173 - 175), one of the sentences containing the words "very severe" was excluded from the list of options and it was noted that in Zulu, there is no substitute for the word "fairly" but there are mainly three levels to grade pain, namely: mild, moderate and severe. This could validate the discrepancy in the fourth Zulu column and may help to explain the other sections/parts of the questionnaires that convey similar results towards the higher ranges of severity.

This section of the questionnaire can be used in future cross-cultural quantitative research based on the high levels of agreement and with some minor adjustments to certain Zulu concepts so that words or phrases used can become more congruent.

Table 19: Cross-tabulation of responses to English (E) and Zulu (Z) questions for the CCMC Neck Disability Index on Section 2 (Personal Care)

		Z2				Total
		2	3	4	5	
E2	2	28	3	0	0	31
	3	3	7	1	0	11
	4	0	1	1	0	2
	5	1	1	0	2	4
	6	0	0	0	1	1
Total		32	12	2	3	49

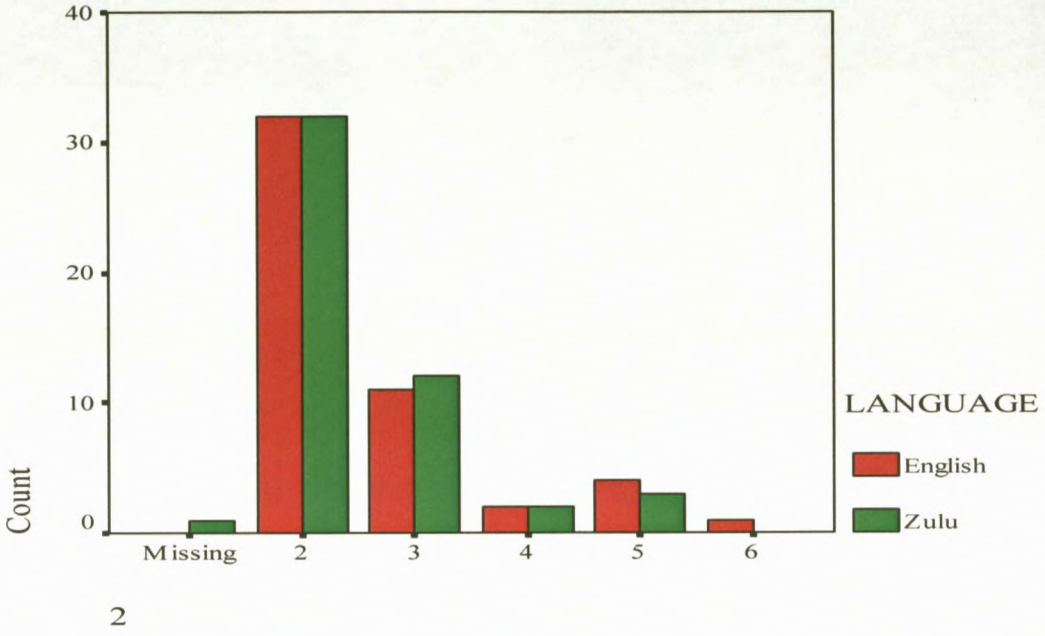

Figure 17: Bar chart of frequency of responses to section 2 (personal care) on CCMC by language

The extract from table 17 as shown below, the levels of agreement are good, indicating that the words/phrases utilized in the translation seemed to have been fittingly and frequently identified in both questionnaires. It occurred that the English and Zulu ratings contained a category that was not found in the either rating and as a result no p value is available for these mismatches.

Section 2 – Personal care	77.55%	0.662	Good	

From the highlighted diagonal boxes above, when the numbers were added up, there are thirty-eight agreements out of the total of forty-nine, which reflected an over-all good level of agreement.

Columns two to five range from flat to fairly flat, which indicates that there might have been very minor differences in understanding of the terms / phrases used. In other words, the concept of personal care at its various levels in either language was properly understood. However, in the first and sixth columns, there were no responses in English and in Zulu respectively. Because these columns are outliers, this could indicate a problem in the interpretation of the concept of the higher ranges of severity for column six but for column one, it could indicate that there was no answers to this section as most participants were symptomatic to begin with and therefore may have suffered pain whilst taking care of themselves.

During the focus group discussion (Appendix G, pages: 175 - 177), most changes made to the section were grammatical, which is probably the reason for the good congruency levels of the graphs.

Section two is a good section to be used in further studies in this field.

Table 20: Cross-tabulation of responses to English (E) and Zulu (Z) questions for the CCMC Neck Disability Index on Section 3 (Lifting)

		Z3					Total
		1	2	3	4	5	
E3	1	22	1	1	0	0	24
	2	0	13	1	1	0	15
	3	0	0	2	0	0	2
	4	1	1	0	2	0	4
	5	0	1	0	0	2	3
	6	0	0	0	1	0	1
Total		23	16	4	4	2	49

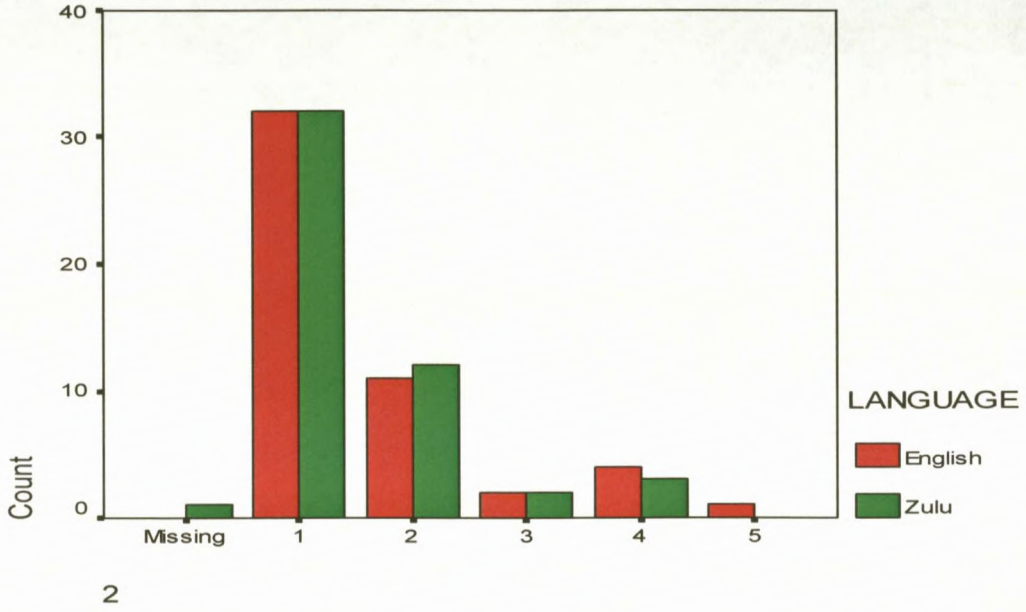

Figure 18: Bar chart of frequency of responses to section 3 (lifting) on CCMC by language

The extract from table 17 as shown below, the levels of agreement are good, indicating that the sentences used in the translation seemed to have been correctly and frequently identified in both questionnaires. Once again, it so happened that the English and Zulu ratings may have contained a category that was not found in the either rating and as a result, no p value is available for these mismatches.

Section 3 – Lifting	83.67%	0.729	Good	

From the highlighted diagonal boxes above, when the numbers were added up there are forty-one agreements out of the total of forty-nine, which supported the good levels of agreement seen above.

Columns one to four range from flat to fairly flat, which indicates that there might have been minor differences in understanding. Therefore, the concept of 'lifting' at its' various levels in either language was properly understood. However, in the first left and fifth columns, there were no responses in English and in Zulu respectively. Because these columns are outliers, this could also indicate a problem in the interpretation of the concept of the higher ranges of severity for column five in Zulu, but for column "missing", it could indicate that there was no answers to this section as most participants were symptomatic to begin with and therefore may have suffered increased levels of pain whilst lifting objects and understood what was asked in Zulu but not in English.

During the focus group discussion (Appendix G, pages: 177 - 178), no changes were made to section three, which is probably the reason for the good congruency levels of the graphs.

With good levels of agreement and much congruency, the researcher recommends that section three is also a good section to keep or be used in further quantitative studies.

Table 21: Cross-tabulation of responses to English (E) and Zulu (Z) questions for the CCMC Neck Disability Index on Section 4 (Reading)

		Z4						Total
		1	2	3	4	5	6	
E4	1	12	0	0	0	0	0	12
	2	1	17	1	0	0	1	20
	3	1	3	5	0	0	0	9
	4	0	1	2	4	0	0	7
	5	0	0	1	0	1	0	2
Total		14	21	9	4	1	1	50

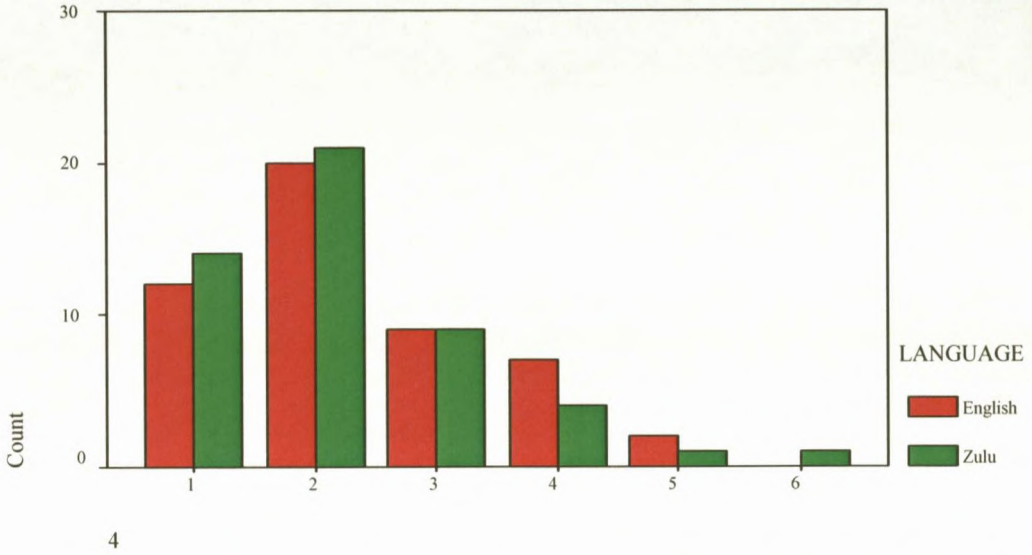

Figure 19: Bar chart of frequency of responses to section 4 (reading) on CCMC by language

The extract from table 17 as shown below, shows that the level of agreement are good, indicating that the words/phrases used in the translation seemed to have been correctly and continually identified in both questionnaires. It also occurred that the Zulu rating contained a category that was not found in the English rating and as a result no p value is available for these mismatches.

Section 4 – Reading	78%	0.713	Good	

From the highlighted diagonal boxes above, when the numbers were added up, there are thirty-nine agreements out of the total of fifty, which supports the good level of agreement.

If one follows the cross-tabulation responses from table 21, the differences in number of responses are small (out by one or two) for columns one to five; this means that there is a greater level of congruency in terms of the words/phrases used in this particular section. Once more, we can say that in terms of the amount one can read versus the intensity or grading of the pain, most participants grasped the concept reasonably well. Again, column six has a missing English column of responses; this could again point to the discrepancy in understanding the higher ranges of severity between the languages, especially in English.

During the focus group discussion (Appendix G, pages: 178 - 180), of section four, a few grammatical changes were instituted.

With good levels of agreement and a few minor changes to this section in both languages regarding the last sentence/phrase to bring a clearer understanding to those concepts, this is a satisfactory section to use in further quantitative studies.

Table 22: Cross-tabulation of responses to English (E) and Zulu (Z) questions for the CCMC Neck Disability Index on Section 5 (Headaches)

		Z5					Total
		1	2	3	4	5	
E5	1	8	1	1	0	0	10
	2	1	9	3	2	0	15
	3	0	4	11	0	0	15
	4	0	0	1	4	1	6
	5	0	1	0	2	1	4
Total		9	15	16	8	2	50

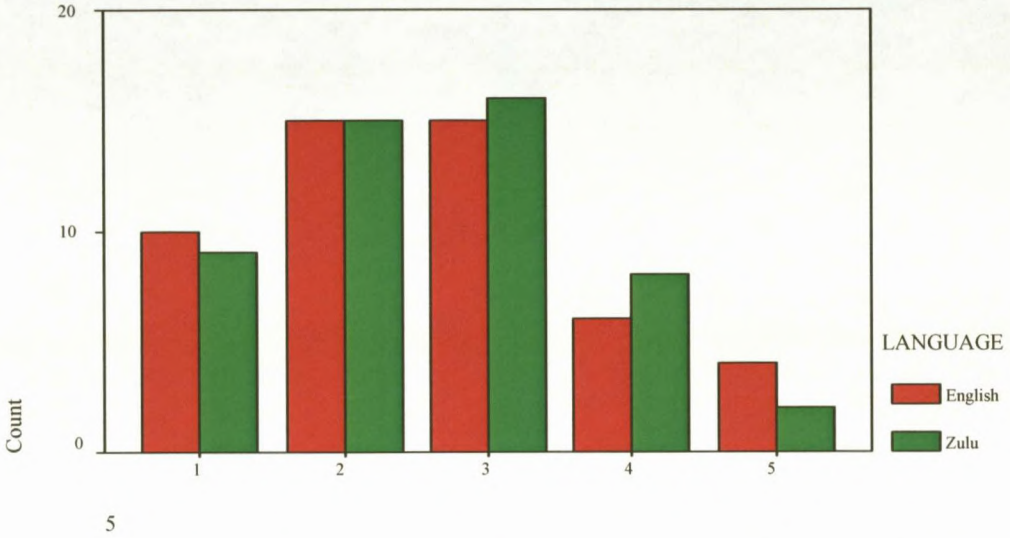

Figure 20: Bar chart of frequency of responses to section 5 (headaches) on CCMC by language

The extract from table 17 as shown below, the levels of agreement are good, supported by the p value (< 0.001) indicating that there is support for an agreement greater than by chance alone. This indicates that the word utilized in the translation seems to have been suitably and repeatedly identified in both questionnaires.

Section 5 – Headaches	66%	0.646	Good	<0.001

From the highlighted diagonal boxes above, when the numbers were added up, there are thirty-three agreements out of the total of fifty, which supports the good level of agreement. If one follows the cross-tabulation responses from table 22, the differences in terms of number of responses are marginal in columns one to three.

In the fourth column the Zulu column is higher, which means the English concept may not have been well understood and the opposite applies to column five. Again, the concept of severity towards the higher end of the scale comes into question regarding the grading of the intensity of the headaches versus the frequency of the headaches, as it has been mentioned in the transcript that in the Zulu culture, three levels of pain exist; that could be why the higher levels of severity are incongruent, in both languages in columns four and five but not in columns one to three.

This section in both questionnaires has six blocks of which one must be ticked as the most appropriate response. With regards to columns four and five on the bar graph, which correspond to blocks four and five of that section in the questionnaire, there was some discussion surrounding those two concepts amongst the members of the focus group because a word in Zulu pertaining to frequency need to put in the 'right' place (Appendix G, pages: 180 - 182). To further support the idea of the discrepancy regarding the concept of severity towards the higher end of the scale in the Zulu culture there is no column six because there were no responses for that question, hence no column on the bar chart.

With good levels of agreement, a p value and a few minor changes to this section in both languages regarding the last sentence/phrase to bring a clearer understanding to those concepts, this is a satisfactory section to use in further quantitative studies.

Table 23: Cross-tabulation of responses to English (E) and Zulu (Z) questions for the CCMC Neck Disability Index on Section 6 (Concentration)

		Z6				Total
		1	2	3	4	
E6	1	27	0	0	0	27
	2	3	11	2	0	16
	3	0	1	3	0	4
	4	0	0	2	0	2
	6	0	0	0	1	1
Total		30	12	7	1	50

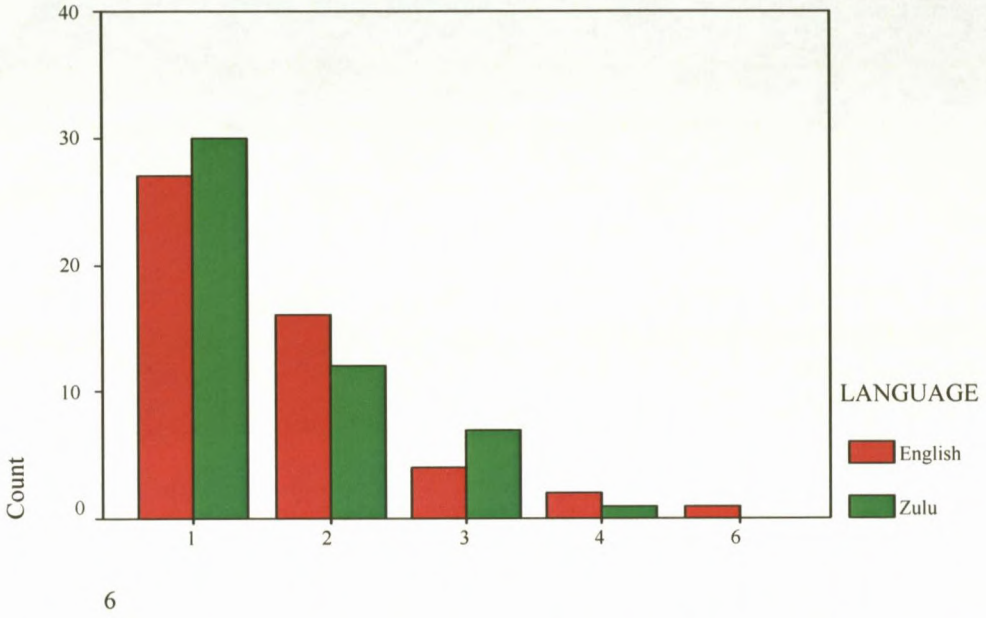

Figure 21: Bar chart of frequency of responses to section 6 (concentration) on CCMC by language

The extract from table 17 as shown below, the levels of agreement are good, indicating that the words/phrases utilized in the translation seems to have been properly and repeatedly identified in both questionnaires. It occurred that the English and Zulu ratings contained a category that was not found in either rating and as a result no p value is available for these mismatches.

Section 6 – Concentration	82%	0.787	Good	

From the highlighted diagonal boxes above, when the numbers were added up, there are forty-one agreements out of the total of fifty, which supports the good level of agreement.

If one follows the cross-tabulation responses from table 23, the differences in terms of number of responses are reasonable from column one to four. Columns one and three show that there was a better understanding of the Zulu phrases whereas in columns two and four the opposite occurred. There were no matches found for column five, which does not exist, and in column six, where a Zulu column of response is missing; this could again point to the discrepancy in understanding the higher ranges of severity between the languages.

It came to light during the focus group discussion (Appendix G, pages: 182, 189 - 191), that there is no word in the Zulu language for concentration but a word does exist for thinking and that in English is not fundamentally the same. A considerable amount of time was spent discussing each phrase of that section in order for those sentences to be as culturally, linguistically and contextually accurate as possible.

It is recommended that this particular section of the questionnaire not be used or excluded from future cross-cultural quantitative research/questionnaires as it has taken much time and effort to contextualize although it appears to have good enough or sound result, i.e. its' percentage of agreement is at eighty-two, which is the third highest percentage for amongst all ten sections.

Table 24: Cross-tabulation of responses to English (E) and Zulu (Z) questions for the CCMC Neck Disability Index on Section 7 (Work)

		Z7				Total
		1	2	3	4	
E7	1	28	0	1	0	29
	2	0	10	1	0	11
	3	0	0	4	0	4
	4	0	0	2	2	4
	5	0	0	1	0	1
	6	0	0	0	1	1
Total		28	10	9	3	50

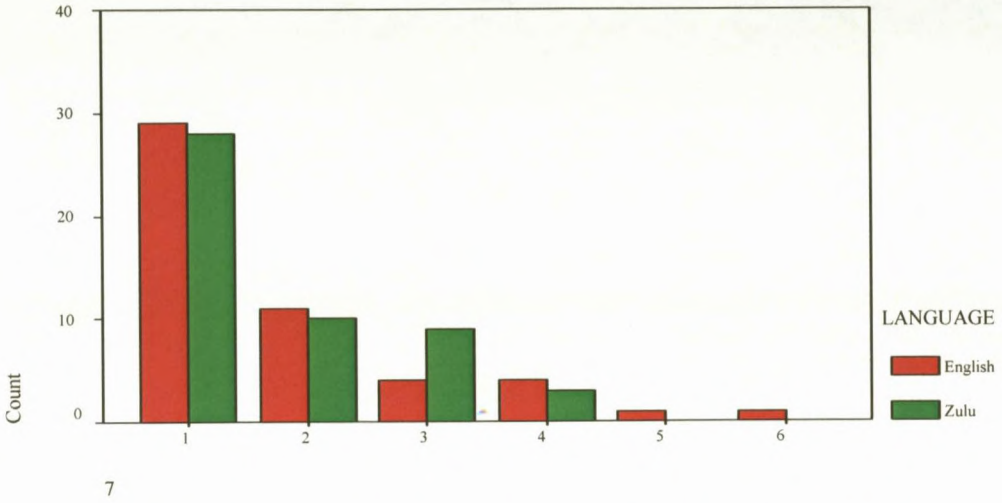

Figure 22: Bar chart of frequency of responses to section 7 (work) on CCMC by language

The extract from table 17 as shown below, the levels of agreement are very good, indicating that the words/statements used in the translation seems to have been appropriately and repeatedly identified in both questionnaires. It also occurred that the English ratings contained a category that was not found in the Zulu rating and as a result no p value is available for these mismatches.

Section 7 – Work	88%	0.830	Very good	

From the highlighted diagonal boxes above, when the numbers were added up, there are forty-four agreements out of the total of fifty, which supports the good levels of agreement. If one follows the cross-tabulation responses from table 24, the differences in terms of number of responses seem minor for columns one, two and four.

These minimal differences in responses could indicate that the difference in understanding of the words is also minor and therefore the words appear to be more congruent. For column three however, because the English column appears considerably lower than the Zulu column, this could mean that the English concept was not as well understood as that concept stated in Zulu. In columns five and six, where each column is missing a Zulu counterpart; this implies that the concept in Zulu regarding the amount of work that one is able to do versus the amount of pain caused at the higher scales of severity was not understood and possibly unanswered.

During the focus group discussions (Appendix G, pages: 183 - 184), certain words were changed/removed from certain phrases and grammar was corrected in others. For example, in the third phrases, there was a substantial amount of discussion surrounding one of the English words used, so the Zulu words had to be changed to bring a more precise meaning. It turns out though that the Zulu phrase became more explicit and the results support this. For the fifth phrase, the group had to find Zulu words that best corresponded with the word 'hardly' found in the English questionnaire. As there is no matching Zulu bar for the fifth column; it implies that a suitable phrase in Zulu was not found to match the one in English. Once again, we see the trend of a missing matching bar in column six, which could point further to the discrepancy in understanding the higher ranges of severity between the languages, in this case, in Zulu.

A few issues were readdressed, like possibly excluding the higher ranges of severity in this section and finding either another more precise English word to be inserted as long as the word carries the same concept as the Zulu phrase currently in the questionnaire. This section had the highest percentage and strength of agreement and therefore is good to use and should be considered in questionnaires in future research.

Table 25: Cross-tabulation of responses to English (E) and Zulu (Z) questions for the CCMC Neck Disability Index on Section 8 (Driving)

		Z8					Total
		1	2	3	5	6	
E8	1	10	0	0	0	0	10
	2	1	3	0	1	0	5
	3	1	1	3	0	0	5
	4	0	0	0	1	0	1
	5	0	0	0	2	2	4
Total		12	4	3	4	2	25

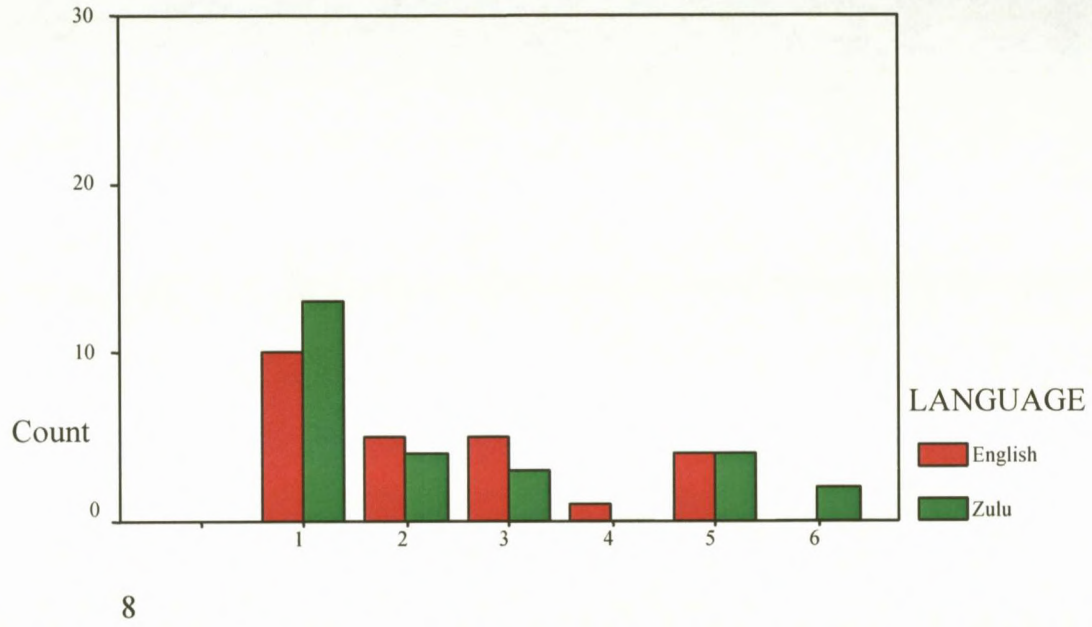

Figure 23: Bar chart of frequency of responses to section 8 (driving) on CCMC by language

The extract from table 17 as shown below, the levels of agreement are good, indicating that the words used in the translation seems to have been appropriately and repeatedly identified in both questionnaires. It happened that the English and Zulu ratings contained a category that was not found in either rating and as a result no p value is accessible for these mismatches.

Section 8 – Driving	72%	0.767	Good	

From the highlighted diagonal boxes above, when the numbers were added up, there are eighteen agreements out of the total of twenty-five, which supports the good level of agreement. If one follows the cross-tabulation responses from table 25, the differences in terms of number of responses seem minute for columns one to three, indicating that the concepts of the effects of neck pain on ones ability to drive in English and Zulu were well understood. In column number one, because the Zulu bar is higher, it means that the English phrase was not precisely represented. The opposite occurs in columns two and three where the Zulu phrase may not represent what was said in English, keeping in mind though, that the differences in responses are marginal. Columns four and six however, each have a missing Zulu and English column respectively. Once again, we see the trend of a missing corresponding bar in column six, which could again point to the discrepancy in understanding the higher ranges of severity between the languages, in this case, in English.

There was quite a fair amount of discussion surrounding this particular section among the members of the focus group (Appendix G, pages: 184 -186), with regards to having moderate neck pain and being able to drive versus having moderate neck pain and not being able to drive. These statements correspond to phrase three and phrase four respectively and it stands to reason why there was a problem with the fourth column of responses.

This section of the questionnaire has the second lowest percentage of agreement and probably needs to be re-evaluated to have the Zulu responses redone or revised on a more detailed/precise level. It is not advisable that this section be used in future quantitative research until amendments have been made to improve the phrases/statements.

Table 26: Cross-tabulation of responses to English (E) and Zulu (Z) questions for the CCMC Neck Disability Index on Section 9 (Sleeping)

		Z9					Total
		1	2	3	4	5	
E9	1	18	1	1	0	0	20
	2	0	11	1	0	0	12
	3	0	3	6	0	0	9
	4	0	1	1	5	1	8
	5	0	0	1	0	0	1
Total		18	16	10	5	1	50

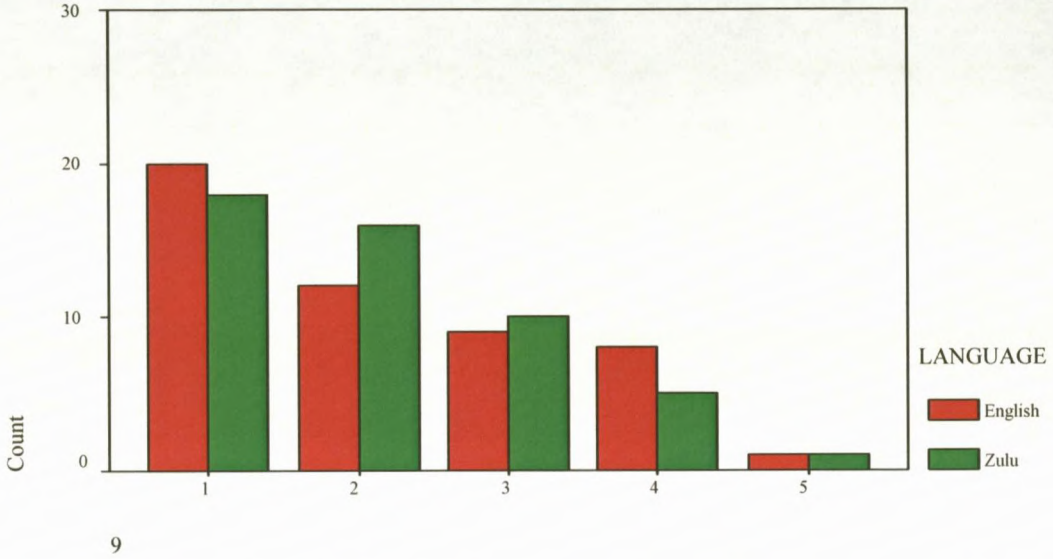

Figure 24: Bar chart of frequency of responses to section 9 (sleeping) on CCMC by language

The extract from table 17 as shown below, the levels of agreement are good, supported by the p value (< 0.001) indicating that there is support for an agreement greater than by chance alone. This indicates that the words utilized in the translation seemed to have been correctly and repeatedly identified in both questionnaires.

Section 9 – Sleeping	80%	0.786	Good	<0.001

From the highlighted diagonal boxes above, when the numbers were added up, there are forty agreements out of the total of fifty, which supports the good level of agreement. If one follows the cross-tabulation responses from table 26, the differences in terms of number of responses for columns one to four are similar and seem to waver in that the English bars are higher than that of the Zulu bars for

columns one and four, meaning that the Zulu phrases didn't match up exactly to what was said in English; but in columns two and three, where the Zulu bars are higher than the English bars, this meaning that the English concepts were not as accurately understood as the phrases stated in Zulu, more so in column two. We see that in column five, there is an exact match of levels, so we can say that what was said in English matched what was said in Zulu, accurately.

During the discussion amongst the members of the focus group (Appendix G, pages: 186 -187), there was some discussion surrounding the first four phrases, changes were made, grammatical and otherwise i.e. words were removed/changed to suit the context of the sentence. Phrase five however remained unchanged and as seen above from the graph, was a statement well understood. The shortfalls for this section occurred with regards to scaling or grading of the degree to which the participants' sleep was disturbed. The word used in the second phrase is, fairly; phrase three, mildly; phrase four, moderately; phrase five, greatly; and phrase six, completely. The highest end of the scale was left unanswered, as column six is non-existent, as none of the participants may have suffered complete lack of sleep due to their neck pain. For column two, there major disagreement comes in with the word fairly, which we already know has no counterpart in the Zulu language. Phrase four however remained unchanged in the discussion and it could be that the matching Zulu expression needs to be revised in order for both phrases in their respective languages to go well together.

With a few issues readdressed, like possibly excluding the higher ranges of severity in this section, excluding the phrase containing the word fairly and/or finding either another more precise English word to be inserted as long as the word carries the same concept as the Zulu phrase currently in the questionnaire. This section had a high percentage and strength of agreement, supported with a p value therefore this question is good to use and should be considered in questionnaires in future quantitative research.

Table 27: Cross-tabulation of responses to English (E) and Zulu (Z) questions for the CCMC Neck Disability Index on Section 10 (Recreation)

		Z10					Total
		1	2	3	4	5	
E10	1	24	1	0	0	1	26
	2	1	12	2	0	0	15
	3	1	1	4	2	0	8
	4	0	0	1	0	0	1
Total		26	14	7	2	1	50

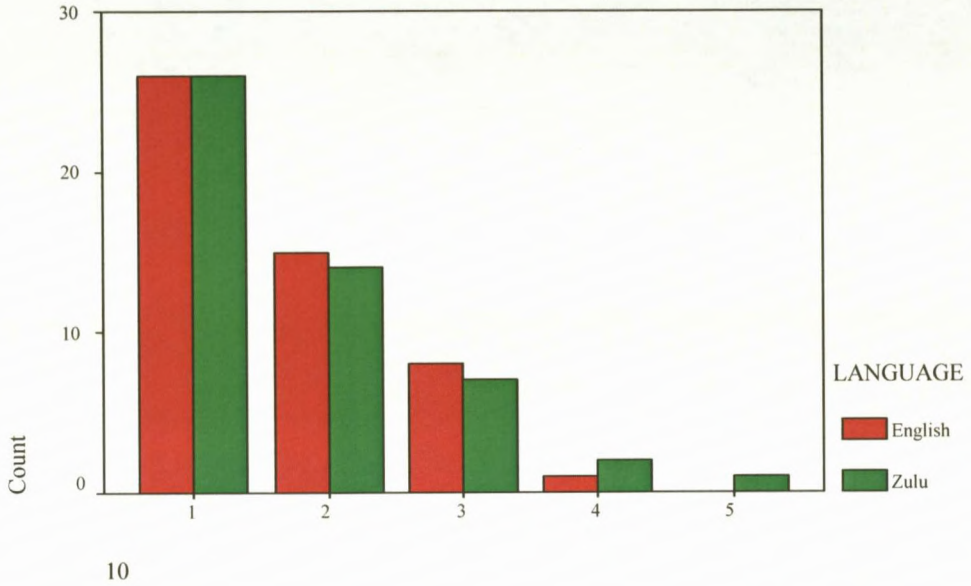

Figure 25: Bar chart of frequency of responses to section 10 (recreation) on CCMC by language

The extract from table 17 as shown below, the levels of agreement are good, indicating that the word used in the translation seems to have been correctly and repeatedly identified in both questionnaires. It happened that the Zulu ratings contained a category that was not found in the English rating and as a result no p value is available for these mismatches.

Section 10 - Recreation	80%	0.691	Good	

From the highlighted diagonal boxes above, when the numbers were added up, there are forty agreements out of the total of fifty, which supports the good level of agreement.

If one follows the cross-tabulation responses from table 27, the differences in terms of number of responses is minimal for columns two and three with the English bars of the columns being a little bit higher than the Zulu bars, meaning that the English phrases were better understood than those in Zulu. Column ones' bars are equal, which means that the phrases were accurate for each language in which they were stated. In column four, the difference in terms of number of responses is minute but the Zulu bar is just a fraction higher than the English bar. In column five, there is no English bar, which may indicate the discrepancy in understanding the higher ranges of severity between the languages, in this case, in English possibly because we saw that the word hardly, also used in the fifth phrase in section seven (relating to work), caused the group have to find Zulu words that best corresponded with the word 'hardly' found in the English questionnaire.

From the focus group discussion (Appendix G, pages: 187 -189), in review of the first translation, a few similar words were removed from the each of the sentences in order to maintain their concepts.

As this particular section, had an over-all good level of agreement and did not require a vast amount of time spent discussing the concepts within the focus group, the researcher believes that this section would serve well in future cross-cultural quantitative research.

4.9.3 Summary.

For the Zulu CMCC NDI, most times the English ratings contained a category that was not found in the Zulu rating or vice versa (and as a result no p value is available for these mismatches) these results imply that quite a few sections (seven out of ten) had problems in the respondents identifying them correctly in both questionnaires, which would in turn imply that these words need to be revisited in the questionnaire. There was also a possible discrepancy in the interpretation of severity in the higher ranges that may have affected the results. On the basis that seven out of ten sections need revision, the Zulu CMCC NDI is therefore not recommended as a tool to be utilized based on the outcomes of this research, pending adjustments to the above-mentioned sections.

4.10. Discussion of objectives.

Objective 1: The first objective of this prospective pilot investigation was to analyse and critique the Zulu translation of the CMCC NDI and SFMPQ in order to establish their face validity.

Hypothesis one:
Face validity was established.

Hypothesis one is accepted.

Objective 2: The second objective, of this prospective pilot investigation was to analyse and critique the Zulu translation of the CMCC NDI and SFMPQ in order to establish their concurrent validity, ensuring that the translations are sensitive and specific enough to use as a tool in data collection when compared to their English counterparts.

Hypothesis two:
The results are in agreement or within an acceptable or reasonable margin for the Zulu SFMPQ but not for the Zulu CMCC NDI. Thus the Zulu SFMPQ is declared to have concurrent validity within the context of the Zulu speaking population of Kwa-Zulu Natal but the Zulu CMCC NDI is declared not to have concurrent validity.

Hypothesis two is accepted.

Objective 3: To make recommendations for further improvement in terms of the Zulu questionnaires.

Hypothesis three:
Changes were necessitated to the Zulu translations of the SFMPQ and CMCC NDI.

For the Zulu SFMPQ, the English ratings contained a category that was not found in the Zulu rating or vice versa. Those results imply that the words of shooting, splitting, fearful and punishing-cruel (four out of fifteen sections) had problems in the respondents identifying them correctly in both questionnaires. The above-mentioned sections or words need to be revisited in the questionnaire. The Zulu SFMPQ was recommended as a tool to be utilized based on the outcomes of this research.

For the Zulu CMCC NDI, most times the English ratings contained a category that was not found in the Zulu rating or vice versa (and as a result no p value is available for these mismatches) these results showed that more than fifty percent of the sections (seven out of ten) had problems in the respondents identifying them correctly in both questionnaires, which would implied that these words need to be revisited in the questionnaire.

Fourthly, to make recommendations for further studies and areas for improvement in terms of the use of these Questionnaires as research tools amongst the Zulu speaking population of South Africa.

Further recommendations will be discussed in the following chapter 5.

4.11. Summary and conclusion.

Both the Zulu SFMPQ and the Zulu CCMC NDI questionnaires (Appendices D and E) showed acceptable levels of intra-rater agreement. However, the SFMPQ showed a much better agreement than the CMCC NDI.

Chapter 5

Conclusion and Recommendations

5.1. Conclusion.

According to Cote` et al; (2004) questionnaires present two advantages: first, they combine the constructs of pain and activity limitations into one outcome that can be used to measure the prevalence and incidence of neck pain; second, they allow for the accurate measurement and reporting of the burden of disability associated with neck pain.

In conclusion, the findings of this study support the suggestion of Guillemin et al; (2000) that, where the culture and country of origin of a particular questionnaire differs to that of where the questionnaire will be used, not only translation, but cultural adaptation of the questionnaire is indicated.

5.1.1. The SFMPQ.

The choice of the questionnaire lay in the fact that the SFMPQ [Appendix D (i)], which was derived from the MPQ (Melzack, 1975) and is a useful measurement that takes 2-5 minutes to administrate. The data obtained from this scale provides information on sensory, affective and overall intensity of pain (Yeoman's, 2000: 64).

The study found a high level of agreement and thus concurrent validity was established between the Zulu and the English versions (as per objective two). There was generally a good level of agreement between responses to the English and Zulu questionnaires. Strength of agreement for the individual items ranged from "fair" to "very good". Percentage agreement ranged from 68% to 94% (see Table 1 on page 90).

For items where a p value was available (i.e. where there was a symmetric two-way table between the English and Zulu responses), there was a highly significant level of agreement ($p < 0.001$), which implied that in the population there was significantly greater agreement than expected by chance alone.

However, for the Zulu SFMPQ, it occurred in certain instances that the reported English ratings contained a category that was not found in the Zulu rating or vice versa. These results imply that the words "shooting", "splitting", "fearful" and "punishing-cruel", where reciprocal categories were not identified, had problems in the respondents identifying them correctly in both questionnaires. This would in turn imply that these words need to be revisited in the questionnaire. Nevertheless, in order to allow for greater congruency in the concept or meaning and allow a more accurately repeated response (on the basis that four out of fifteen sections needing revision) the Zulu SFMPQ is recommended as a tool to be utilized based on the outcomes of this research, pending adjustments to the above-mentioned sections.

5.1.2. The CMCC NDI.

The NDI [Appendix D (ii)] has stable psychometric properties, which provides an objective means of assessing the disability of patients suffering from neck pain (Hains, Waalen and Mior, 1998 and Pietrobon et al; 2002). It was also developed to measure self-perceived disability from neck pain (Hoving et al; 2003).

The study found a moderate level of agreement but concurrent validity was not established between the Zulu and the English versions (as per objective two). With this scale there was a good level of intra rater agreement, with 90% of items having a "good" strength of agreement. Item 7 had a "very good" agreement between the English and Zulu questionnaires. Where p values were available, the significance of agreement was very high and could not have arisen purely by chance.

For the Zulu CMCC NDI, most times the English ratings contained a category that was not found in the Zulu rating or vice versa (and as a result no p value is available for these mismatches), these results imply that more than fifty percent of the sections had problems in the respondents identifying them correctly in both questionnaires, which would in turn imply that these words need to be revisited in the questionnaire.

There was also a possible problem with the interpretation of severity in the higher ranges that may have affected the results.

On the basis that seven out of ten sections requiring revision, the Zulu CMCC NDI is therefore not recommended to be utilized based on the outcomes of this research, pending adjustments to the fore-mentioned sections. The seven out of ten sections that need revision are sections: two (personal care), three (lifting), four (reading), six (concentration), seven (work), eight (driving) and ten (recreation).

5.2. Recommendations.

The administration of the questionnaires, were within a fairly lengthy time period (i.e. +/- forty-five minutes) and as a result this allowed for decreased participant question recognition. This method could however be further improved by the use of a combination of scrambling of the questions from one questionnaire to the next as well as increased time in order to decrease reactive memory response.

A limitation in this study is that, in order to assess the questionnaire, participants had to be literate in both English and Zulu. However, the situation this research primarily seeks to address is that of Zulu speaking persons who would not be able to answer the English version easily. A recommendation for future research is to assess the understanding of the Zulu translation of this group alone.

The fourth objective of the study was to make recommendations for further studies and areas for improvement in terms of the use of these questionnaires as research tools amongst the Zulu speaking population of South Africa.

Recommendations for improvement are that for the Zulu CMCC NDI (sections 2, 3, 4, 6, 7, 8 and 10) and in the Zulu SFMPQ (the sections pertaining to the words of shooting, splitting, fearful and punishing-cruel) be further culturally and contextually adapted.

The Delphi Method could/should be incorporated into the methodology of future studies. This method makes use of a panel of experts, selected based on the areas of expertise required. The notion is that well-informed individuals, calling on their insights and experience, are better equipped to predict the future than theoretical approaches or extrapolation of trends. Their responses to a series of questionnaires are anonymous, and they are provided with a summary of opinions before answering the next questionnaire. It is believed that the group will converge toward the "best" response through this consensus process. The midpoint of responses is statistically categorized by the median score. In each succeeding round of questionnaires, the range of responses by the panelists will presumably decrease and the median will move toward what is deemed to be the "correct" answer. One distinct advantage of the Delphi Method is that the experts never need to be brought together physically, and indeed could reside anywhere in the world. The process also does not require complete agreement by all panelists, since the majority opinion is represented by the median. Since the responses are anonymous, there wouldn't be any pitfalls of ego and domineering personalities (www.ryerson.cal/~mjoppe/ResearchProcess/841TheDelphiMethod.htm). The Delphi Method would allow for a close approximation of the Zulu and English NDI as they require further qualifying.

Also, a focus group (if the Delphi Method is inappropriate) should be set up and allocated ample time to discuss how the English meanings could be more accurately reflected in Zulu.

The group should consist of a wide range of literacy levels, in order to ensure accurate understanding of the English question, and relevant traditional input.

Another recommendation is that the researcher should be more proficient in both languages that are involved in the translation process.

Lastly, it is also suggested that any further research of this type apply a stratification model in terms of literacy level, age and other relevant categories pertinent to the study, to ensure that the demographic data gathered is more representative of the Zulu speaking population.

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Appendix A

Letter of Information (Research)

Dear Participant,

I would like to welcome you to my study. The title of my research project is:

A prospective pilot investigation of the Zulu translation of the CMCC Neck Disability Index Questionnaire and Short Form McGill Questionnaire with respect to its concurrent validity when compared to their English counterparts.

Until now, no validated Zulu neck pain questionnaires have been available in order to help assess, accurately record and therefore treat neck pain in your community. Translations of well-used English neck pain questionnaires were done, and assessed by a focus group. The improved questionnaires now have to be put through a few more tests to see if they are useful.

Therefore the purpose of this study is to see how understandable and useful the Zulu translations of the Short-form McGill Questionnaire and the CCMC Neck Disability Index questionnaires are. This will be done by comparing the information gathered from the Zulu questionnaires you will fill in, with the information obtained from the English form of the questionnaires. You will be required to fill in the questionnaires that follow as accurately as you can. By taking part in this study you are helping us see how we can improve the questionnaires so that you can get better treatment in the future. If at any time you feel uncomfortable answering the questionnaire, please feel free to withdraw. Be assured that your answers to the questionnaire will be kept confidential and that the names of participants will not appear in the results. A copy of the final results can be made available to you, should you wish it.

There will be ***no treatment of your neck pain*** with taking part in this study however, an assessment of your neck pain is offered free of charge with participation. An assessment will consist of a number of clinical tests performed in order to find the cause of your neck pain so that adequate treatment or appropriate care can take place. Should we be unable to treat your neck pain, you will be referred to an appropriate health care provider. These assessments will take place in the Chiropractic Day Clinic. Appointments for assessments need to be made at the time of the study and the initial assessment will take approximately one and a half to two hours.

If you have any questions, please feel free to contact either my supervisor or myself at:

Tel: 2042611 (Supervisor - Dr. Korporaal) or 204 2205 (Researcher – Corinne Ally)

Thank you very much for your participation

Appendix B
Informed Consent Form (Research)

Date:

Title of research project:
A prospective pilot investigation of the Zulu translation of the CMCC Neck Disability Index Questionnaire and Short Form McGill Questionnaire with respect to its concurrent validity when compared to their English counterparts.

Name of Supervisor: Dr. Charmaine Korporaal
Telephone no.: 031 2042611

Name of Researcher: Corinne Ally
Telephone no.: 204 2512 or 204 2205

Please circle the appropriate answer:

1. Have you read the information sheet?	Yes	No
2. Have you had an opportunity to ask questions regarding this study?	Yes	No
3. Have you received satisfactory answers to your questions?	Yes	No
4. Have you had opportunity to discuss this study?	Yes	No
5. Have you received enough information about this study?	Yes	No
6. Do you understand the implications of your involvement in this study?	Yes	No
7. Do you understand that you are free to withdraw from this study?	Yes	No
a.) at any time		
b.) without having to give any reason for withdrawing		
c.) without affecting your future health care		
8. Do you agree to voluntarily participate in this study?	Yes	No
9. Who have you spoken to regarding this study? _____		

IF YOU HAVE ANSWERED NO TO ANY OF THE ABOVE, PLEASE OBTAIN THE NECESSARY INFORMATION BEFORE SIGNING.
Please print in block letters:

Patient/Subject Name: _____

Signature: _____

Witness' Name: _____

Signature: _____

Researcher's Name: _____

Signature: _____

Appendix C
Advertisement

NGABE UNAYO INKINGA YEQOLO, UMQALA, IHLOMBE AMAQUKALA NOMA UNYAWO?

NGABE UYASIKHULUMA YINI ISIZULU NESINGISI?

Okuzodingeka ukuba ukwenze ukugcwalisa izimpendulo ngesiZulu nangesiNgisi.
Uma usuqedile ukuba nathi kuloluphenya uzothola ukuhlolwa kanye nokwelasha kwamahala kwalokhu okungenhla kweqolo lakho ngesikhathi esingangesonto kusukela manje.
Uma ungathanda ukwazi kabanzi ungaxhumana no

Zhakir (Zak)
no
Corinne

(Owengamele lolucwaningo) kwinomboloelandelayl:

083 4793357 / 204 2205 (Zak) 082 7245713 / 204 2205 (Corinne)

DO YOU HAVE LOWER BACK, NECK, SHOULDER OR FOOT/ANKLE PAIN?

DO YOU SPEAK ENGLISH AND ZULU?

All you need to do is fill in a few pain questionnaires in English, and then Zulu.
As a result of participation in my study, you are entitled to a FREE assessment and treatment of your lower back, neck, shoulder or foot/ankle pain.
If you would like to know more, please contact

Zhakir (Zak)
On:
083 4793357 / 204 2205
Or
Corinne
On:
082 7245713 / 204 2205

Appendix D (i)

English Short-form McGill Pain Questionnaire (SFMPQ)

Ronald Melzack (1984)

Date: _____ File no.:_____ Visit no.:_____

Patient Name: _____

	NONE 0	MILD 1	MODERATE 2	SEVERE 3
THROBBING				
SHOOTING				
STABBING				
SHARP				
CRAMPING				
GNAWING				
HOT – BURNING				
ACHING				
HEAVY				
TENDER				
SPLITTING				
TIRING-EXHAUSTING				
SICKENING				
FEARFUL				
PUNISHING-CRUEL				

Appendix D (ii)
English CCMC Neck Disability Index

Patient Name: _____File no.: _____ Date: _____

This questionnaire has been designed to give the doctor information as to how your neck pain has affected your ability to manage everyday life. Please answer every section and mark in each section only ONE box as it applies to you. We realize you may consider that two of the statements in any one section could 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 very severe at the moment.
- ❑ The pain is the worst imaginable at the moment.

Section 2- Personal Car (washing, dressing)

- ❑ I can look after myself normally without causing extra pain
- ❑ I can look after myself normally but it causes extra pain.
- ❑ It's painful to look after myself and I'm slow and careful.
- ❑ I need some help but manage most of my personal care.
- ❑ I need help everyday in most aspects of self-care.
- ❑ I do not get dressed, I wash with difficulty and stay in bed.

Section 3- Lifting

- ❑ I can lift heavy weights without extra pain.
- ❑ I can lift weights but it gives extra pain.
- ❑ Pain prevents me form lifting heavy weights off the floor but I can manage if they're conveniently placed, for example on a table.
- ❑ Pain prevents me from lifting heavy weights but I can manage light to medium weights of they're conveniently positioned.
- ❑ I can lift only very light weights.
- ❑ I cannot lift or carry anything at all.

Section 4- Reading

- ❑ I can read as much as I want to without any 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 to with moderate pain in my neck.
- ❑ I cannot read as much as I want to 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 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 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 7- Work

- ❑ I can do as much work as I want to.
- ❑ I can do only 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 cannot do any work at all.

Section 8- Driving

- ❑ I can drive my car without any neck pain.
- ❑ I can drive my car for 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 cannot drive my car as long as I want because of moderate pain in my neck.
- ❑ I cannot drive at all.

Section 9- Sleeping

- ❑ I have no trouble sleeping.
- ❑ My sleep is slightly disturbed. (<1 hour sleep loss)
- ❑ My sleep is mildly disturbed. (1-2 hours sleep loss)
- ❑ My sleep is moderately disturbed. (2-3 hours sleep loss)
- ❑ My sleep is greatly disturbed. (3-5 hours sleep loss)
- ❑ My sleep is completely disturbed. (5-7 hours sleep loss)

Section 10- Recreation

- ❑ I'm able to engage in all my recreation activities with no neck pain at all.
- ❑ I'm able to engage in all my recreation activities with some pain in my neck.
- ❑ I'm able to engage in most but not all of my usual recreation activities because of my neck pain.
- ❑ I'm able to engage in a few of my recreation activities because of pain in my neck.
- ❑ I can hardly do any of my recreation activities because of pain in my neck.
- ❑ I cannot do any recreation activities at all.

Vernon/Hagino, modified from Foubister et al; Physiotherapy, 1980.

Appendix E (i)
Zulu Short-form McGill Pain Questionnaire

Ifomu Elifingqiwe Lemibuzo Yobuhlungu kaMcGill Pain Questionnaire (SFMPQ) Ronald Melzack (1984)

Usuku: _____ Inamba yefayela: _____

Inamba Yokuvakasha: _____

Igama lesiguli: _____

	Abukho 0	Obuncane 1	Obubekezele kayo 2	Okwedlulele 3
Obunkenkethayo				
Obuchachamba				
Obugwazayo				
Obuhlabayo				
Obusontekayo				
Obuhlezibukhona				
Obushisayo				
Obuqaqambayo				
Obusindayo				
Obubekezelekayo				
Obusabalalayo				
Obukhathazayo				
Obugulisayo				
Obusabisayo				
Obunesihluku				

Appendix E (ii)

Zulu CMCC Neck Disability Index

C.M.C.C UHLA LWEMIBUZO NGOKUKHUBAZEKA KOMQALA

Igama lesiguli:_____ Inamba yefayela:_____ Usuka:_____

Sicela uphendule zonke izigaba ukhombise ngokubeka uphawu ebhokisini elilodwa kuphela. Kungenzeka ukuthi ungavumelana nesilatimende ezingaphezu kwesisodwa kodwa sicela ufake uphawu kulelo bhokisi eliyichaza kangcono inkinga yakho.

ISIGABA 1: Amandla obuhlungu

- ❑ Angubuzwa ubuhlungu okwamanje
- ❑ Ubuhlungu buncane okwamanje
- ❑ Ubuhlungu buyabekezeleka okwamanje
- ❑ Ubuhlungu kakhulu impela okwamanje
- ❑ Ubuhlungu ilobu obungasabekezeleleki

ISIGABA 2: Ukuzinakekela (Ukugeza, ukuggoka)

- ❑ Ngingazinakekela ngaphandle kokwengeza ubuhlungu
- ❑ Ngingazinakekela nokwejayelekile kodwa lokhu kwengeza ubuhlungu
- ❑ Kubuhlungu ukuzinakekela futhi ngenza kancane ngicophelele
- ❑ Ngidinga usizo oluncane kodwa izinto eziningi ngiyakwazi ukuzenzela
- ❑ Ngidinga usizi nsukuzonke ezintweni eziningi zokuzinakekela
- ❑ Angikwazi ukuzigqokisa, ngigeza kanzima futhi ngihlala ngisembhedeni

ISIGABA 3: Ukuqukula

- ❑ Ngingaziqukula izinto ezisinda kakhulu ngingabuzwa ubuhlungu
- ❑ Ngingakuqukula okusinda kakhulu kodwa kunginika_obunye ubuhlungu
- ❑ Ubuhlungu buyangivimba ukuthi okusindayo ngikususe phansi, kodwa ngingakwasi ukuqukula uma kubekeke etafuleni
- ❑ Ubuhlungu buyangivimba ukuba ngiqukule okusindayo, kodwa ngingakwazi uma kulula noma kukahle, uma kubekeke kahle
- ❑ Ngingakwazi ukuqukula okunesisindo esilula kakhulu kuphela
- ❑ Angikwazi nje sampela ukuqukula noma ukuphata noma utho oluthile

ISIGABA 4: Ukufunda

- ❑ Ngingafunda ngendlela engithanda ukufunda ngayo ngaphandle kokuzwa ubuhlungu emqaleni wami
- ❑ Ngingafunda ngendlela engithanda ukufunda ngayo kodwa kube khona ubuhlungu obuncane emqaleni wami
- ❑ Ngingafunda ngendlela engithanda ukufunda ngayo kodwa ubuhlungu emqaleni wami
- ❑ Angikwazi ukufunda isikhati eside engisithandayo ngenxa yobuhlungu emqaleni
- ❑ Akuvumi ukuba ngifunde ngenxa yobukhulu bobuhlungu obusemqaleni
- ❑ Angikwazi nhlobo ukufunda

ISIGABA 5: Ukuphathwa ikhanda

- ❑ Alingiphathi nhlobo ikhanda
- ❑ Ngiphathwa ikhanda kancane futhi alivamile ukungiphatha
- ❑ Ngiphathwa ikhanda ngokugekukhulu lingiphatha gqwa alivamile
- ❑ Lijwayele ukungiphatha ikhanda kodwa hhayi njalo
- ❑ Lijwayele ukugiphatha ikhanda njalo
- ❑ Ngiphathwa ikhanda cishe ngaso sonke isikhathi

ISIGABA 6: Ukucabangisisa

- ❑ Ngiyakwazi ukucabangisisa ngaphandle kobunzima
- ❑ Ngiyakwazi ukucabangisisa uma ngifuna kodwa kuba khona ubunzima obuncane
- ❑ Kuba khona ukudlulana obuncane ubunzima uma ngifuna ukucabangisisa
- ❑ Ngiba nobunzima obuningi uma ngicabangisisa
- ❑ Ngiba nobunzima obuningi kakhulu uma ngifuna okunakisisa
- ❑ Angikwazi nhlobo ukucabangisisa

ISIGABA 7: Umsebenzi

- ❑ Ngingenza umsebenzi omningi ngokuthanda
- ❑ Ngingenza umsebenzi wami engiwujwayele kuphela
- ❑ Ngingenza okuningi engikujwayele, kodwa hhayi okwengeziwe
- ❑ Angikwazi ukwenza umsebenzi wami engijwayele ukwenza
- ❑ Ngiwenza kalukhuni noma yimuphi umsebenzi
- ❑ Angikwazi nhlobo ukwenza noma yimuphi umsebenzi

ISIGABA 8: Ukushayela

- ❑ Ngiyayishayela imoto yami bungabi bikho ubuhlungu emqaleni wami
- ❑ Ngiyayishayela imoto yami ngokuthanda kodwa kuba khona ubuhlungu obuncane emqaleni
- ❑ Ngiyayishayela imoto yami ngokuthanda kube khona ubuhlungu obubekezelekayo emqaleni
- ❑ Angikwazi ukushayela imoto isikhathi eside ngoba kuba khona ubuhlungu obungabukhulu kangako emqaleni
- ❑ Akuvumi ukuba ngishayele ngenxa yobuhlungu obukhulu emqaleni wami
- ❑ Angikwazi nhlobo ukushayela

ISIGABA 9: Ukulala

- ❑ Anginayo inkinga yokulala
- ❑ Ukulala kwami kuphazamiseka (<1 amahora amoshekile)
- ❑ Ukulala kwami kuphazamiseka kodwa hhayi kakhulu (1-2 amahora amoshekile)
- ❑ Ukulala kwami kuphazamiseka kancane (2-3 amahora amoshekile)
- ❑ Ukulala kwami kuphazamiseka kakhulu (3-5 amahora amoshekile)
- ❑ Angisalali nhlobo (5-7 amahora amoshekile)

ISIGABA 10: (Ukuzilibazisa) Ukuzijabulisa

- ❑ Ngiyakwazi ukuzimbandakanya ekuzijabulisa ngaphandle kokuba nobuhlungu emqaleni
- ❑ Ngiyakwazi ukuzimbandakanya ekuzijabulisa kube khona ubuhlungu obungatheni
- ❑ Ngiyakwazi ukuzimbandakanya kokuningi, kodwa hhayi konke ngenxa yobuhlungu emqaleni
- ❑ Ngiyakwazi ukuzimbandakanya kokumbalwa ngenxa yobuhlungu emqaleni
- ❑ Akuvumi ukuthi ngenze imisebenzi yokuzijabulisa ngenxa yobuhlungu emqaleni wam
- ❑ iAngikwazi nhlobo ukuzijabulisa

Vernon/Hagino, modified from Foubister et al; Physiotherapy, 1980

Appendix F (i)

LETTER OF INFORMATION (Focus Group)

Dear Participant,

Welcome to the focus group of my study. Thank you for your interest.

Name of supervisor: Dr. C. Korporaal (031-2042611)

Name of Research Student: Corinne Ally (0827245713)

Name of Institution: Durban Institute of Technology

The purpose of this focus group is to validate the use of the CMCC Neck Disability Index Questionnaire and the Short Form McGill Questionnaire in terms of gathering information from Zulu speaking patients. The discussions will focus on the changes that are necessary in order to alter the Questionnaires into the Zulu-speaking patients' context.

Your participation is much appreciated and it is assured that your comments and contributions will remain confidential. You are at any point permitted to disagree, however if this is the case, please give your reasons for this, as it will assist in the research process. The results of this focus group will only be used for research purposes.

Thank you for your participation,

Yours sincerely,

Corinne Ally
(4th year Chiropractic student)

Dr. C. Korporaal
(Supervisor)

Appendix F (ii)

INFORMED CONSENT FORM (Focus Group)

Date: September 3, 2003

Title of research project: A prospective pilot investigation of the Zulu translation of the CMCC Neck Disability Index Questionnaire and the Short Form McGill Questionnaire with respect to its concurrent validity when compared to their English counterpart.

Name of Supervisor: Dr. Charmaine Korporaal

Telephone no.: (031) 204 2611

Name of researcher: Corinne Ally

Telephone no.: 0827245713

Please read the questions and only sign the form if the answer to all of them is YES. If an answer to a particular question is NO, please obtain the necessary information before signing.

Please circle the appropriate answer.

1. Have you read the patient information sheet? YES / NO
2. Have you had opportunity to ask questions regarding this study? YES / NO
3. Have you received satisfactory answers to your questions? YES / NO
4. Have you had an opportunity to discuss this study? YES / NO
5. Have you received enough information about this study? YES / NO
6. Who have you spoken to regarding this study?

---

7. Do you understand the implications of your involvement in this study? YES / NO
8. Do you understand that you are free to withdraw from this study? YES / NO
   a). At any time?
   b). Without having to give a reason for withdrawing?
   c). Without affecting your future health care?
9. Do you agree to voluntarily participate in this study? YES / NO

Please print in block letters:

1. Participant's name:_____ Signature:_____
2. Participant's name:_____ Signature:_____
3. Participant's name:_____ Signature:_____
4. Participant's name:_____ Signature:_____
5. Participant's name:_____ Signature:_____
6. Participant's name:_____ Signature:_____
7. Participant's name:_____ Signature:_____
8. Participant's name:_____ Signature:_____
9. Participant's name:_____ Signature:_____

Appendix F (iii)

CONFIDENTIALITY STATEMENT (Focus Group)

This form needs to be completed by every member of the focus group prior to commencement of the focus group meeting.

Declaration

As a member of this committee I agree to abide by the following conditions:

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

2. The patient files have already been coded and will be kept anonymous, no identification of isolated patient cases will be allowed in the focus group.

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

4. The information of this focus group will be made public in terms of a journal publication, which will in no way identify any participants of this research.

Once this form has been read and agreed to, please fill in the appropriated information on the attached sheet and sign to acknowledge agreement.

Code of Conduct

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

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

3. The information of this focus group will be made public in terms of a journal publication, which will in no way identify any participants of this research.

	Member's full name	***Occupation***	***Signature***	**Contact details**
1				
2				
3				
4				
5				
6				
7				
8				
9				

Appendix G

Focus Group Transcript

Due to the poor quality of the recording of the focus group discussions, the transcribers decided that it would be best if the discussions in Zulu were summarized in English for purposes of completing the transcript. The videotape will be available for viewing from the Chiropractic Department.

Corinne: HI my name is Corinne Ally and you are here to be a part of our research tonight. Has everybody had enough tea or coffee? We are going to do this recorded so we need you to speak up. Umm. We could start by each of you introducing yourselves to each other.

Charmaine: Start with your name and where you from so we can have an idea of your background, if we can please start on the left hand side.

Zama: My name is Zama and I'm a teacher.

Promise: My name is Promise and I am an admin assistant.

Gugu: My name is Gugu Khosi and I am a teacher from Umlazi.

Lukas: I am Lukas Mngadi and I am a trainer.

Mzwandile: My name is Mzwandile Mjwana from Pretoria and I'm studying second year chiro.

Zandile: My name is Zandile Ndlovu and I'm a 4th year chiropractic student.

Nosipho: My name is Nosipho and I'm a student.

Connie: Connie, I'm her mother (points to Nosipho).

Corinne: Umm, the basic reason why you guys are here, is that we have some English pain scales or questionnaires that we've translated into Zulu and your purpose is to see that grammatically, that is correct and that what is in English translated into Zulu means the same thing. Anything else?

Charmaine: Get your form signed.

Zhakir: We just need everyone to sign the forms so whoever hasn't signed please get on with it.

Corinne: If we have a look at my two questionnaires. I'll be handing to you your letter of information for the focus group, your English scales and Zulu scales together. Then once you've read the letter of information, sign the informed consent sheet.

Time was given for the participants to read through the questionnaires and sign the informed consent forms.

Corinne: Has everyone signed the forms?

Zhakir: Sign those.

Corinne: Has everyone signed? Umm. Since you've had a chance to look at the questionnaires we'll be going through it all step by step, each thing like even the name and date to see if there are any discrepancies or if there's any disagreements. Umm. Can I ask someone to write down any corrections if there are any?
Anyone willing to? Will Zama? Would you mind, if there are any corrections? Thank you. Okay, we'll be starting with CMCC Neck Disability Index Questionnaire (NDIQ). Umm, I'll read it out in English, someone can read it out in Zulu and if there are any discrepancies, we'll change it. We'll start with the title, CMCC Neck Disability Index.

Promise: CMCC uhla lokungasebenzi kahle kweqolo.

Corinne: Is that okay?

Zandile: No

Mzwandile: Neck should be spelt umqala.

Zandile: We are saying that lokunga sebenzi kahle doesn't describe the disability.

Mzwandile: Kweqolo is the wrong part of the body. It's not the neck.

Corinne: Do we have any suggestions for these two words?

Zandile: Neck is umqala and iqolo is your back.

Zama: Neck disability should be ukukhubazeka komqala.

Mzwandile: Do we need to make adjustments on our papers?

Corinne: She will (points to Zama) be writing it down. So how does it go? CMCC.

Zandile: CMCC uhla lokukhubazeka komqala.

Everyone: That's fine.

Corinne: Can we move on?

Lukas: Okay, the context, the word index is used here, I'd like you to explain that. Is it in the context of, is it questions? What context is that word used in?

Corinne: Charmaine?

Charmaine: A description of the condition. So it's almost quantifying the condition via a set number of index points or reference points.

Lukas: Okay. In this case you should say iwemibuzo.

Zama: So we'll say CMCC uhla lwemibuzo ngokukhubazeka komqala.

Corinne: Is everyone okay with that?

Everyone: Yes.

Corinne: Next, we've got patient name.

Promise: Igama lesiguli.

Corinne: Is that okay?

Everyone: Yes.

Corinne: File number.

Promise: Inamba yefayela.

Everyone: Fine.

Corinne: Date.

Promise: Usuku.

Everyone: Fine.

Corinne: I'll read this slowly. This questionnaire has been designed to give the doctor information as to how your back pain has affected your ability to manage everyday life.

Promise: Loluhla lwemibuzo lwakhelwe ukunikeza udokotela ulwazi lokuthi ubuhlungu obuseqolo buyiphazamisa kanjani impiloyakho yansukuzonke.

Lukas: Before we go further okay, I'm not a medical professional. If you could just explain so that I understand what you are talking about. The topic is about the neck.

Corinne: Yes, okay.

Lukas: But in the first line, they are talking about the back.

Corinne: Okay. This scale has been derived from a lower back pain scale. So there was another scale before this one, which had a lot more questions in it and so they converted it to be used for the neck. That's why it's called the CMCC NDIQ, but I have noted that they need to change the back pain to neck pain.

Lukas: Okay.

Corinne: Can I carry on reading it to the end and then we can discuss it. Please answer every section and mark in each section only one box as it applies to you. We realize you may consider that two of the statements in any one section could relate to you, but please just mark the box, which most closely describes your problem.

Promise: Phendula zonke izigaba umake ibhokisi elilodwa kuphela lei ovumelana nalo. Siuazi ukuthi ungavumelana nezitatimemende ezimbili, kodwa inkinga ikhona okwamanje.

Lukas: We need to say sicela and change obuseqolo to emqaleni.

The group discussed what word in Zulu would be best to use to indicate as to where and how to answer the questions and tick the blocks. They discussed how to answer the questions most appropriately so as to choose one / the most appropriate one. The group also noted that it is possible to experience more than one option / statement.

Corinne: The one we're doing now is the longest. Can we continue? We'll go to Section One. Pain Intensity.

Promise: Isigaba one. Amandla Obuhlungu.

Everyone: That's fine.

Corinne: First box. I have no pain at the moment.

Promise: Anginabo ubuhlungu okwamanje.

Everyone: That's okay.

Corinne: Box two. The pain is very mild at the moment.

Promise: Ubuhlungu bukahle okwamanje.

The word mild was debated in Zulu in terms of intensity because in Zulu there is no substitute for the word fairly, it's mild, moderate or severe.

Gugu: Pain is something that you feel. So it should be "umgubuzwa ubuhlungu okwamanje.'

Tuto: Ungubuzwa ubuhlungu okwamanje.

Zama: Okay then, for number two, buncane means that the pain is not that serious.

Tuto: Ya, buncane for number two and buyabekezeleka for number 3.

Corinne: So between number one to three, we are clear.

Everyone: Yeah.

Corinne: Number 4. The pain is fairly severe at the moment.

Promise: Ubuhlungu bukhona okwamanje.

The group discussed the increasing severity of pain. For fairly painful and very painful, in Zulu it's all the same. Some pain is tolerable while you experience it (moderate) and other times it's terrible / unbearable (severe). There's little middle ground.

Mzwandile: Do we have to have six points in Zulu? We are thinking of closing down one of the points so that we have five points in the first block.

Zhakir: Any changes that you guys decide on any of the questionnaires, it has to be a unanimous decision. So put it to the vote, then we can implement the changes of the questionnaires.

Zhakir: But that's entirely up to you because that's what the focus group is about.

Corinne: So you all have decided on having five points?

Mzwandile: Yes.

Corinne: Which box will you be excluding?

Zama: Very Severe. We'll combine fairly and very so we just focusing only on severe.

Again the group discussed the ranges of severity of pain as relevant to the Zulu speaking population.

Corinne: So is everyone happy with box one?

Everyone: Yes.

Corinne: Can I just ask, what would you guys mind if we spend a limited time for each section so that we can get through this quicker. Is that ok with everybody?

Everyone: Yes.

Corinne: Then we could work through this faster and all go home.

Charmaine: The motivation is to first have some food and then all go home.

Everyone: Yeah.

Corinne: Section two. Personal care, washing, dressing, dot, dot, dot.

Promise: Isigaba two. Ukuzinakekela, ukugeza, ukugqoka.

Everyone: That's ok.

Corinne: Box one. I can look after myself normally without causing extra pain.

Promise: Ngijwayele ukuzinakekela ngaphandle kokwengeza ubuhlungu.

Discussion about how people are able to take care of themselves without causing pain.

Tuto: Let's move on.

Corinne: Box two. I can look after myself normally but it causes extra pain.

Promise: Ngiyazinakekela ngokujwayelekile kodwa lokhu kwengeza ubuhlungu.

There were discussions around the idea that although a person may be in pain, care is manageable.

Corinne: Box three. It's painful to look after myself and I am slow and careful.

Promise: Kubuhlungu ukuzinakekela kanti futhi ngenza kancane ngicophelele.

The group discusses the idea around people being careful or being slow while taking care of themselves so as not to increase the pain.

Zandile: Ok.

Corinne: Box four. I need some help but manage most of my personal care.

Promise: Ngidinga usizo oluncane kodwa izinto eziningi ngiyakwazi ukuzenzela.

Everyone: Ok.

Corinne: Box five. I need help everyday in most aspects of self-care.

Promise: Ngidinga usizo zonke izinsuku kukho konke ukuzinakekela.

Everyone: Yes.

The word "konke" in isiZulu means all. The idea is that one can't do everything but can do most things; they say that one would need helping some things while taking care of themselves because of the pain.

Tuto: That's fine, the next one.

Corinne: I do not get dressed; I wash with difficulty and stay in bed.

Promise: Angizigqoki, ngigeza kanzima futhi ngihlala ngisembhedeni.

The group discussed how one could be unable to self-dress because of the pain and they were also trying to explain the difference in not being able to get dressed at all.

Promise: The next one please.

Corinne: Section three. Lifting.

Promise: Isigaba three. Ukuqukula.

The discussion is about the word lifting and how to lift objects.

Corinne: Box one. I can lift heavy weights without extra pain.

Promise: Ngingaziqukula izinto ezisinda kakhulu ngingabuzwa ubuhlungu.

Everyone agrees that that is right.

Corinne: Box two. I can lift heavy weights but it gives extra pain.

Promise: Ngingakuqukula okusinda kakhulu kodwa kunginika obunye ubuhlungu.

Everyone agrees that that is fine.

Corinne: Box three. Pain prevents me from lifting heavy weights off the floor, but I can manage if they are conveniently positioned, for example on a table.

Promise: Ubuhlungu buya angivimba ukuthi okusindayo ngikususe phansi, kodwa ngingakwazi ukukuqukula uma kubekeke kahle, njengokuthi uma kubekwe etafuleni.

Everyone: Yes.

Corinne: Box four. Pain prevents me from lifting heavy weights, but I can manage light to medium weights if they are conveniently positioned.

Promise: Ubuhlungu buya angi vimba ukuba ngiqukule okusindayo, kodwa ngingakwazi uma kulula noma kukahle, uma kubekeke kahle.

Everyone agrees that is correct.

Corinne: Box five. I can lift only very light weights.

Promise: Ngingakwazi ukuqukula okunesisindo esilula kakhulu kuphela.

Everyone: Yes.

Corinne: Box six. I cannot lift or carry anything at all.

Promise: Angikwazi nje sampela ukuqukula noma ukuphatha noma utho oluthile.

Tuto: Excellent, we're getting somewhere.

Corinne: Section four. Reading.

Promise: Isigaba four. Ukufunda.

The word "ukufunda" in Zulu can mean to study or learning to do something, but here the group talks about reading related to books only.

Corinne: Block one. I can read as much as I want to without pain in my neck.

Promise: Ngingafunda ngendlela engithanda ukufunda ngaya ngaphandle kokuzwa ubuhlungu emqaleni wami.

Everyone: Yes.

Corinne: Block two. I can read as much as I want to with slight pain in my neck.

Promise: Ngingafunda ngendlela engithanda ukufunda ngaya kodwa kube khona ubuhlungu obuncane emqaleni wami.

Everyone: That's fine.

Corinne: Block three. I can read as much as I want to with moderate pain in my neck.

Promise: Ngingafunda ngedlela engithanda ukufunda ngayo kodwa bunciphe ubuhlungu emqaleni wami.

Corinne: Box four. I cannot read as much as I want to because of moderate pain in my neck.

Promise: Angikwazi ukufunda isikhati eside engisithandayo ngoba kunobuhlungu obuncane emqaleni.

There was a problem with the wording in the English version with regards to not being able to read because of the pain and not for time allocated reasons, one can read but not for prolonged periods of time.

Corinne: Number five. I can hardly read at all because of severe pain in my neck.

Promise: Akuvumi ukuba ngifunde ngexa yobukhulu bobuhlungu emqaleni.

Everyone: Yes, that's fine.

Corinne: Ok. Block six. I cannot read at all.

Promise: Angikwazi nhlobo ukufunda.

Everyone: Ok.

Corinne: Section five.

Zama: Back to block four.

The group once again entered into a discussion about box four and eventually grammatical changes were made because of the concept that someone can read but not for prolonged periods of time, in other words, someone may find difficulty in reading for a long time for as long as they want to.

Corinne: So what have we decided about number four, are we leaving it?

Everyone: No, we are changing it. (According to the pilot procedure, the focus group participants could isolate problems/errors or omissions with respect to the grammar, sentence structure, ambiguity or other linguistic parameters, as well as problems of a more logistical nature e.g. time, appropriateness of procedure utilized).

Corinne: Ok. Can we go to section five, headaches?

Everyone: Ok.

Promise: Isigaba five. Ukuphathwa ikhanda.

Everyone: Yes.

Corinne: Block one. I have no headaches at all.

Promise: Alingiphathi nhlobo ikhanda.

Everyone: Ok.

Corinne: Block two. I have slight headaches, which come infrequently.

Promise: Ngiphathwa ikhanda kancane futhi alivamile ukungiphatha.

Everyone: Yeah, that's right.

Corinne: Block three. I have moderate headaches, which come infrequently.

Promise: Ngiphathwa ikhanda ngokungekukhulu lingiphatha gqwa alivamile.

Tuto: That's fine.

Corinne: Block four. I have moderate headaches, which come frequently.

Promise: Lijwayele ukungiphata kakhulu ikhanda.

During the talk a few grammatical changes were made while talking about the frequency of headaches relating to those that speak Zulu.

Corinne: Ok. Block five. I have severe headaches, which come frequently.

Promise: Lijwayele ukungiphatha kakhulu ikhanda.

The word njalo in Zulu relates to the word frequently in English. The group was speaking about having a lot of headaches which will leave you in a lot of pain therefore implying that severity (in terms of perceived levels of pain) of the headaches is related a lot - to frequency.

Zama: Lijwayele ukungiphatha njalo ikhanda.

Everyone: Ok.

Corinne: Block six. I have headaches almost all the time.

Promise: Ngiphathwa ikhanda cishe ngaso sonke isikhathi.

Everyone: Yes.

Corinne: Section six. Concentration.

Promise: Isigaba six. Ukucabangisisa.

The discussion revolved around the group trying to find a better word for concentration or to focus.

Tuto: We'll come back to it.

Corinne: So when we've done the entire sections we'll come back to it. Ok, that's fine. Box one. I can concentrate fully when I want to with no difficulty.

Promise: Ngiyakwazi ukucabangisisa uma ngifuna ngaphandle kobunzima.

The group still battles to find an appropriate word in Zulu.

Tuto: We're leaving that block out completely for now.

Corinne: So we're leaving this block out completely for now and going to section seven. Section seven. Work.

Promise: Isigaba seven. Umsebenzi.

Everyone: Ok.

Corinne: Block one. I can do as much work as I want to.

Promise: Ngisebenzi omningi uma ngithanda.

Zandile: Ngingenza umsebenzi ngokuthanda.

Everyone: Ok.

Corinne: Block two. I can only do my usual work, but no more.

Promise: Ngingenza umsebenzi wami engiwujwayele kuphela, kodwa hhayi kakhulu.

"Kodwa hhayi kakhulu" was removed because it would mean the person can do the usual amount of work but nothing more than that.

Corinne: Block three. I can do most of my usual work, but no more.

Promise: Ngingenza okuningi engikujwayele, kodwa hhayi kakhulu.

"Kakhulu" was changed to "okwengeziwe", which implies most of the usual but no more, so the discrepancy comes back to the block two in the English version, only my usual and most of my usual, difference is too small in Zulu for

there to be a difference in understanding the two statements because they mean the same to those who speak in Zulu.

Zama: Ok. Four.

Corinne: Ok. Block four. I cannot do my usual work.

Promise: Angikwazi ukwenza umsebenzi wami engijwayele ukwenza.

Everyone: Yes.

Corinne: Block five. I can hardly do any work at all.

Promise: Ngiwenza kalukhuni noma yimuphi umsebenzi.

There was much discussion surrounding the word hardly because in Zulu it could mean heavy (in terms of weight) or relate to some level of difficulty in the task. The group is debating the cultural difference in the use of the word hardly between the languages.

Corinne: Section eight. Driving.

Promise: Isigaba eight. Ukushayela.

Everyone: Ok.

Corinne: Block one. I can drive my car without any neck pain.

Promise: Ngiyayishayela imoto yami bungabi bikho ubuhlungu emqaleni wami.

Everyone: Yes.

Corinne: Block two. I can drive my car as long as I want to with slight pain in my neck.

Promise: Ngiyayishayela imoto yami umo ngisithanda kodwa kuba khona ubuhlungu obuncane emqaleni.

The group is saying that a person can drive the car as much as they want to although they feel some pain.

Corinne: Block three. I can drive my car as long as I like with moderate pain in my neck.

Promise: Ngingayishayela imoto yami uma ngisithanda kuba khona ubuhlungu obungebukhulu emqaleni.

Here the group is saying that one can drive the car while still in pain and be able to tolerate the pain.

Corinne: Block four. I cannot drive my car as long as I want to because of moderate pain in my neck.

Promise: Angikwazi ukushayela imoto isikhati eside ngoba kuba khona ubuhlungu obungabukhulu kangako emqaleni.

There is some debate about block three and four between having a moderate level of pain and being able to still drive versus having a moderate level of pain and not being able to drive and making sure that the reader understands that the difference lies in the pain tolerance level of the reader that will effect their ability to drive.

Everyone: Ok.

Corinne: Block five. I can hardly drive at all because of the severe pain in my neck.

Promise: Akuvumi ukuba ngishayele ngenxa yobuhlungu obukhulu emqaleni wami.

Everyone: That's fine.

Corinne: Block six. I cannot drive at all.

Promise: Angikwazi nhlobo ukushayela.

The word "ukushayela" in Zulu could mean hitting / to hit or it could mean to drive.

Tuto: Ok. Next one.

Corinne: Section nine. Sleeping.

Promise: Isigaba nine. Ukulala.

Everyone: Yes.

Corinne: Block one. I have no trouble sleeping.

Promise: Anginayo inkinga yokulala.

Tuto: Ok, next one.

Corinne: Block two. My sleep is slightly disturbed (<1 hour sleep loss).

Promise: Ukulala kwami kuphazamiseka lokhu oku kahle (<1 amahora amoshekile).

The above sentence was changed to: "ukulala kwami kuphazamiseka, (<1...)" to make the sentence more understandable.

Corinne: Block three. My sleep is mildly disturbed (1-2 hours sleep loss).

Promise: Ukulala kwami kuphazamiseka lokhu okukahle kodwa hhayi kakhulu (1-2 amahora amoshekile).

The group decided to remove the words "loku" and "okukahle" for grammatical purposes.

Corinne: Block four. My sleep is moderately disturbed (2-3 hours sleep loss).

Promise: Ukulala kwami kuphazamiseka kancane (2-3 amahora amoshekile).

Everyone: Yes.

Corinne: Block five. My sleep is greatly disturbed (3-5 amahora amoshekile).

Promise: Ukulala kwami kuphazamiseka kakhulu (3-5 amahora amoshekile).

Everyone: Yes.

Corinne: Block six. My sleep is completely disturbed (5-7 hours sleep loss).

Promise: Ukulala kwami kuphazamiseka bonke baphela (5-7 amahora amoshekile).

The group replaced the above sentence with "angisalali nhlobo" (5-7 amahora amoshekile) which means that the person wouldn't be able to sleep at all.

Tuto: We can move to the next block.

Corinne: Section ten. Recreation.

Promise: Isigaba ten. Ukuzilibazisa/ ukuzijabulisa.

The group replaced "ukukuzijabulisa" with "ukuzijabulisa" as a grammatical change.

Corinne: Block one. I am able to engage in all my recreation activities with no pain in my neck at all.

Promise: Ngiyakwazi ukuzimbandakanya emsebenzini wokuzilibazisa ngaphandle kokuba nobuhlungu emqaleni.

"Ekuzijabulisa" replaced "emsebenzini" and "wokuzilibazisa" as a grammatical change. The group discussed that recreation meant entertaining oneself / others or to go out and enjoy oneself. The word needed greater clarity.

Promise: Ok.

Corinne: Block two. I am able to engage in all my recreation activities with some pain in my neck.

Promise: Ngiyakwazi ukuzimbandakanya emsebenzini wokuzilibazisa, kube khona ubuhlungu obungatheni.

"Emsebenzini" and "wokuzilibazisa" were removed from the above sentence. The sentence means that a person can entertain themselves while feeling pain at a tolerable level.

Corinne: Block three. I am able to engage in most but not all of my usual recreation activities because of pain in my neck.

Promise: Ngiyakwazi ukuzimbandakany kokuningi, kodwa hhayi konke kokuzilibazisa ngenxa yobuhlungu obusemqaleni.

The group decided to remove the word "kokuzilibazisa" from the sentence also for grammar purposes so that the above sentence would indicate that it would be ok to entertain oneself but not a lot / often because of the pain.

Corinne: Block four. I'm able to engage in a few of my usual recreation activities because of pain in my neck.

Promise: Ngiyakwazi ukuzimbandakanya kokumbalwa okokuzilibazisa okujwalekile ngenxa yobuhlungu emqaleni.

The words "okukuzilibazisa" and "okujwalekile" were removed from the above sentence in order for the sentence to mean that a few or the usual entertaining but no more can be done because of the pain e.g. some things that would require more energy / exertion is not possible.

Corinne: Block five. I can hardly do any recreation activities because of pain in my neck.

Promise: Akuvumi ukuthi ngenze imisebenzi yokuzijabulisa ngenxa yobuhlungu emqaleni wami.

Everyone: Ok.

Corinne: Block six. I cannot do any recreation activities at all.

Promise: Angikwazi nhlobo ngisho nokuzijabulisa.

The group replaced "ngisho" with "ukuzijabulisa" to emphasize that one wouldn't be able to do anything at all!

The conversation was diverted back to section six concerning the discussion around concentration. The group did not find a word for concentration in Zulu but found that one does exist for thinking, which isn't essentially the same thing.

Corinne: A suggestion. What about using the word "focus"?

Zama: There is no word for that in Zulu.

The discussion continues around the word "ukunakisisa" and the group still battles to find a word to convey the idea of concentration. The group thought of words like focus or to pay attention. They finally agreed to use a word which means to be thorough.

Corinne: Block one. I can concentrate fully when I want to with no difficulty.

Promise: Ngiyakwazi ukucabangisisa uma ngifuna ngaphandle kobunzima.

Tuto: That's fine.

Corinne: Block two. I can fully concentrate when I want to with slight difficulty.

Promise: Ngiyakwazi ukucabangisisa uma ngifuna kodwa bubakhona ubunzima obuncane.

Corinne: Block three. I have fair difficulty concentrating when I want to.

Promise: Kuba khona ukudlulana obuncane ubuzima uma ngi funa ukucabangisisa.

The group says that one would find it difficult to concentrate because of the pain.

Corinne: Block four. I have a lot of difficulty concentrating when I want to.

Promise: Ngibe nobunzima obuninigi uma ngicabangisisa.

Everyone: Ok.

Corinne: Block five. I have a great deal of difficulty in concentrating when I want to.

Promise: Ngiba nobunzima obuningi kakhulu uma ngifuna ukucabangisisa.

The group is figuring out the degree to which someone can concentrate in Zulu, i.e. that someone can concentrate while still in pain.

Corinne: Block six. I cannot concentrate at all.

Promise: Angikwazi nhlobo ukucabangisisa.

Everyone: Ok.

Corinne: Our next one is a little bit better.

Charmaine: The next one will go lots quicker.

Corinne: And then we can have a break after that. Ok. The Short-Form McGill Pain Questionnaire.

Promise: Ifomu elishane likaMcGill Pain Questionnaire.

The group discusses what short means in Zulu and what the name implies but they said that they will not change the name of the questionnaire but rather chose to keep it the same.

Corinne: Date.

Promise: Usuku.

Everyone: Ok.

Corinne: File number.

Promise: Inamba yefayela.

Everyone: Ok.

Corinne: Visit number.

Promise: Inamba yoku vakasha.

Everyone: Ok.

Corinne: Patient name.

Promise: Igama lesiguli.

Everyone: Ok.

Corinne: Can I continue?

Everyone: Ok.

Corinne: We'll start going across from left to right at zero or none.

Promise: Abukho.

Everyone: Ok.

Corinne: Mild.

Promise: Okukahle.

The group changed to "okukakhle" to obuncane for the correct interpretation of the severity. And everyone agreed that that was ok.

Corinne: Moderate.

Promise: Okuphakathi.

The group also changed to "okuphakathi" to "obubekezelekayo" also for more accurate interpretation of severity.

Corinne: Severe.

Promise: Okwedlulele.

Everyone: Ok.

Corinne: Throbbing.

Promise: Okunkenkethayo.

The group discussed the change of "okunkenthayo" to "obunkenkethayo" as this was correct grammatically in Zulu.

Corinne: Shooting.

Promise: Okudubulayo.

There was an explanation of shooting pain by Zhakir and that word was replaced with "obuchachamba". The word shooting was a difficult word to understand. Another word brought forward was radiating but eventually shooting pain was understood and correctly stated in Zulu.

Corinne: Stabbing.

Promise: Okugwazayo.

The above word was replaced with the word "obugwazayo". There was great discussion in trying to understand how the pain would feel.

Corinne: Sharp.

Promise: Okuhlabayo.

Everyone agreed to replace the above word with "obuhlabayo" for grammar purposes. The rest of the words to follow would have the same changes imposed.

Corinne: Cramping.

Promise: Okusontekayo.

The above word was replaced with "obusontekayo".

Corinne: Gnawing.

Promise: Okudlavazayo.

The above word was replaced with "obuhlezibukhona". This word was discussed at length.

Corinne: Hot-burning.

Promise: Okushisayo.

The above word was replaced with "obushisayo".

Corinne: Aching.

Promise: Okuqaqambayo.

The above word was replaced with "obuqaqambayo".

Corinne: Heavy.

Promise: Okusindayo.

The above word was replaced with "obusindayo". Association of the word heavy and pain in Zulu is difficult but easier in English.

Corinne: Tender.

Promise: Okubekezelekayo.

The above word was replaced with "obubekezelekayo".

Corinne: Splitting.

Promise: Obusabalalayo.

Everyone: Ok.

Corinne: Tiring-exhausting.

Promise: Obukhathazayo.

Everyone: Ok.

Corinne: Sickening.

Promise: Obugulisayo.

Everyone: Ok.

Corinne: Fearful.

Promise: Obusabisayo.

Everyone: Ok.

Corinne: Punishing-cruel.

Promise: Obunesihluku.

Everyone: Ok.

The groups' discussion went back to what gnawing pain means and feels like.

Zhakir: Pain that's not localized, it's just there but you can't pinpoint where it is.

Charmaine: It's always there. It doesn't want to go away. Whatever you want to do with it, it's at that level that hampers what you're able to do on a daily basis. It's almost like it's something that's eating away at you.

Mzwandile: Do we have to give one word for it in Zulu?

Zhakir: No, it's up to you.

Charmaine: Give a short phrase or something that best describes it.

Again the group entered into a discussion as to how the pain feels and how it should be translated between the languages so that everyone understands or correctly interprets the statements. Eventually the closest word in Zulu was found and incorporated into the questionnaire.

Corinne: Ok guys. I'll hand over to Zhakir.

Title: A prospective pilot investigation of the Zulu translation of the CMCC Neck Disability Index Questionnaire and Short Form McGill Pain Questionnaire with respect to its concurrent validity when compared to their English counterparts.

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Abstract

Neck pain is a common problem, globally as well as in South Africa. Zulu is the first language of a very large proportion of the South African population, and as such, addressing the needs of this population group with respect to neck pain is a priority. Many reliable pain indices exist in English to record the degree of disability with regard to neck pain. These are invaluable tools in aiding the health practitioner to assess the progress of treatment and the severity of the patient's disability. One of the most creditable and frequently used indices is the Canadian Memorial Chiropractic College Neck Disability Index (CMCC NDI) and the Short Form McGill Pain Questionnaire (SFMPQ). However, no such scale exists in Zulu.

The purpose of this pilot investigation was, firstly, to analyze and critique the Zulu translations of the CMCC NDI and the SFMPQ in order to establish their face validity. Secondly, to establish their concurrent validity ensuring that the translated questionnaires are specific and sensitive enough to use as tools in data collection when compared to their English counterparts. Thirdly, to make recommendations for further improvement in terms of the Zulu questionnaires and lastly, to make recommendations for further studies for improvements in terms of the use of these questionnaires as research tools amongst the Zulu speaking population of South Africa.

The CMCC NDI and the SFMP questionnaires were translated into Zulu. These versions were then assessed by means of a focus (or discussion) group to assess their face validity. Changes were made to the original translations according to the recommendations of this group. These versions were then assessed as to their concurrent validity with the original English versions. Fifty volunteers, who were literate in both English and Zulu and who have suffered with neck pain, filled in both the Zulu and English versions of both questionnaires. Much time was given from the completion of the first set of questionnaires to the time the second set was completed to prevent participants simply copying their answers from the English questionnaires. These results were then analyzed using statistical tests. The descriptive statistics were analysed using the SPSS package version 11.5 (Esterhuizen, T. Biostatistician at UKZN, Personal communication in 2005 and 2006). The null hypothesis was rejected at $\alpha = 0.05$ level of significance.

The results showed that the Zulu SFMPQ had very good levels of agreement and concurrent validity was established. For the Zulu CMCC NDI, concurrent validity was not established and thus needed further adaptation to ensure correlation.

For the Zulu SFMPQ, because it happened that the English ratings contained a category that was not found in the Zulu rating or vice versa these results implied that the words of shooting, splitting, fearful and punishing-cruel had problems in the respondents identifying them correctly in both questionnaires, which would in turn imply that these words need to be revisited in the questionnaire. On the basis that four out of fifteen sections needed revision, the Zulu SFMPQ is recommended as a tool to be utilized based on the outcomes of this research, pending adjustments to the above-mentioned sections.

Introduction

Cervical spine pain is broadly defined as pain located between the occiput and the third thoracic vertebra[7]. This presents as either acute pain, which is defined as pain having severe symptoms over a short course[10] of one to four days[19] or less than six months; or chronic pain, where the pain is defined as any pain that has been present for over six months[41].

The statistics for neck pain are rates of 9,5% of men and 13,5% of women found in Finland[37] which correlates with Dutch statistics of 13, 4%[7] for the general population. It can thus be seen that neck pain is a common problem in our society and at any given time affects conservatively about 10% of the general population[37].

In South Africa, Drew (1995) conducted an epidemiological study at the Technikon-Natal Chiropractic Day Clinic comparing different types of conditions seen at the teaching clinic with those seen in the private chiropractic practices in South Africa and more specifically KwaZulu-Natal.
It was found that 54,4% of the patients presenting to the teaching clinic and 57,4% of the patients presenting to the private practices complained of neck pain. In addition to this, it was noted that this presentation reflected as a higher percentage than the norm as patients with neck problems presented more commonly for chiropractic treatment. This is however supported by the fact that it has been noted that chronic pain affects one in four South Africans and can take many forms such as: lower back pain, headaches and neck pain[41].

It is however unknown to which extent neck pain contributes to the 25% of chronic pain reported, as the analysis of neck pain in the South African context is complicated by the lack of information to date on the incidence and prevalence of neck pain in any of the native ethic groups (e.g. our Zulu population in KwaZulu-Natal in South Africa). This is as a result of the paucity of representation of these native ethnic groups in the South African statistics because at present there is a lack of appropriate research tools in order to

accurately assess the populations that are non-English speaking. Nevertheless, there are continuous and accelerating changes in the health care sector worldwide implying that more scientific data on health care issues must be developed and transformed into information and this into knowledge, to allow for more informed judgements by decision makers[13]. The decision makers are thus recognising the importance of a comprehensive evaluation of patients[13], as we cannot allocate health care expenditure to a sector we know little about and provide an appropriate health care industry plan for the treatment of conditions for which they can only estimate based on global statistics that may not be relevant.

IsiZulu is the predominant language in KwaZulu-Natal[40] and is spoken by 8,5 million people in South Africa. This makes it the most widely spoken first language in the country[39]. Approximately 8 million of these reside in KwaZulu-Natal[38].

Thus in order to meet the health care needs within the Zulu population and allow for their incorporation into the South African statistics, the validated and widely used English neck-pain questionnaires were translated into Zulu in order to formulate a specific and accurate tool that will enable researchers and professionals alike to extract the necessary information from the target population in order to get more information from the patients so that we can address the health care needs of that population while maintaining cultural integrity.

Translations however pose inherent problems. Even if the words are translated accurately, the meaning of the words or phrases may be unclear as the meaning hinges upon interpretation by others[29]; this is because when words are taken out of context, they will lose their meaning[1] as the meaning will differ between cultures, even if the same words are used. Therefore, although valid in their countries of origin, these measures (CMCC NDI and SFMPQ) are not directly applicable elsewhere due to cultural differences among the nations and ethnic groups. In order to be appropriately used in a new context, they must be submitted through a complex process that includes

translation of the instrument into a different language, followed by a detailed process of cultural adaptation and validation of its measurement properties[11]. The translation should not be exclusively linguistic but it must be culturally adapted to maintain the same measurement properties[11]. Consequently, with translation some validity will be lost as the questions themselves may not be understood and/or error will be introduced in the results of the questionnaires.

Therefore one needs to determine validity, by means of a focus group, of the translation prior to accepting the data that is generated. When establishing validity, one is determining the degree to which a particular tool reflects reality. This process is vital in order to ensure that future research utilizing the particular tool is accurate[4] thus according to the guidelines for cross-cultural translations[15] which include: (1) translations and (2) back-translations by qualified people (3) committee review of those translations and back-translations (4) pre-testing for equivalence using adequate techniques (with bilingual or monolingual individuals) and, (5) re-examination of the weighting scores, if relevant. However one could also utilize a process where data is collected using both sets (English and Zulu) to gather information from a bilingual representative portion of the population, in order to determine concurrent validity. By doing so, one is able to assess whether the responses to the English and Zulu questionnaires are similar and therefore measuring similar constructs.

The first objective of this prospective pilot investigation was to analyse and critique the Zulu translation of the CMCC NDI and SFMPQ in order to establish their face validity. The second objective of this prospective pilot investigation was to analyse and critique the Zulu translation of the CMCC NDI and SFMPQ in order to establish their concurrent validity, ensuring that the translations are sensitive and specific enough to use as a tool in data collection when compared to their English counterparts. Thirdly, to make recommendations for further improvement in terms of the Zulu questionnaires; and lastly, to make recommendations for further studies and areas for improvement in terms of the use of these Questionnaires as research tools amongst the Zulu speaking population of South Africa.

In 2002, Campbell and Mzaidume[6] conducted a study on the impact of HIV and AIDS in the mining community. They found that "among marginalized groups in poor countries, providing information about health risks changes the behaviour of, at most, one in four people- generally those who are more affluent and better educated". This is especially important in that health interventions, such as condom distribution, did not prove successful because of community contexts that frowned on this practice[6]. These findings highlight the need of health interventions to be relevant to the specific social and cultural context they are addressing. Therefore, this research will assist to provide the necessary and adequate measurement tools that are socially and culturally accepted, in order to provide accurate information to the health care sector, which can then make the needed resources available to the target populations, which in this case would be Zulu population.

Review of the literature

The various structures in the cervical region can all be involved in neck pain; therefore a basic understanding of what these structures are is necessary in order to fully understand the condition under study.

The structures involved include, but are not limited to: bony anatomy; joints; muscles; ligaments; vascular compartment and nerve supply as all of these structures have an important part to perform in respect of the functioning of the cervical spine.

Posture demands that the cervical spine carry the head weighing about 10% of the body weight and balancing it at the end of a long lever, which makes the cervical spine especially vulnerable to traumatic forces. This is as a result of the extremely flexible neck balancing about a 4-5 kg of the head principally on the lateral masses of the atlas [14, 5]. The remainder of the primary protecting structures are the muscles, ligaments and joint capsules which assist in maintaining the integrity of the posture which often results in them being damaged as they are more susceptible to injury than the osseous structures

of the cervical spine. As a result, the most common pathology is joint sprain with articular locking and accompanying muscle strain [14, 5].

Thus, it can be seen that all structures must be interrelated and coordinated to allow for optimal function and co-ordination between the various motion units within the various regions of the spine, but also between the regions in terms of attaining total functional ability in order that the human frame can fulfil the tasks set out for it[3].

Cervical pain (neck pain) may have several causes, including inflamed lymph nodes, muscular strain and protrusion of IVD's[25]. In the following paragraphs, the various causes of neck pain will be discussed at a basic level.

When the facet joints are injured or diseased, this causes pain along the distribution patterns of the dermatomes and spasm in the muscles derived from the associated myotomes[25]. This is as a result of the joint capsules that are richly innervated with proprioceptive and pain receptors[5].

Also according to Moore and Dalley[25], symptom-producing intervertebral disc protrusions occur in the cervical region almost as often as in the lumbar region. The most commonly ruptured discs are those between C5/C6 and C6/C7. As degenerative changes occur, the cervical intervertebral discs thin out because of dehydration, and the uncinate processes approach the bevelled inferior surface of the cervical vertebra superiorly. The result is encroachment of the intervertebral foramina, inflammation of the surrounding nerve roots, and neck pain.

A forcible hyperflexion-extension (whiplash injury) of the cervical region may rupture the intervertebral disc as well as severely stretch surrounding muscles and ligaments[25]. Severe hyperextension is most likely to injure the posterior elements of the vertebra- the vertebral arches and their processes. Fractures of these elements may radiate pain to the back of the neck and scapular regions because the same spinal sensory ganglia and spinal cord segments

receiving impulses from the vertebrae are also involved in supplying the Levator Scapulae, Rhomboid and Deep neck muscles[25].

Myofascial pain due to trigger points is a prevalent cause of pain in all parts of the body and was reported as a source of pain in numerous medical specialities. In myofascial pain due to trigger points, the presenting complaint, which is usually a referred symptom, may be located in or about normal muscular a non-muscular structures. In the head and neck region, the patient may complain of such things like headaches, neck pain, toothache, sinus or temporomandibular joint pain. Yet clinical evaluation of these areas does not yield any evidence of local pathological changes. Head and neck pain is most likely caused by trigger points in certain muscles[33].

The most sensitive structures that produce pain are the periosteum (covering of the bone) and the ligaments. It is important to note that in the scale of pain sensitivity (which part of the body hurts more when injured), the periosteum ranks first, followed by ligaments, tendons, fascia (the connective tissue that surrounds muscle), and finally muscle[45]. Most pain fibres can be excited by multiple stimuli. However, some fibres are more likely to respond to excessive mechanical stretch, others to extremes of heat or cold and still others to specific chemicals in the tissues. The nerve endings in the ligaments respond to mechanical stretch and chemicals such as histamines, acids and proteolytic enzymes[17].

Other internal tissues that have widespread free nerve endings are the arterial walls, the falx and the tentorium of the cranial vault. Tugging on the venous sinuses; damaging the tentorium or stretching the dura can all cause intense pain. Almost any type of traumatising, crushing or stretching stimulus to the blood vessels of the dura can cause a headache. A very sensitive structure is the middle meningeal artery. Prolonged tension/stress causes reflex vasospasm of some of the arteries of the head, including some of the arteries the supply the brain itself. Through a host of processes that cause the vessels to dilate and pulsate intensely can cause the actual pain of migraine headaches[17].

Neuropathic pain results from dysfunction in the nervous system. It's believed to be sustained from aberrant somatosensory processes in the peripheral nervous system, the central nervous system or both. Pain may involve the efferent function of the sympathetic nervous system (sympathetically maintained pain) or a peripheral pathology (e.g. nerve compression) or central nervous system pathology (e.g. stroke or spinal cord injury)[2]. This pain is often described as a burning or lacinating pain[2].

With regards to the epidemiology of neck pain, transient episodes of acute neck pain and stiffness occur in 40-50% of all adults, within an increasing incidence in those over the age of 45 years.

Many attacks appear to be caused by awkward sleeping postures and most resolve spontaneously within 1-4 days[19]. More prolonged neck pain and stiffness lasting up to 2-3 months is a frequent sequel of 'whiplash' hyperflexion-extension injuries in up to 50% of all serious car collisions, even in the absence of fractures or nerve root injuries[19].

Musculoskeletal pain disorders such as neck pain are common public health problems among today's working population in industrialized countries. It not only has an economic impact, but also produces a lot of pain and suffering to people. The lifetime prevalence of neck pain in adults has been reported to range from 26 to 71%, increasing with age up to the age of 60–70 and it is believed that neck pain is significantly more common among women than men[31].

Cross-sectional studies consistently report that the prevalence of neck pain increases with age and that it is higher in women; these findings are supported by Cote et al;[9] who found that the incidence of neck pain increased slightly with age and peaked between the ages of 30 and 45 years. The higher prevalence of chronic neck pain in older individuals and in women suggests that the prognosis of neck pain varies with age and gender[9].

In terms of being age-specific[31], in the last decade, neck pain has become a growing health problem among adolescents and reports of WHO Cross-National Study support these findings. The prevalence of neck pain increases with age and symptoms are more common among girls than boys analogously to adult population. In preadolescence, no difference between genders was found in either the occurrence of neck pain, or in other musculoskeletal pain symptoms[31]. In adolescence, however, neck pain was significantly more common among girls (13–16-year-olds). It's also been found that pain in the neck is common and often associated with disability among adults of working age[36].

In terms of the effect of neck pain on the economy, according to Ferrari and Russell[12] neck pain is second only to low back pain as the most common musculoskeletal disorder in population surveys and primary care, and like low back pain, it poses a significant health and economic burden, being a frequent source of disability. Luime et al;[22] however, states that shoulder and neck pain are common problems in the general population, with 1-year prevalence varying from 7% to 47% for shoulder complaints and from 16% to 61% for neck complaints and that shoulder and neck complaints may result in sick leave, loss of productivity, and inability to carry out household and leisure time activities.

It is known that neck symptoms have a multifactorial etiology. Several physical risk factors have been identified, with repetitive movements and prolonged computer work as the most prominent until now. Also, neck symptoms were associated with personal characteristics, such as coping style, type A personality, high job demands and introversion[34].

While most individuals with acute neck pain do not seek health care, those that do, account for a disproportionate amount of health care costs. Chronic pain also brings with it the spectre of litigation (e.g. whiplash issues) and disability claims[12]. Furthermore, in the setting of the whiplash syndrome, neck pain accounts for significant costs to society in terms of insurance and litigation, and days lost from work.

The Quebec Task Force on Whiplash-Associated Disorders found, for example, that 12% of whiplash patients in Quebec remained in chronic pain 1 year after their collision. Yet, these 12% accounted for 47% of costs of all whiplash injuries in terms of treatment and lost wages[12].

Road traffic accidents on the South African road and street networks, rate amongst the highest in the world. In order of 10 000 persons lose their lives annually while about 40 000 are seriously injured and 110 000 slightly injured in 500 000 accidents. These accidents cost the country more than R 13 billion per annum.

In December 2002, more than 1200 people (nearly 40 per day) were killed as a result of road trauma in South Africa. Analysis of this trauma has shown: most collisions occur at night and on weekends; pedestrians make up almost 40% of all road trauma victims; and over 12% of all victims are children with the most at risk group being aged between 6 and 12 [44].

Selected national figures from surveys indicated that of road users:

- The age groups responding to the survey consisted of 6% under 16 years of age, 29% between 16 and 25, 34% between 26 and 40, 20% between 41 and 55, and 11% over 55 years of age
- The split between residential areas shows 32% rural response with 68% residing in the metropolitan areas.
- Racial groups represented were 36% black, 18% coloured, 16% Asian and 31% white.
- Incomes group surveyed 11% no income, 35% low income, 44% middle income and 9% high income. 1% would not respond to this question.
- Travel information revealed that 37% did not drive a vehicle with 79% travelling on three or more days per week. 58% used motorcars as their primary method of travel, with 28% using mini bus taxies, 9% pedestrians and 4% on motorcycles.

- This trend was consistent in most Provinces with KZN and Eastern Cape having the closest balance of motor vehicle and taxi usage[44].

Nearly two thirds (61%) of the pedestrians were injured slightly and moderately serious, while a quarter was seriously injured. Almost two thirds (62%) of the pedestrians were men. Africans constituted the largest group (three quarters –75%), while coloureds, whites and Indians comprised 15%, 6% and 4% of this group respectively. More than half (52%) of the accident victims in this group were between 20 and 49 years old, while more than a third (36%) were under the age of 20 and children under the age of 10 make up a substantial portion (10%) of pedestrian victims[43].

It is estimated that the cost of traffic crashes to individuals, commerce, communities and the country is in the region of R38 billion annually. As a developing country and continent, we cannot afford to spend this amount of money on road trauma, when we have so many other developmental needs in education, health, housing and social upliftment. What is just as frightening is that around 20 people are permanently disabled on our roads every day. This means that more than 7000 people are left maimed each year by poor attitude and behavior on our roads. 7000 families each year have to cope with a permanent reminder of an incident, which changed their lives forever[42].

The argument is that in South Africa, with the high percentage of road accidents and injuries, the picture should become all the more clearer as to how many "injured" people we have suffering from neck pain specifically in the Zulu-speaking communities, and how many people need to be help.

Methods and materials

This section deals with the collection of data and the research methodology used. The process of statistical analysis is also discussed.

The primary data was the data collected from the questionnaires / participant responses and the data obtained once the statistical analysis was complete.

Secondary data is the data in the literature, Internet, books, journals etc with which to compare the outcome of the results in the research study.

This was a prospective, quantitative validity and reliability assessment study that compared the English versions of the CMCC NDI and the SFMPQ to their Zulu counterparts to assess their validity. This was achieved by recruiting bilingual (i.e. speakers of both English and Zulu) subjects with neck pain, requesting them to fill in both the English and the Zulu questionnaires at the Durban Institute of Technology Chiropractic Day Clinic.

Advertisements were placed at the Durban Institute of Technology Chiropractic Day Clinic, Durban Institute of Technology Campus and local newspapers, as these were the most convenient method. Because the study was limited to bilingual participants, there was a screening process, telephonic and through the use of only English adverts, to determine that the participant can read and understand English and Zulu and fitted the inclusion criteria.

In terms of the sample size of the participants, fifty participants were involved in the study once they had been screened. There was no group allocation as it was mandatory that each participant complete each of the 4 questionnaires - the two English and the two Zulu questionnaires. All fifty participants answered all four questionnaires, and English responses were compared with Zulu responses, thus we had a paired analysis, which effectively doubled the statistical power compared with an independent groups' analysis. Thus any p values (where available) with high significance ($p < 0.001$), would indicate that the agreement observed could not be due to chance. This is as a result of the fact that chance is likely in studies that are underpowered due to small sample size. Consequently the result would hold greater statistical validity as this study was not underpowered for its objectives. In addition, if this is considered as a pilot study, statistical power is not of great concern, as pilot studies are concerned with testing the methods and tools (questionnaires) rather than drawing statistical conclusions. However, this study has the ability to draw viable statistical conclusions, based on its strength (Esterhuizen, 2005).

In this study the first two hundred valid questionnaires (fifty English CCMC NDI, fifty Zulu CMCC NDI, fifty English SFMPQ and fifty Zulu SFMPQ) were used to gather information from the neck pain sufferers. On data capture, the selection process for the questionnaires was based on the amount of data omitted from the questionnaires. Any information omitted made the questionnaire invalid. This procedure increased the stability and consistency of the information gathered from the questionnaire and minimized the human reactivity[27], which could bias the results.

Through the telephonic interview as well as an initial consultation, the participants were assessed by means of lingual interaction as well as a case history, physical and cervical regional examination to ensure that:

1. The participants spoke 1st language Zulu and 2nd language English to accurately interpret the questions.
2. The participants were able to read and understand Zulu and English in order to participate in the study and because patient inclusion criteria number 1 and 2 are proposed guidelines for cross-cultural adaptations to questionnaires according to Guillemin, Bombardier and Beaton[15].
3. Those who participated in the combined scale validation were 18 years or older, for ease of consent and because the prevalence of neck pain increases with age[8].
4. The participant's neck pain was of mechanical origin and fall within the treatment capabilities of primary contact practitioners (i.e. the participant would be able to receive care from a General Practitioner or Chiropractor). This by implication indicates that all participants with visible pathology or neck pain of excruciating nature or radicular pain were excluded as they were assumed to necessitate specialist intervention e.g. an orthopaedic assessment and referred for such[14].

The above-mentioned points relate to the patient inclusion criteria while the points below relate to the patient exclusion criteria.

1. Participants were excluded if they were under the age of 18, as they would have required parental/guardian consent.
2. Participants were excluded if the required secondary, tertiary or quaternary care for their neck pain. This by implication indicates that all participants with visible pathology or neck pain of excruciating nature or radicular pain were excluded as they were assumed to necessitate specialist intervention and referred for such[14].
3. Participants were excluded if they had participated in the face validity testing of the Zulu questionnaires, so as not to bias the results [27, 1].

All the questionnaires were used in the data capturing process as the participants had answered all the questions correctly in order for the questionnaires to be valid.

With regards to the questionnaires and the validity, pain measurements are the most challenging and difficult areas of subjective health measurements and it can be argued that pain is a private and internal sensation that cannot be directly observed or measured, but whose measurement depends wholly on the subjective response of the person experiencing it[32]. Thus, there are many methods of gathering this type of data, ranging from the methods of observation to in-depth interviews and questions to active interventions with data sheets[32]. The questionnaire however, is by far the most common and widely used technique of data collection because it can be used in any setting whether formal or informal[32].

In this respect and according to Korporaal[21], there are certain set principles that need to be incorporated into the development of each new questionnaire that will be used as a research tool. These are:

- Inclusion of the research question into the questionnaire
- Inclusion of indicators that have been established through consultation with the literature, to ensure that any possible relation can be detected
- Inclusion of hypothesised relationships, which are being tested

- Inclusion of simple language concepts to allow for understanding and ease of completion of the questionnaire by the participant in the research process

Notwithstanding the above criteria, validity with respect to questionnaire design also needs to be addressed, as research tools for the English speaking population exist, one could assume that the translated version (Zulu) would be applicable and readily usable, however with translation there are inherent problems.

Therefore in terms of questionnaires, when one establishes validity, one is determining the degree to which a particular tool reflects reality, in particular cultural reality[27]. Even if words are translated accurately, the meaning of a phrase or combination of words may be unclear. This may be as a result of the fact that meaning is not only determined by words or phrases, but also in their interpretation by others[29]. This occurs because when words are taken out of context they will loose their meaning[1] thus meaning will differ between cultures, even if the same words are used. Consequently, with translation some validity will be lost as the questions themselves may not be understood and error / bias will be introduced in the results of the questionnaire.

Questionnaires need to fulfil certain requirements and these include the concepts of face validity, content validity, construct validity, and criterion validity. Therefore a discussion on the validity of the CMCC NDI and SFMPQ follows.

The choice of the questionnaires lay in the fact that the SFMPQ, which was derived from the McGill Pain Questionnaire[23] (MPQ), is a useful measurement that takes 2-5 minutes to administer. The data obtained from this scale provides information on sensory, affective and overall intensity of pain. This scale has been found to be valid and reliable[24]. The main component of the SFMPQ consists of fifteen descriptors (eleven sensory and four descriptive), which are all rated on an intensity scale: as zero is equivalent to none or no

pain, one is equivalent to mild pain, two is equivalent to moderate pain and three is equivalent to severe pain[24].

The NDI is different to the MPQ because it has stable psychometric properties, which provides an objective means of assessing how neck pain in individuals affects activities of daily living[18, 28] and was also developed to measure self-perceived disability from neck pain[20]. This scale is widely used and has been proved valid and reliable[35] as well as appearing to be sensitive to the levels of the severity of the complaint and to changes in severity in the course of treatment and correlated significantly with the MPQ[18].

From a psychometric perspective, the NDI is the scale most widely validated among different patient populations[28].

Concurrent validity has been established in the CMCC NDI, and it has been shown to demonstrate a high degree of test-retest reliability as well as internal consistency [35, 28]. When utilizing these questionnaires as a base for translation, the construct validity and content validity of the CMCC NDI and SFMPQ remain intact, as they have been established in the English versions of the questionnaires. In addition, a focus group ensured that the meanings / concepts / constructs of these questionnaires were apparent in the Zulu translations developed for the focus group.

Once the choice of questionnaires was made and the questionnaires where translated, a focus group was then assembled. Streiner and Norman[32] describe a focus group as a discussion in which a small group of informants (six to twelve people), guided by a facilitator, in order to talk freely and spontaneously about themes considered important to the investigation. The participants were selected from a target group whose opinions and ideas were of importance to the research and the interests of the researcher with respect to the study.

This study's participants were enlisted via word of mouth and advertising, with 9 respondents coming forward and expressing interest in the focus group.

From the focus group's participants, some were health-care professions and some were laypersons, this excluded the researcher and a camera operator / witness. This composition was necessary to maintain homogeneity of the group because it was vital for the groups' ability to share a discussion on the research topic[26] as well as comply with Guillemin, Bombardier and Beaton[15] suggestions for standardised guideline for the translation of questionnaires from English to another mother tongue. The members of the focus group were bilingual, from a variety of backgrounds, and represented those that would have a vested interest in the results that the questionnaire would ultimately capture.

The session was tape-recorded and an observer (recorder) also took notes on the discussion as this becomes public record in support of the questionnaire development[30].

Before commencing the focus group each participant was required to read a: letter of information, sign a confidentiality statement and sign an informed consent form. A registration process is common practice to verify that participants meet the screening requirements for the focus group[26] this is done for two reasons: firstly, one is to verify that participants are reasonably representative of those you want in the focus group, and secondly, to aid in analysis, as there may be a factor in the background of a participant that may help explain a certain view.

The English questionnaires were then given to each member of the focus group to read. The forum of the meeting was stated and the members then entered a discussion initiating the comparisons of the translation of the English questionnaires to Zulu. Each participant was then able to analyse and comment on how accurately (or inaccurately) each of the Zulu questions reflected the basic meaning of the English questions and vice versa[15]. Once the process of subjecting the English questionnaires to the translation and back-translation process was complete, the face validity testing was also completed. The suggested changes were made and thus the Zulu CMCC NDI

and Zulu SFMPQ were formed by consensus agreement within the focus group.

In order to achieve this, the questions were discussed in sequential order. If inconsistencies were found or changes proposed, a unanimous vote was needed to have a change instituted. At the end of the discussion a chance was given for any comment on the questionnaire, or on translation in general. However, the participants made no further comments and all agreed that the changes affected where accurate. This focus group was furthermore necessary so that once the language pre-test with the focus group was done, the questionnaires were finalised and then ready to be piloted and subsequently used as tools for data collection.

A pilot procedure followed the focus group. This entailed having persons not involved in the focus group complete the questionnaires as though they were respondents in the actual study. After completion of the questionnaires, the pilot respondents completed a pre-research questionnaire which isolated problems / errors or omissions with respect to the grammar, sentence structure, ambiguity or other linguistic parameters, as well as problems of a more logistical nature (e.g. time, appropriateness of procedure utilized). Minor changes were / were not made in response to these pre-research questionnaire outcomes.

This study therefore, used the face validated Zulu translations of the CMCC NDI and SFMPQ. The data collected from the Zulu questionnaires was compared to results gleaned from the English version of the questionnaires. Data was then generated using participants with neck pain, which is within the scope of the CMCC NDI and SFMPQ.

The final set of questionnaires consisted of the same basic questions in Zulu. The questionnaires should be the same in terms of what is measured e.g. pain, but different in terms of how it is questioned based on the cultural context of the target population. The questions on the Zulu CMCC NDI and Zulu SFMPQ were re-arranged in order to overcome participants simply answering corresponding questions from the English CMCC NDI and English

SFMPQ, from memory. This, in conjunction with the 45-minute break, ensured a true reflection of the participant's condition as well as the perception of the questions and the responses.

According to Smith (1975) cited in Mouton[27], the researcher has to accept the fact that there is a natural decay in the ability to remember events that have positive correlations with: the length of time that has elapsed since the occurrence of the event; the irregular occurrence of the event; the relative unimportance of the event and decreased accessibility to relevant data relating to the event.

This procedure increased the stability and consistency of the information gathered from the questionnaire and minimized the human reactivity[27], which could have biased the results.

The data collection process in terms of each participant completing each of the four questionnaires occurred only once, as it was not necessary to collect the data over a period of time. The data collected was then taken for data capturing purposes using the ***descriptive statistics*** using the SPSS package. Inferential statistics were completed using Graphpad software in order to analyse the intra rater agreement between the English and Zulu Questionnaire responses (http://graphpad.com/quickcalcs/Kappa2.cfm). The weighted Kappa statistic was used to measure the inter rater agreement as the categories were ordinal. If there was a significant correlation between the two versions of the questionnaires, concurrency could be claimed.

Results and discussion of results

For the SFMPQ, there was generally a good level of agreement between responses to the English and Zulu questionnaires. Strength of agreement for the individual items ranged from "fair" to "very good". Percentage agreement ranged from 68% to 94%. For items where a p value was available (i.e. where there was a symmetric two-way table between the English and Zulu responses), there was a highly significant level of agreement ($p < 0.001$),

which implied that in the population there was significantly greater agreement than expected by chance alone.

For the CMCC NDI, this scale showed good levels of intra rater agreement, with 90% of items having a "good" strength of agreement. Item 7 had a "very good" agreement between the English and Zulu questionnaires. Where p values were available, the significance of agreement was very high and could not have arisen purely by chance.

When establishing validity, one is determining the degree to which a particular tool reflects reality[27]. Validity should be viewed as the "best approximation of the truth"[27], it should also be emphasized that 'validity' is an epistemic criterion, which means that it is a quality of the elements (data, statements, hypotheses, theories and methods) of knowledge. In order to utilize a questionnaire as an assessment tool in research, the questionnaire needs to fulfill certain requirements and these include the concepts of face validity, content validity, construct validity, and criterion validity.

Face validity, the simplest type of validity, is determined by agreement between researchers and those focus group participants with a vested interest in the questionnaire, that on the face of it the tool seems valid and assessing the desired qualities. The terms face validity and content validity, are technical descriptions of the judgement that a scale looks reasonable[32].

Content validity is a closely related concept to face validity, consisting of a judgement whether the instrument samples all the relevant or important content. These two forms of validity consist of judgements by experts whether the scale appears appropriate for the intended purpose. 'Content relevance' and 'content coverage' are argued to be more accurate descriptors than content validity [32].

Construct validity measures how accurately answers to questions in a scale reflect theoretical predictions of a particular construct, in this case neck / cervical pain. An instrument has high construct validity if there is a close fit

between the construct it supposedly measures and actual observations made with the instrument[4]. A construct can be thought of as a mini-theory to explain the relationships among various behaviors or attitudes[32]. Thus construct validation is an on-going process, of learning more about the construct, making new predictions, and then testing them.

Criterion validity is measured when a particular tool produces similar results when compared with another tool already known to be trustworthy. This is also called concurrent validity by[27].
An instrument has high criterion validity if there is a close fit between the measures it produces and the measures produced by some other instrument that is known to be valid[4] this is the gold standard test.

The first objective of this prospective pilot investigation was to analyse and critique the Zulu translation of the CMCC NDI and SFMPQ in order to establish their face validity. Face validity was established and hypothesis one was accepted.

The second objective of this prospective pilot investigation was to analyse and critique the Zulu translation of the CMCC NDI and SFMPQ in order to establish their concurrent validity, ensuring that the translations are sensitive and specific enough to use as a tool in data collection when compared to their English counterparts. The results were in agreement or within an acceptable or reasonable margin for the Zulu SFMPQ but not for the Zulu CMCC NDI. Thus the Zulu SFMPQ is declared to have concurrent validity within the context of the Zulu speaking population of KwaZulu-Natal but the Zulu CMCC NDI is declared not to have concurrent validity and hypothesis two is accepted.

The third objective was to make recommendations for further improvement in terms of the Zulu questionnaires. Changes were necessitated to the Zulu translations of the SFMPQ and CMCC NDI. The changes are as follows:

Table 1 represents the Kappa statistics for agreement between English and Zulu questionnaires for the SFMPQ.

Item	% of agreement	Weighted Kappa	Strength of agreement	p value
Throbbing	78%	0.691	Good	<0.001
Shooting	90%	0.556	Moderate	
Stabbing	88%	0.756	Good	<0.001
Sharp	84%	0.808	Very good	<0.001
Cramping	80%	0.681	Good	<0.001
Gnawing	78%	0.510	Moderate	<0.001
Hot burning	76%	0.526	Moderate	<0.001
Aching	68%	0.591	Moderate	<0.001
Heavy	76%	0.672	Good	<0.001
Tender	68%	0.524	Moderate	<0.001
Splitting	78%	0.343	Fair	
Tiring	78%	0.722	Good	<0.001
Sickening	94%	0.803	Very good	<0.001
Fearful	84%	0.641	Good	
Punishing	90%	0.655	Good	

The kappa statistic for table 1 and 17 is worked out on the agreement of the **level** of response for each type of pain. The % of agreement is where both English and Zulu responses were identical in **level** (i.e. if they put a 4 for English they also put a 4 for Zulu).

In terms of the results of this study, for the SFMPQ, because it happened that sometimes that the English or Zulu ratings contained a category that was not found in the Zulu rating or vice versa (and as a result no p value is available for these mismatches) these results imply that the words of shooting, splitting, fearful and punishing-cruel (four out of fifteen questions) had problems in the respondents identifying them correctly in both questionnaires, which would in turn imply that these words need to be revisited in the questionnaire.

On the basis that four out of fifteen sections needed revision, the Zulu SFMPQ is recommended as a tool to be utilized based on the outcomes of this research, pending adjustments to the above-mentioned sections, therefore concurrent validity is established for the Zulu SFMPQ based on the results.

Table 17 represents the Kappa statistics for agreement between English and Zulu questionnaires for the CCMC Neck disability index

Item	% of agreement	Weighted Kappa	Strength of agreement	p value
Section 1 – Pain intensity	78%	0.755	Good	<0.001
Section 2 – Personal care	77.55%	0.662	Good	
Section 3 – Lifting	83.67%	0.729	Good	
Section 4 – Reading	78%	0.713	Good	
Section 5 – Headaches	66%	0.646	Good	<0.001
Section 6 – Concentration	82%	0.787	Good	
Section 7 – Work	88%	0.830	Very good	
Section 8 – Driving	72%	0.767	Good	
Section 9 – Sleeping	80%	0.786	Good	<0.001
Section 10 - Recreation	80%	0.691	Good	

For the Zulu CMCC NDI, because it happened that most times the English or Zulu ratings might have contained a category that was not found in the Zulu rating or vice versa (and as a result no p value is available for these mismatches) these results imply that quite a few sections (seven out of ten) had problems in the respondents identifying them correctly in both questionnaires, which would in turn imply that these words need to be revisited in the questionnaire. There was also a possible discrepancy in the interpretation of severity in the higher ranges that may have affected the results. On the basis that seven out of ten sections need revision, the Zulu CMCC NDI is therefore not recommended as a tool to be utilized based on the outcomes of this research, pending adjustments to the above-mentioned sections.

Conclusion and recommendations

In conclusion, according to Cote` et al;[9], questionnaires present two advantages. First, they combine the constructs of pain and activity limitations into one outcome that can be used to measure the prevalence and incidence of neck pain. Second, they allow for the accurate measurement and reporting of the burden of disability associated with neck pain.

The findings of this study support the suggestion of Guillemin et al;[16] that, where the culture and country of origin of a particular questionnaire differs to that of where the questionnaire will be used, not only translation, but cultural adaptation of the questionnaire is indicated.

The fourth objective was to make recommendations for further studies and areas for improvement in terms of the use of these Questionnaires as research tools amongst the Zulu speaking population of South Africa.

Recommendations for improvement are that sections 2, 3, 4, 6, 7, 8 and 10 of the Zulu CMCC NDI and in the Zulu SFMPQ, the sections pertaining to the words of shooting, splitting, fearful and punishing-cruel (as the results implied that these words had problems in the respondents identifying them correctly in both questionnaires) be further culturally and contextually adapted.

The Delphi Method could/should be incorporated into the methodology of future studies as this method makes use of a panel of experts, selected based on the areas of expertise required as they are better equipped to predict the future than theoretical approaches or extrapolation of trends. Their responses to a series of questionnaires are anonymous, and they are provided with a summary of opinions before answering the next questionnaire. One distinct advantage of the Delphi Method is that the experts never need to be brought together physically, and indeed could reside anywhere in the world. The process also does not require complete agreement by all panelists, since the majority opinion is represented by the median[46].

The Delphi Method would allow for a close approximation of the Zulu and English NDI as they require further qualifying.

Also, a focus group (if the Delphi Method is unusable) should be set up and allocated ample time to discuss how the English meanings could be more accurately reflected in Zulu. The group should consist of a wide range of literacy levels, in order to ensure accurate understanding of the English question, and relevant traditional input.

The administration of the questionnaires were within a fairly lengthy succession (i.e. +/- forty-five minutes) and as a result, this allowed for decreased participant question recognition, this method could however be further improved by the use of a combination of scrambling of the questions from one questionnaire to the next as well as increased time differential in order to decrease reactive memory response.

A limitation in this study is the fact that, in order to assess the questionnaire, participants had to be literate in both English and Zulu. However, the situation this research primarily seeks to address is that of Zulu speaking persons who would not be able to answer the English version easily. A recommendation for future research is to assess the understanding of the Zulu translation of this group alone. Another recommendation is that researcher should be more proficient in both languages that are involved in the translation exercise.

Lastly, it is also suggested that any further research of this type apply a stratification model in terms of literacy level, age and other relevant categories pertinent to the study, to ensure that the demographic data gathered is more representative of the Zulu speaking population.

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