Chapter One: Introduction

1.1 Chapter Aims

This chapter aims to:

- Present an introduction of what this research study entails.
- Discuss the significance of the study
- Pose the research question.
- State the research aims and objectives.

1.2 Introduction

In healthcare services it is increasingly important to evaluate if therapeutic regimens are working. Determining the effect of therapeutic interventions will guide the prioritization of health care resources. This will then result in better quality care for patients (Streiner and Norman, 1995).

Low back pain (LBP) has proved to be a considerable challenge in both developed and developing countries and is responsible for a major portion of people staying away from work or visiting a medical practitioner (World Health Organisation, 2003). LBP impacts on the functional status of a patient, interfering with basic activities of daily living such as sitting, standing, walking and other work related activities (Kopec, 2000).

According to Beattie et al. (1997) one of the most important outcomes of the physiotherapy management of LBP is to restore normal function. Measurement tools that evaluate functional limitation in patients with LBP, and examine the change in functional status over time are thus important.

There are numerous objective tests that can be used by the physiotherapist in the clinical setting, such as x-rays or MRI-scans. These may give an indication of the outcome of the treatment for LBP. However the functional status of many daily activities may not be directly observed by the physiotherapist and will have to form part of the subjective evaluation, assessing them by way of questioning. The only problem with this non standardized way of

questioning is that it is unlikely to be very reproducible (reliable) (Streiner and Norman, 1995).

Standardized self reported outcome measures are convenient means of collecting and integrating large amounts of information on disability (Davidson & Keating, 2002). In order to facilitate a standardized outcome measurement in clinical studies an international group of back pain researchers suggested that a selected group of LBP disability questionnaires be used (Kopec 2000).

After a review of the literature three questionnaires were chosen for this study based on the inclusion criteria used by Davidson & Keating (2002). The questionnaires must be able to be patient self- administered, brief and easy to complete, have a clear scoring protocol and measure activity limitation and participation restriction.

The Roland Morris Disability Questionnaire (RMDQ) was selected because it is one of the most widely used low back questionnaires with many studies reporting on its reliability and validity. The Quebec Disability Scale, although a new questionnaire, was developed using more sophisticated processes than older questionnaires. The Waddell Disability Index is a very brief and questionnaire (9 items) and asks specific and direct questions and seemed appropriate for the use in this study.

In a recent systematic review done by Grotle et al. (2004) all of the above 3 questionnaires have been recommended for use, on English speaking patients, without the need for further validation studies. However, for researchers and clinicians to use these self reported disability questionnaires in other cultures, the questionnaires will have to be translated and culturally adapted. According to Grotle et al. (2003), the translation must be revalidated to achieve an equivalent questionnaire. The benefit of translating questionnaires is that it allows clinicians and researchers to compare the clinical outcomes of many interventions for LBP by large scale meta-analyses and will allow subjects from more language groups to be included in the same studies, allowing more reflective and larger samples (Davidson & Keating, 2002). The fact that we do not yet have a validated and published version of the RMDQ, QDS and WDI in a local South African language was the motivation to perform this study.

Reliable and valid Tswana versions of the RMDQ, QDS and WDI, as instruments for the assessment of disability in patients with LBP, have not yet been developed. The purpose of

this study then was to translate and culturally adapt the RMDQ, QDS and WDI into Tswana and to establish their validity and reliability for Tswana speaking patients with low back pain.

1.3 Significance of the study

This study will assess whether the Tswana versions of the RMDQ, QDS and WDI are valid and reliable measures for the assessment of disability in patients with LBP and if they are worth using in clinical and research settings. Researchers will be able to compare and share clinical outcomes of several interventions for LBP by large scale meta-analyses. More importantly clinicians may be able to assess patients' functional status better. This will benefit Tswana speaking patients with LBP, since a change in functional status can be monitored over time and therefore change in treatment goals can be made.

1.4 Research question

Are the Tswana versions of the RMDQ, QDS and WDI valid and reliable instruments for the assessment of disability in Tswana speaking patients with LBP?

1.5 Aims

The aims of this study were to translate and culturally adapt the RMDQ, QDS and WDI and to establish the validity and reliability of their use for assessing disability in Tswana speaking patients with LBP**.**

1.6 Objectives

- To translate and culturally adapt the RMDQ, QDS and WDI into Tswana.
- To establish the validity of the Tswana versions of RMDQ, QDS and WDI for assessing disability in Tswana speaking patients with LBP
- To establish the reliability of the Tswana versions of RMDQ, QDS and WDI for assessing disability in Tswana speaking patients with LBP

Chapter two: Literature Review

2.1 Chapter Aims

This chapter aims to:

- Define pain and discuss its effect on the individual.
- Outline the prevalence, health impact and management of LBP.
- Discuss the role of self reported questionnaires as outcome measures for LBP.
- Discuss the need to translate and cultural adapt self reported questionnaires.
- Establish criteria for evaluating health outcome measures.
- Describe the selected research tools in detail and to review the literature on the psychometric properties of the research tools.

2.2 Pain

Pain is the symptom for which patients frequently seek medical care. The International Association for the Study of Pain has defined pain as: “An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage”. Pain is highly subjective as it includes the perception of the discomfort felt by the individual and each persons’ perception may be different (Lipton, 1991). The problem with pain is that it invariably leads to disability which will affect the quality of life of an individual (Ostelo & De Vet, 2005).

2.3 LBP epidemiology and management

LBP is a major problem, and now ranks as one of the most common complaints in developed economies. The incidence of LBP remains extraordinarily high, with 80% of the working population suffering from LBP at some point in their lives (World Health Organisation, 2003). The literature on the epidemiology of low back pain is accumulating, but studies are mostly restricted to developed countries, which account for less than 15% of the world's population. It was the objective of Volinn (1997) to review the relatively few studies on the epidemiology of low back pain in developing countries. Contrary to his hypothesis that LBP

incidences are higher in developing countries than in developed countries, based on the greater prevalence of hard physical labour, the results indicated that hard physical labour itself is not necessarily related to low back pain. However a disturbing trend showed that there were higher incidences of LBP in urban populations as compared to rural populations, in developing countries.

According to Beall et al. (2000) the rate of urbanisation has increased in South Africa since the 1994 elections especially in the African population. To the author's knowledge no study has been conducted on the prevalence of low back pain in a black African population in South Africa. A total number of 5727 low back pain cases were seen by physiotherapists in government hospitals in Gauteng Province between the 1st of January and 30th of August 2006 with the majority of cases being black African patients (Gauteng Department of Health, 2006).

A study by Croft et al. (1998) followed 490 subjects complaining of LBP and found that 90% of subjects ceased to consult a medical practitioner within three months and only 25% of these subjects had fully recovered 12 months later. This study illustrates the importance of effective early treatment and management of LBP to minimize the risk of recurrence and chronicity. There are many different approaches to LBP management and a vast amount of literature relating to these approaches. However many of these studies have questionable methodology and it becomes difficult to draw meaningful conclusions. One of the major challenges of LBP research is the need for valid and reliable outcome measures (Kopec, 2000). The same need for accurate outcome measures holds true for clinical practitioners, trying to get the best outcome for a particular patient through an intervention (Bombardier, 2000).

2.4 Self reported outcome measures

The belief is that the outcome of treatment for LBP should no longer be assessed exclusively on the basis of radiological results (such as MRI scans and X-rays) or objective functional measures (Kopec, 2000). It is generally acknowledged that the success of any intervention for back pain should also be judged in relation to the patient's perception of the benefit gained. The benefit gained is usually in terms of its effect on pain and disability in functional activities of daily living and quality of life (Kopec, 2000).

Standardized self reported measures are a convenient means of collecting and integrating large amounts of information on disability caused by LBP (Davidson & Keating, 2002). The most obvious benefit is that they collect information which can be used for functional goal setting and treatment planning that will be patient specific. Furthermore, self report measures can improve therapist-patient communication. The therapist can monitor the response to treatment and results can be used to provide feedback to patients and set treatment goals accordingly (Deyo et al.,1998).

Several self reported questionnaires have been developed for people with LPB and their importance as measures of treatment outcome in the clinical and research settings have been emphasized. The choice of an appropriate self reported outcome measure depends largely on the intended use of the instrument, the concept being measured, the understandability of the questions and very importantly the measurement properties of the instrument. Measurement properties refer to the validity, reliability and responsiveness of an instrument (Mokkink et al., 2006). However most of these questionnaires' measurement properties have not been reported in the literature and Kopec (2000) suggests that only those that have been validated be used.

2.5 Translation and cross cultural adaptation

Most of these standard questionnaires have been developed to study English- speaking patients and it is clear that a scale cannot be transferred from one culture to another without being revalidated for new conditions (Boscainos et al., 2003). There is a need for measures to be specifically designed for use in other languages as the perception of disease differs among different cultural groups. Therefore a simple direct translation of a questionnaire from one language to another does not ensure that it can be used in clinical or research settings. The translation must be validated to achieve an equivalent questionnaire, which can be accurately used in clinical settings on individual patients and to allow comparability of data in research settings (Grotle et al., 2003). Beaton et al. (2000) outline a practical approach to the translation and cross-cultural adaptation of patient-based outcome measures. This process includes forward and backward translations with reconciliation of the two. Pilot testing is also carried out to obtain participants feedback on the outcome measures, with regard to comprehensibility.

2.6 Evaluating health outcome measures

In an evaluation of the clinical utility and quality of low back outcome measures, a range of factors needs to be considered (Streiner and Norman, 1995).

2.6.1 Practical features

The first and most important criteria for the selection of self report questionnaires measuring disability caused by low back pain is the practicality of use. According to Deyo et al.(1998) self report measures that are most widely accepted by patients and therapists are the ones that are short, easy to understand and quick to score. Lengthy outcome measures may interfere with patient treatment time and according to Davidson & Keating (2002) questionnaires that take longer than 10 minutes to complete are probably not practical for clinical application. They state that the questionnaires must be able to be patient self- administered and measure activity limitation and participation restriction.

According to Bombardier & Tugwell (1987) questionnaires that ask about activity limitations during a definite time period (such as “today”) are preferable to those that do not specify a time period (such as “lately”). They also prefer questionnaires containing specific activity limitations (eg. travelling by car or bus) to those that ask more general questions (eg. using transportation) as they are more unambiguous.

2.6.2 Scale range

This is also termed the floor and ceiling effects of a questionnaire and according to Davidson et al. (2002) refer to the proportion of patients who obtain the lowest or highest possible score for the given scale, and for whom any transition to an even more extreme status would therefore not be measurable with that scale. For example a person has difficulty walking due to LBP, but scores a 0 (lowest possible score) on a certain LBP disability outcome measure. According to this particular outcome measure the person has no disability as a result of LBP, as walking was not one of the functional activities evaluated in this outcome measure. When LBP does not limit his walking anymore, further improvement from the lowest possible score (0) will not be detected by this particular scale. The same holds true for a person scoring the highest possible score. If these respondents, who obtain the lowest or highest possible score for the given scale, add up to a rate of more than 15% it is recommended as unacceptable (McHorney & Tarlov, 1995).

2.6.3 Missing data

High levels of missing data may indicate a lack of understanding or acceptability among respondents (Streiner and Norman, 1995). This will affect the quality of the data. Currently no recommendations exist for acceptable levels of missing data.

2.6.4 Validity

Validity can be defined as the extent to which a measure actually measures what it is intended to measure. (Trochim, 2001)

There are many labels for different types of validity, but they all have to do with threats and biases which would challenge the significance of any research. Streiner & Norman (1995) state that validity can be subdivided into three categories: content, criterion and construct validity. For an instrument to be regarded as valid all three of the above categories should be established.

In content validity one is concerned with whether the instrument measures whatever objectives or specifications the test was originally designed to measure. Content validity may be established by the use of surveys of groups of well-trained content experts or focus groups of representative subjects, although there is a possibility that this may be subjective (Streiner et al., 1995).

Davidson & Keating (2002) based the content validity of instruments used to measure activity limitation in LBP patients on a comparison with the World Health Organisation's International Classification of Functioning, Disability and Health (ICF). This is backed up in a literature review done by Bruyère et al. (2005) where they mention two studies. The first was done by Cieza & Stucki (2004) who viewed the ICF as a new global language of functioning and health, with a new perspective for understanding the impact of LBP. The second was done by Weigl et al. (2003) who linked osteoarthritis-specific outcome measures to the ICF. Both these studies perceived their results as showing that the ICF classification can become the key reference for existing health-status measures.

The ICF consists of two parts each with two components (World Health Organization, 2001):

- Part one: Functioning and Disability
    a) Body functions and structures
    b) Activities and participation
- Part two: Contextual Factors
    a) Environmental factors
    b) Personal factors

According to Cieza & Stucki (2004) the activities and participation ICF classification is the most relevant component that will be affected by disability caused by low back pain. Activity limitations according to the ICF are "difficulties an individual may have in executing activities". Participation restrictions according to the ICF are "problems an individual may have in involvement in life situations". Davidson & Keating (2002) judged self report questionnaires measuring disability caused by low back pain by the extent to which the activity and participation domains of the ICF were represented by the items in the questionnaires. An overview of the relevant domains, of the activities and participation component of the ICF, that may be experienced by people with LBP are given in table 2.1

Table 2.1 Relevant domains, of the activities and participation component of the ICF, that may be experienced by people with LBP

DOMAINS (Activities and Participation)	
d4	Mobility
d5	Self-care
d6	Domestic life
d7	Interpersonal interactions and relationships
d8	Major life areas
d9	Community, social and civic life

Criterion validity allows you to support the validity of a new test by determining the correlation between the test and some well-respected outside measure already accepted within the science community (Streiner & Norman, 1995). The two measures may be for the same construct, or for different, but presumably related, constructs. There are two variants of criterion validity. Concurrent validity is when a measurement correlates highly with the current performance on some other test (both tests are administered at about the same time). Another version of criterion validity is called predictive validity where one measure occurs earlier, and is meant to predict, some later measure (Streiner & Norman, 1995).

Construct validity is a way of assessing the validity of a new test by examining whether the test is really measuring the theoretical construct it is supposed to be. The two main subcategories of construct validity are convergent and discriminant validity. Convergent validity refers to the degree to which scores on one measure, correlate with scores on another measure (preferably already accepted in the field) that is designed to assess the same construct. In contrast, discriminant validity refers to the degree to which scores on one measure are not related to scores on another measure to which in reality it should not be related to (Trochim, 2001).

Internal consistency is a type of convergent validity, which seeks to assure there is at least moderate correlation among the items in a scale, considering the scale measures one construct. Poor convergent validity among the items of a scale may mean the model needs to have more factors. Cronbach's alpha is commonly used to establish internal consistency (Bland & Altman, 1997). Internal consistency is discussed further in the next section.

2.6.5 Internal Consistency

Internal consistency is the coefficient of test scores (Bland & Altman (1997) Put more simply, internal consistency measures the consistency of results across items within a scale. According to Streiner & Norman (1995) it is advisable that all items in a self report measure, measuring a particular construct, reflect much the same underlying variable so that the items may be added up to a total score. If the items were not related to each other it would not make sense to add the scores together.

Cronbach's alpha is the most common form of internal consistency reliability coefficient. Cronbach's alpha indicates the strength of the association between all the items within the test instrument, thus assessesing the extent to which items within a scale measure a single

underlying trait. A score is computed from each test item and the resulting total score (overall score) is defined by the sum of all the item responses. Then alpha is defined to be the square of the correlation between the measured scale and the underlying factor the scale was supposed to measure. Alpha equals zero when the true score is not measured at all and there is only an error component. Alpha equals 1.0 when all items measure only the true score and there is no error component (Streiner & Norman, 1995).

Nunnally (1978) states that instruments used in basic research should have alpha values of about 0.70 or better. He adds that increasing reliabilities much beyond 0.80 ads no additional value to instruments used for basic research. On the other hand, with instruments used in clinical settings, a reliability of 0.80 may not be high enough. Where important decisions about the fate of individuals are made on the basis of test scores, reliability should be at least 0.90 or better. Bland & Altman (1997) agrees that alpha values may be less than in the clinical situation compared to the research setting. They state that for comparing groups, alpha values of 0.7 to 0.8 are considered satisfactory and for the clinical application much higher values of alpha are needed and a minimum of 0.9 is desirable. A level of 0.9 and higher would indicate excellent consistency of results across items within a scale.

Cronbach's alpha increases as the number of items in the scale increases. This assumes, of course, that the added items are not poor items compared to the existing set. Increasing the number of items can be a way to push alpha to an acceptable level. The assumption then is that scales and instruments with a greater number of items are more reliable. It also means that comparison of alpha levels between scales with differing numbers of items is not appropriate (Bland & Altman, 1997). The researcher may wish to drop items where the alpha, of a particular item, if deleted is higher than the overall alpha as another way to improve the alpha level as these items do not contribute to the internal consistency of the scale (Trochim, 2001).

2.6.6 Test-retest reliability

Test-retest reliability is the consistency or repeatability of scores of a measuring instrument when administered on two different occasions. This approach assumes that there is no substantial change in the construct being measured between the two occasions. Reliability does not imply validity, that is an instrument may have excellent reliability but will not be clinically useful if it does not measure what it is intended to measure. (Trochim, 2001)

The retest interval between measures is an important consideration. If the same thing is measured twice the correlation between the two observations will in part be influenced by the amount of time elapsed between the two measurement occasions. The shorter the retest interval, the higher the correlation as subjects may remember their initial responses. The longer the retest interval, the lower the correlation as subjects may have undergone real change in the construct being tested (Streiner & Norman, 1995).

2.6.7 Responsiveness

The responsiveness of a questionnaire is another criteria that can be used for the evaluation of the suitability of questionnaires as a self report outcome measure. It can be defined as the ability of a test to detect clinically meaningful change over time. (Deyo & Centor, 1986)

Responsiveness is closely related and dependent on the properties of reliability and validity. If an instrument is unreliable then very a large change in scores may be needed before real change can be distinguished from measurement error and the measure will be unresponsive. The same holds true for validity, if the measure is not valid then the scores may change but will not reflect change in the variable of interest (Deyo & Centor, 1986).

However to test the responsiveness of a questionnaire requires some kind of intervention during which it is expected that the patients' condition will improve or deteriorate (clinically meaningful change). Determining the responsiveness of questionnaires will fall outside the scope of this study as no intervention will be tested.

2.7 Research tools

2.7.1 Roland Morris Disability Questionnaire (RMDQ)

The RMDQ was developed by Roland and Morris (Rocchi et al., 2005) and aims to evaluate the level of disability in patients with low back pain. It is a self-administered questionnaire consisting of 24 items that measure the interference of LBP in different domains (eg. mobility, dressing, standing, sleeping, mood, recreation, appetite). To improve the specificity of the response, Roland and Morris added the phrase "because of my back" to each item (Wiesinger et al., 1999). It takes about five to ten minutes to complete. The subject must mark each item that applies to his or her current status. Each checked item receives a score of

one. Scores range between zero (no disability caused by LBP) and 24 (the maximum possible disability).

Table 2.2 Summary of characteristics of the Roland Morris Disability Questionnaire

Content	Housework, moving around, self care, walking, sleeping, sitting, irritability, appetite.
Number of items	24
Time to complete	5-10 min
Reference period	Today
Method of scaling	Single check-box for each item
Method of scoring	One point for each selected item. Total possible score is 0-24, higher score indicates worse function
Translated versions	Brazilian, Swedish, German, French, Dutch, Flemish, Norwegian, Spanish, Romanian, Italian, Portuguese, Polish, Czech, Thai, Iranian, Tunisian Moroccan, Japanese and Greek

The RMDQ is one of the disability questionnaires most widely used as outcome measure in patients with low back pain (Bombardier, 2000). It has been extensively tested and show good psychometric properties (Roland & Fairbank, 2000). It has also been translated into several languages and is now available in 19 non-English languages (Brazilian, Swedish, German, French, Dutch, Flemish, Norwegian, Spanish, Romanian, Italian, Portuguese, Polish, Czech, Thai, Iranian, Tunisian, Moroccan, Japanese and Greek).

Numerous studies have provided evidence that the RMDQ form an internally consistent set of items with Chronbach's alpha consistently above 0.7 exceeding Nunnally's criterion (Nunnally, 1978). The test-retest reliability of the RMDQ is also generally high (Roland & Fairbank, 2000, Roland & Morris, 1983).

The RMDQ items show a spread of content (content validity) across four of the six relevant ICF activity categories and includes activities requiring movement as well as sustained postures (see Table 2.5). The RMDQ has been shown to correlate significantly with a range of pain and disability instruments, as well as measurements of physical and functional activities, adding to its construct validity (Deyo et al., 1986, Greenough & Fraser, 1992).

2.7.2 Quebec Disability Scale (QDS)

The QDS was developed by Kopec et al. (1995) and aims to measure functional disability in patients with back pain It is a self-administered questionnaire consisting of 20 items that describe the perceived difficulty of performing simple physical activities. The 20 items cover six domains (bed/rest, sitting/standing, ambulation, movement, bending/stooping, handling large heavy objects. It takes about 5- 10 minutes to complete. Each item is scaled on a six point Likert Scale (range 0-5), with 0 indicating no perceived disability due to back pain and 5 indicating the inability of performing the activity. The total score ranges from 0-100 and can be interpreted as the percent of perceived disability.

Table 2.3 Summary of characteristics of the Quebec Disability Scale

Content	Six categories: bed/rest, Sitting/standing, ambulation, movement, bending/ stooping, handling large heavy objects
Number of items	20
Time to complete	5-10 min
Reference period	Today
Method of scaling	6 point Likert Scale (range 0-5)
Method of scoring	0= not difficult 1= minimally difficult 2= somewhat difficult 3= fairly difficult 4= very difficult 5= unable to do Total score is the sum of item scores, score range 0-100, higher scores indicate worse function
Translated versions	English, French

In a study by Kopec et al. (1995) they found test-retest reliability of the QDS to be 0.92 which can be considered excellent with the time interval between the test and retest being four days. Cronbach's alpha coefficient of 0.96 observed in the study demonstrates a very

high internal consistency of the scale. Davidson et al. (2002) also found the QDS to be reliable with sufficient scale width to reliably detect improvement and deterioration in most patients.

Content of the QDS falls into three of the six relevant ICF activities and participation categories (See table 2.5). The Quebec thoroughly assesses mobility, but not work, sport or social activities, or interpersonal relationships. Two studies added to the convergent validity of the QDS. Kopec et al (1995) found that the scale correlated significantly with other measures of disability such as the Oswestry, Roland Morris and SF-36 Physical functioning scales. This was supported by Fritz & Irrgang (2001) who reported that the QDS and Oswestry change scores were significantly correlated. Significant changes in disability over time, and differences in change scores between patients that were expected to differ, were found (Kopec et al., 1995).

The final set of 20 items of the QDS were selected from a larger group of 48 items by examining the test-retest reliability, item-total correlations and by using factor analysis and item response theory techniques (Kopec et al, 1996). Although further studies of the reliability and validity are needed, Kopec et al. (1996) believes this method was likely to produce a scale with measurement properties better than those scales developed with a more intuitive approach to item selection.

2.7.3 Waddell Disability Index (WDI)

The WDI was developed by Waddell and Main (Rocchi et al, 2005) and aims to provide an easy to use disability index for patients with LBP. It is a self-administered questionnaire consisting of nine items that aim to measure the patients' ability to perform simple daily activities. The nine items cover different domains (social activities, sitting/standing, ambulation, sleeping handling heavy objects etc.) It takes about 3-5 minutes to complete. The subject must mark each item that applies to his or her current status. Each checked item receives a score of one. Scores range between zero (no disability caused by LBP) and nine (the maximum possible disability).

Table 2.4 Summary of characteristics of the Waddell Disability Index

Content	Lifting, Sitting, traveling, standing, walking, sleeping, social activity, sexual activity, putting on footwear
Number of items	9
Time to complete	3-5 minutes
Reference period	Today
Method of scaling	Single check-box for each item
Method of scoring	One point for each selected item. Total possible score is 0-9, higher score indicates worse function
Translated versions	English

The internal consistency and test-retest reliability of the WDI remains to be established. The nine WDI items fall into four of the six relevant ICF activity categories adding to its content validity (see Table 2.5). The WDI has been shown to correlate with other pain and disability scales. In a study done by Greenough & Fraser (1992) the WDI correlated significantly with the Low Back Outcome Score which was devised as a new and accurate rating system for patients with low back pain. The WDI correlated significantly with pain ratings in a study by Lindstrom et al. (1995) who studied the physical performance, pain and disability in patients with subacute low back pain.

2.7.4 Visual Analogue Scale (VAS) (pain)

The Visual Analogue Scale (VAS) was originally developed to allow the measurement of individual responses to physical stimuli such as heat. Visual Analogue Scales are one of the most frequently used scales in health care research and is most commonly known and used for measurement of pain intensity (Lindstrom et al, 1995). VAS consists of a horizontal line, 100mm in length, on a page with clearly defined end points. The end points range across a continuum from no pain on the left-end to very severe pain on the right-end. Scale markers are often added to the line and are sometimes also numbered from 1-10. When a VAS is used to measure pain intensity, individuals are instructed to place a mark on the line or circle the

number that report the intensity of the pain that they experience at that given moment. The single greatest appeal of the VAS for measuring pain intensity is its simplicity of use (Wewers & Lowe, 1990). If a questionnaire is a valid measure of activity limitation, and if the limitation is due to pain, one would expect a significant correlation of questionnaire scores with self rated pain, and also improvement in pain scores would be reflected by improvement in the questionnaire scores.

2.7.5 Disability Rating Index (DRI)

The disability rating index is the mean score of twelve daily activity functional variables (physical exercise or sports, running, heavy physical work, heavy lifting, carrying a bag, leaning over a wash-stand, making a bed, moderate physical work, walking, climbing stairs, sitting still more than briefly and dressing or undressing). Like the VAS pain scale, the disability rating index is measured with visual analogue scales, 100 millimetres long, ranging from 0 (no pain or problem) to 100 (maximum pain or problem). The distance in millimetres from the left end of the scale to the patient's marking, is used as the disability rating score for each separate activity.

The results of Grotle et al. (2004) suggest that the DRI is appropriate for measuring changes in functional status and pain in patients with both acute and chronic low back pain. This was supported when the DRI was used in a randomized controlled clinical trial by Grunnesjo et al. (2004) as an outcome measure for LBP interventions. The DRI has also been used in studies as a correlation tool to establish the convergent (construct) validity of other disability scales (Feise & Menke, 2001, Grotle et al., 2004). Content of the DRI fall into four of the six relevant ICF activities and participation categories (see Table 2.5).

Table 2.5 Comparison of questionnaires' content by ICF classification of activities and participation domains

ICF (activity & participation domains)	RMDQ	QDS	WDI	DRI
d4. MOBILITY				
Lifting and carrying objects	**N**	**Y**	**Y**	**Y**
Fine hand use *(picking up, grasping)*	**N**	**N**	**N**	**N**
Sitting down	**Y**	**Y**	**Y**	**Y**
Standing	**Y**	**Y**	**Y**	**N**
Walking	**Y**	**Y**	**Y**	**Y**
Running	**N**	**Y**	**N**	**Y**
Climbing stairs	**Y**	**Y**	**N**	**Y**
Using transportation *(car, bus, train, plane, etc.)*	**N**	**Y**	**Y**	**N**
d5. SELF CARE				
Washing oneself *(bathing, drying, washing hands, etc)*	**N**	**N**	**N**	**N**
Toileting	**N**	**N**	**N**	**N**
Dressing	**Y**	**N**	**N**	**Y**
Eating	**Y**	**N**	**N**	**N**
d6. DOMESTIC LIFE				
Acquisition of goods and services *(shopping, etc.)*	**N**	**Y**	**N**	**N**
Preparation of meals *(cooking etc.)*	**N**	**N**	**N**	**N**
Doing housework	**Y**	**Y**	**N**	**Y**
d7. INTERPERSONAL INTERACTIONS AND RELATIONSHIPS				
Informal social relationships	**Y**	**N**	**Y**	**N**
Intimate relationships	**N**	**N**	**Y**	**N**
d8. MAJOR LIFE AREAS				
Remunerative employment	**N**	**N**	**N**	**N**
d9. COMMUNITY, SOCIAL AND CIVIC LIFE				
Social Life	**N**	**N**	**Y**	**N**
Recreation and leisure	**N**	**N**	**Y**	**Y**

Y= present

N= not present

2.8 Chapter conclusion

In this chapter the prevalence, health impact and management of LBP were described. The issues of measuring functional status using self reported questionnaires were outlined as well as the need for measures to be specifically designed for use in other languages. The use of LBP outcome measures in different cultural groups must follow certain guidelines for translation and cross cultural adaptation and must be tested for validity and reliability. The criteria for evaluating existing low back disability measures were established. The research tools were described in detail with regard to their characteristics and measurement properties. The next chapter will describe the methodology of the study.

Chapter Three: Method

3.1 Chapter Aims

This chapter aims to:

- Describe the study design
- Discuss the research participants with regard to sample selection, inclusion and exclusion criteria, sample size and ethical considerations.
- Describe the research tools used in the study
- Describe the study procedure
- Describe the procedure used to translate the questionnaires

3.2 Study Design

A cross sectional study design with a sample of convenience was used to validate and test the reliability of translated, culturally adapted questionnaires.

3.3 Research participants

3.3.1 Sample selection

The study was conducted at five hospitals in areas that are predominantly Tswana speaking. The questionnaires were tested on all the blue collar workers (cleaners, kitchen- and laundry staff) who met the inclusion criteria and agreed to take part in the study at the Wilmed Park and Sunningdale private hospitals, and the Duff Scott and Westvaal mining hospitals in Klerksdorp, and Dr George Mukhari government hospital, where the battery of questionnaires was tested on patients attending a spinal clinic as well as on the nursing staff. Both patients and nursing staff met the inclusion criteria and agreed to take part in the study.

3.3.2 Inclusion criteria

- Complaints of low back pain (acute/ chronic LBP, with or without radiculopathy)
- Tswana speaking
- Male or female
- Aged 18 and older

3.3.3 Exclusion criteria

- Younger than 18

3.3.4 Sample size

One hundred subjects who met the inclusion criteria agreed to take part in the study. Of the one hundred subjects 31 were retested 24 hours later. The sample size was based on the numbers needed to perform the planned statistical analysis. According to Nunnally (1978) a minimum of five patients per questionnaire item was required to be statistically significant. The largest set of items in a single scale within the battery of questionnaires was the 24-item Roland Morris. The desirable sample size according to Nunnally (1978) therefore is 120. In a recent study Mousavi et al. (2006) developed and validated cross cultural versions of the Oswestry, Roland Morris and Quebec scales for use in Persian speaking patients with low back pain. A total of 100 patients were asked to complete the battery of questionnaires, with 31 retested 24 hours later. From this study it appears that a slightly smaller number of subjects may also yield significant results.

3.3.5 Ethical considerations

Subjects were invited to participate in the study and were free to decline without being disadvantaged in any way. An information sheet of the study was provided in Tswana before handing out the questionnaires. Informed consent forms were provided in Tswana and were signed by each patient before filling in the questionnaires. Names of the patients were kept on a separate list to maintain confidentiality. Written permission was obtained from all hospitals. The Committee for Research on Human Subjects of the Faculty of Health Sciences at the University of the Witwatersrand approved the study. Ethical clearance number M060720 (see appendix D).

3.4 Research tools

The following research tools were used in this study (A more detailed description of the research tools used can be found in the literature review).

3.4.1 RMDQ (see appendix A)

The wide use and proven psychometric properties of the RMDQ was the motivating factor for its inclusion into this study

3.4.2 QDS (see appendix A)

The final set of 20 items of the QDS was selected from a larger group of 48 items by examining the test-retest reliability, item-total correlations and by using factor analysis and item response theory techniques (Kopec et al, 1996). The author of the current study agrees with Kopec et al. (1996) that this method was likely to produce a scale with measurement properties better than those scales developed with a more intuitive approach to item selection and for that reason was included in this study.

3.4.3 WDI (see appendix A)

Although limited information exists on the measurement properties of the WDI, the briefness of the scale and ease of scoring makes it particularly appealing as a potential measure of function in clinical practice and was the motivating reason for the author to include it in this study.

3.4.4 DRI (see appendix A)

The fact that the literature supports the use of the DRI as an activity limitation measure and that it has been used in studies as a correlation tool to establish the convergent validity of other disability scales (Feise & Menke, 2001, Grotle et al., 2003) was the primary motivating factor for its use as a correlation tool in this study.

3.4.5 VAS (pain) scale (see appendix A)

If a questionnaire is a valid measure of activity limitation, and if the limitation is due to pain, one would expect a significant correlation between questionnaire scores and self rated pain, and also improvement in pain scores would accompany improvement in the questionnaire scores. For this reason the VAS pain scale was included in this study to determine the concurrent validity of the RMDQ, QDS & WDI.

3.5 Procedure

The study was conducted over a period of two months. During the first month data were collected from Wilmed Park and Sunningdale private hospitals as well as Duff Scott and Westvaal mining hospitals in Klerksdorp. The scoring was done by the researcher during the same month. In the second month the battery of questionnaires was tested at Dr George Mukari government hospital in Tswane. Again the scoring was done in the same month.

Subjects who consented to participate in the study were asked to complete a questionnaire booklet, which contained an information sheet, consent form, the Tswana versions of the RMDQ, QDS, WDI, DRI and 100mm VAS (pain). A brief personal data questionnaire was also completed which was kept separately to maintain confidentiality. The original and Tswana versions of the RMDQ, QDS, WDI , DRI and VAS (pain), personal data questionnaire, information sheet and consent form, can be found in appendices A,B,C and E, respectively. Self administration was chosen as the mode of administration. A Tswana speaking research assistant was present to read (not explain) each question of the Tswana versions of the questionnaires to those subjects who could not read. The researcher was also present during data collection to ensure the coordination of the study logistics.

The completion of the four questionnaires, the VAS pain scale and a brief personal data questionnaire was estimated to take approximately 25 minutes to complete and this was explained to the subjects before consent was given.

In addition to the four disability questionnaires and VAS (pain) scale it was necessary to complete a brief personal data questionnaire as differences in sample characteristics may have accounted for different results. Included in the questionnaire were the most important demographics namely age, gender and educational level.

To minimise the effect the sequencing of the questionnaires could have, the subjects were asked to randomly draw a number out of a box. Each of the four disability questionnaires and the VAS pain scale was assigned a given number. The subjects completed the questionnaires in sequence with the numbers they drew from the box.

Test-retest reliability indicates the extent to which the same results are obtained by administering the same test to the same subjects at two points in time. In this study, 31 subjects with LBP were asked to complete the second questionnaire booklet, containing the

four disability questionnaires and the VAS pain scale, 24 hours after they completed the first questionnaire booklet.

3.6 Translation procedure

The translation and cross cultural adaptation (refer to Chapter 4) of the original English versions of the RMDQ, QDS and WDI into Tswana was carried out in accordance with published guidelines (Beaton et al, 2000)

The RMDQ, QDS and WDI were translated into Tswana by two different and independent Tswana speakers. Tswana had to be their home language and they needed to have good English skills. One of the translators had a medical background and was aware of the purpose of the study and the other had no medical background and had had no idea of the objectives of the study. The different profiles of the two translators assured good agreement and accuracy with the original English versions in terms of both the clinical content and the appropriateness of the terminology.

The translations were compared with one another and with the original English versions. After discussing any discrepancies that may have arisen, consensus was reached and the translated versions were integrated into one common Tswana version for each of the three questionnaires.

Two Tswana speakers, with good English skills then carried out back-translations of the Tswana versions into English. One of the back translators was a physiotherapist and was aware of the purpose of the study and the other had no medical background and had no idea of the objectives of the study. Each carried out their translations independently.

A third bilingual physiotherapist compared the back-translations with each other and with the original English questionnaires and highlighted any gross inconsistencies in the content of the translated versions. The bilingual physiotherapist and one of the original translators then jointly reviewed and fine-tuned the pre-final Tswana versions.

Lastly the pre-final translated questionnaires were tested in a pilot study on ten Tswana speaking subjects. They were briefly interviewed to check what they thought were meant by each question and the chosen response. All the findings were evaluated and the Tswana versions of the RMDQ, QDS and WDI were then finalized.

The translation and cross cultural adaptation of the original English versions of the DRI and VAS pain scale into Tswana was also carried out in the same manner described above, but were done so at a later stage by different translators as they were only added after the pilot study. The reason for their inclusion was the need to establish the convergent validity of the RMDQ, QDS and WDI.

3.7 Statistical analysis

Internal consistency will be measured by means of Cronbach's alpha. Test-retest reliability will be determined by using the Intraclass Correlation Coefficient. Construct and concurrent validity will be determined by the Pearson Correlation Coefficient.

3.8 Chapter conclusion

This chapter described the methodology of the study. In this cross sectional study a sample of convenience was used and the translation and cross-cultural adaptation of the original RMDQ, QDS and WDI were performed in accordance with the published guidelines. The Tswana versions of the questionnaires were tested on a total of 100 subjects, who met the inclusion criteria, at five hospitals in areas that are predominantly Tswana speaking. The questionnaires were re-tested on a third of the sample 24 hours after they completed the first questionnaire booklet. The next chapter will present the results of the study.

Chapter 4: Results

4.1 Chapter Aims

This chapter aims to

- Give the demographic data of the study sample.
- State the results for the translation and cross cultural adaptation of the questionnaires.
- Present the missing data and scale range results of the questionnaires.
- Point out the results of the internal consistency of the questionnaires.
- Cite the test-retest reliability results of the questionnaires.
- Present the construct and concurrent validity results of the questionnaires.

4.2 Translation and cross cultural adaptation

The Tswana versions of the RMDQ, QDS, WDI, DRI and VAS pain scale are shown in appendix B. A few noteworthy difficulties arose during the development of the questionnaires as there are also certain cultural differences that make the direct translation from the original English versions of the questionnaires into Tswana difficult. For this reason some modifications were performed during the translation process.

4.2.1 RMDQ

The process of translating the RMDQ appeared to be the most straightforward and was clearly understood by the pilot sample.

4.2.2 QDS

Question 8: During the pilot study "Walk a few blocks (300-400m)" was found not to be very well understood and was changed to "To walk for a certain distance (300-400m)".

Question 10: "Reach up to high shelves" was not that comprehensible during the pilot study and was changed to " To reach up to the top cupboards".

Question 12: As for question 8 "Run one block (100m)" was changed to "To run for a certain distance (100m)".

4.2.3 WDI

Question 1: 30-40 pound suitcase was dropped as pounds are generally not used in South Africa. The example of a 3-4 year old child was a good enough example of a heavy object and was well understood by the pilot study sample.

Question 3: "Travelling in a bus or car..." As many of the pilot study sample make use of public transport the word car was changed to taxi. Thus it was changed to "Travelling in a bus or taxi...".

Question 9: "Help required with footwear (tights, socks, tying laces etc.)" was translated as "To be unable to put your shoes on or to tie them yourself". It was agreed upon that this would be better understood.

4.3 Demographic data

The demographic data of the study population are shown in Table 4.1.

Table 4.1 Demographic Data

Characteristics	**Patients (n=100)**
Age (years)	
Mean (SD)	42 (±9.13)
Range	23-63
Gender (male/female)	5/95

Of the 100 subjects who participated in the study 95 were female and only 5 were male. The reason for the majority being female subjects in the study was mainly due to the occupations of the subjects (cleaners, kitchen staff, laundry workers and nurses). The mean age of the subjects was 42 with a standard deviation of ± 9.13 and a range of 23-63.

The education level of the subjects is shown in Table 4.2.

Table 4.2 Education level of subjects (n=100)

Education level (Grade)	**Frequency**	**Percent**	**Cumulative**
3	1	1%	1.00
5	1	1%	2.00
6	2	2%	4.00
7	7	7%	11.00
8	13	13%	24.00
9	10	10%	34.00
10	**25**	**25%**	**59.00**
11	**19**	**19%**	**78.00**
12	**22**	**22%**	**100.00**
Total	100	100%	

As seen in Table 4.2 the education level of the subjects ranged from grade 3 to grade 12. The majority of subjects had a grade 10 or higher education level with only 34% having an education level of grade 9 or lower.

4.4 Missing data

Missing data could not be determined for the RMDQ and WDI as a single check box method of scaling was used. The percentage of missing data for each question of the QDS can be found in Table 4.3.

Table 4.3 The percentage of missing data for each question of the QDS (n=100)

	% missing data
Question 1	1
Question 2	0
Question 3	2
Question 4	0
Question 5	2
Question 6	2
Question 7	0
Question 8	1
Question 9	0
Question 10	2
Question 11	**12**
Question 12	**10**
Question 13	0
Question 14	1
Question 15	2
Question 16	3
Question 17	1
Question 18	0
Question 19	1
Question 20	0

As seen in Table 4.3 the percentage of missing data for each question of the QDS is minimal (ranging between zero and three percent), with the exception of question 11 and 12. Ten percent of subjects failed to answer question 12 and 13 percent of subjects failed to answer to answer question 11. This may indicate a lack of understanding or acceptability for these two questions among subjects.

4.5 Scale range

The floor and ceiling effects of the RMDQ, QDS and WDI are shown in Table 4.4.

Table 4.4 Floor and ceiling effects of the RMDQ, QDS and WDI (n=100)

	% of subjects with the lowest possible score (floor effect)	**% of subjects with the highest possible score (ceiling effect)**
RMDQ	3	2
QDS	1	0
WDI	5	5

Three percent of subjects obtained the lowest possible score (floor effect) whereas two percent of subjects reached the ceiling (highest possible score) of the RMDQ. The lowest possible score was obtained by one percent of subjects completing the QDS with no subjects reaching the ceiling effect. Five percent of subjects obtained the floor as well as the ceiling effect of the WDI. None of the three questionnaires exceeded the benchmark of 15 percent (McHorney & Tarlov, 1995).

4.6 Validity

The Pearson correlation coefficient of the Tswana versions of RMDQ, QDS and WDI with the DRI can be seen in Table 4.5.

Table 4.5 Pearson correlation coefficient of the Tswana versions of RMDQ, QDS and WDI with the DRI (n=100)

	Correlation with the DRI
RMDQ	0.74
QDS	0.85
WDI	0.63

Construct validity of the Tswana versions of the RMDQ, QDS and WDI was measured by determining the correlation between them and a Tswana adaptation of the DRI. The correlation of the RMDQ with the DRI produced a Pearson correlation coefficient of 0.74.

The correlation of the QDS with the DRI produced a Pearson correlation coefficient of 0.85. The correlation of the WDI with the DRI produced a Pearson correlation coefficient of 0.63. The QDS showed a strong correlation with the DRI while the WDI and RMDQ had a moderate relationship.

A scatter diagram of scores for the QDS, which had the strongest association with the DRI, is shown in figure 4.1

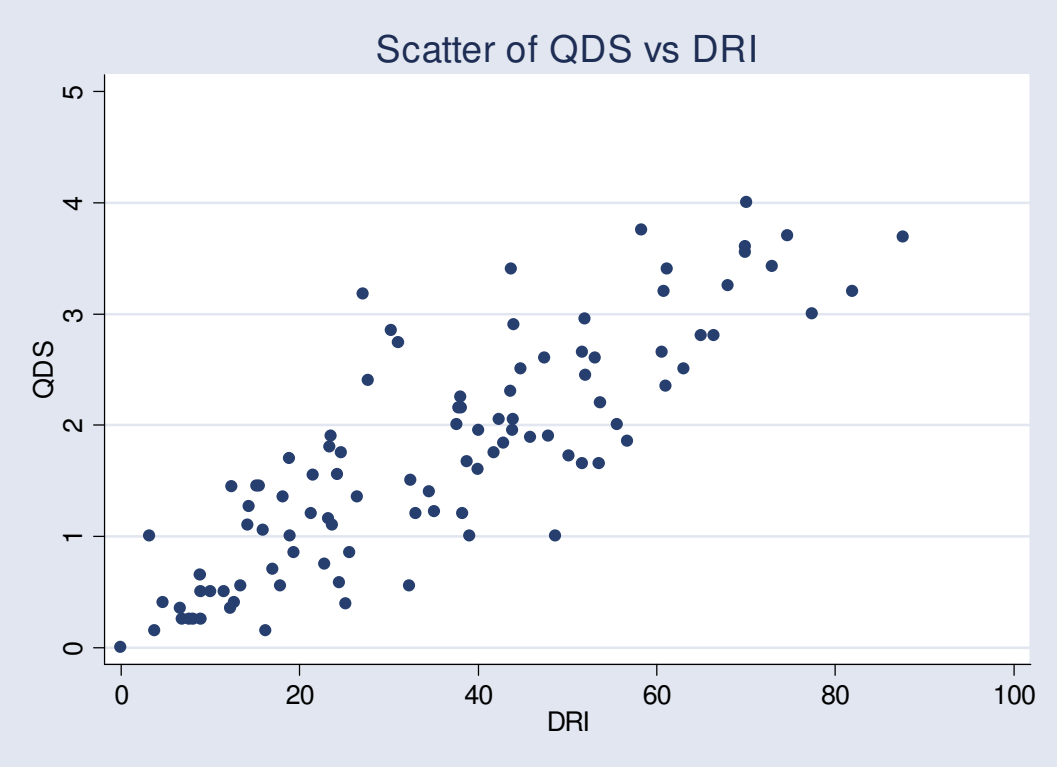

Figure 4.1 Scatter diagram of scores for the QDS, which had the strongest association with the DRI

Figure 4.1 shows a scatter diagram of the relationship between the RMDQ and DRI. The scatter diagram is composed of a horizontal axis containing the measured values of the DRI and a vertical axis representing the measurements of the RMDQ. As seen there is a strong positive correlation between the QDS and DRI, that is, as the amount of variable x (DRI) increases, the variable y (QDS) also increases. Of all three questionnaires the QDS had the strongest correlation with the DRI. The scatter diagrams of the RMDQ and WDI and their relationship with the DRI can be found in appendix G.

The Pearson correlation coefficient of the Tswana versions of RMDQ, QDS and WDI with the VAS (pain) can be seen in Table 4.6.

Table 4.6 Pearson correlation coefficient of the Tswana versions of RMDQ, QDS and WDI with the VAS (pain) (n=100)

	Correlation with the VAS (pain)
RMDQ	0.63
QDS	0.68
WDI	0.74

Concurrent validity of the Tswana versions of the RMDQ, QDS and WDI was assessed with their correlation to the VAS pain scale. The correlation of the RMDQ with the VAS pain scale produced a Pearson correlation coefficient of 0.63. The correlation of the QDS with the VAS pain scale produced a Pearson correlation coefficient of 0.68. The correlation of the WDI with the VAS pain scale produced a Pearson correlation coefficient of 0.74. Moderate correlation was found among the RMDQ, QDS and WDI summed scores and the VAS pain scale.

A scatter diagram of scores for the WDI, which had the strongest association with the VAS (pain), is shown in figure 4.2

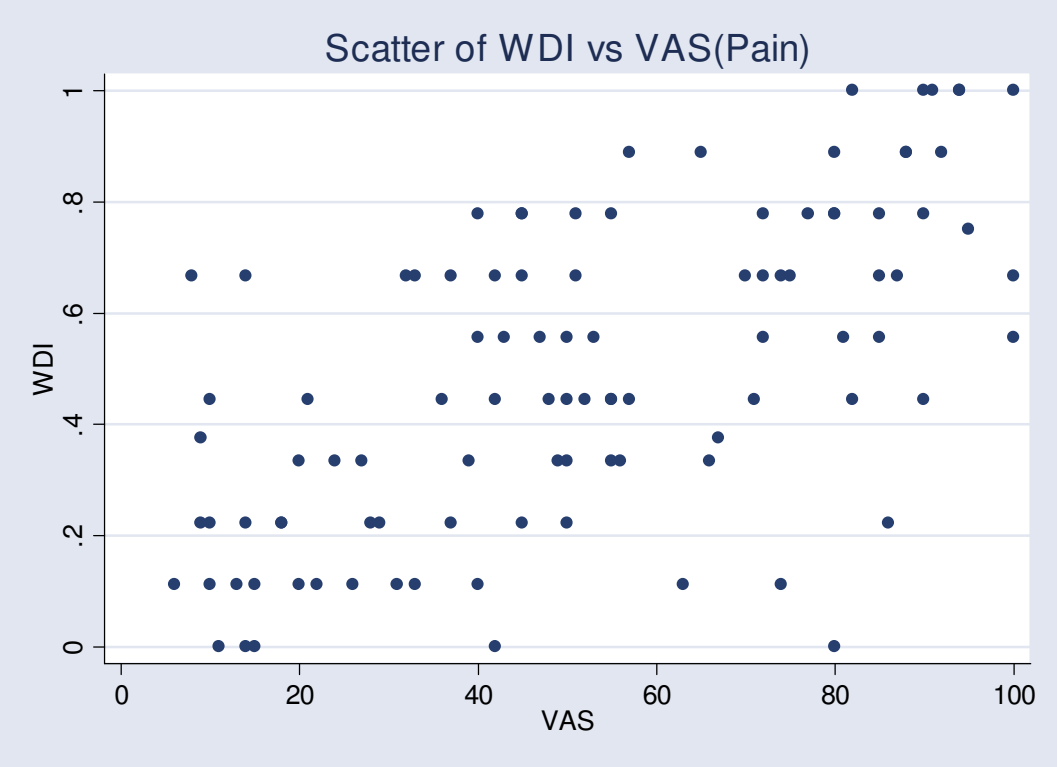

Figure 4.2 Scatter diagram of scores for the WDI, which had the strongest association with the VAS (pain)

Figure 4.2 shows a scatter diagram of the relationship between the WDI and VAS (pain) scale. The scatter diagram is composed of a horizontal axis containing the measured values of the VAS (pain) and a vertical axis representing the measurements of the WDI. As seen there is a moderate positive correlation between the WDI and VAS (pain), that is, the value of y (WDI) increases slightly as the value of X (VAS (pain)) increases. Of all three questionnaires the WDI had the strongest correlation with the VAS (pain). The scatter diagrams of the RMDQ and QDS and their relationship with the VAS (pain) scale can be found in appendix H

4.7 Internal consistency

Table 4.7 illustrates the internal consistency (Cronbach's alpha) of the RMDQ.

Table 4.7 Internal consistency (Cronbach's alpha) of the RMDQ (n=100)

Overall Cronbach's alpha coefficient= 0.9240 (RMDQ)	**Cronbach's alpha coefficient if question is omitted**
Question 1	0.9232
Question 2	0.9224
Question 3	0.9210
Question 4	0.9193
Question 5	0.9212
Question 6	0.9211
Question 7	0.9209
Question 8	0.9202
Question 9	0.9187
Question 10	0.9208
Question 11	0.9203
Question 12	0.9203
Question 13	0.9206
Question 14	0.9107
Question 15	***0.9244***
Question 16	0.9212
Question 17	0.9190
Question 18	0.9225
Question 19	0.9228
Question 20	0.9196
Question 21	0.9224
Question 22	0.9192
Question 23	0.9211
Question 24	0.9200

Reliability of the Tswana version of the RMDQ estimated by the internal consistency reached an overall Cronbach's alpha of 0.9240. The Cronbach's alpha value exceeds 0.7, satisfying the Nunnally's criterion, indicating that the RMDQ is an internally consistent scale. This table includes the alpha value of each item. When the item is removed from the questionnaire this value would be the new overall Cronbach's alpha value. For example if question 1 is omitted from the RMDQ, the new overall Cronbach's alpha value would be 0.9232, which is lower than the overall alpha value of 0.9240, if the question is included and therefore justifies its inclusion. Note that the overall alpha value of question 15 is higher when omitted which will be discussed in the next chapter. Coefficients ranged from 0.9107 (question 14) to 0.9244 (question 15).

Table 4.8 illustrates the internal consistency (Cronbach's alpha) of the QDS.

Table 4.8 Internal consistency (Cronbach's alpha) of the QDS (n=100)

Overall Cronbach's alpha coefficient= 0.9538 (QDS)	**Cronbach's alpha coefficient if question is omitted**
Question 1	0.9527
Question 2	0.9535
Question 3	0.9512
Question 4	0.9527
Question 5	0.9518
Question 6	0.9510
Question 7	0.9500
Question 8	0.9511
Question 9	0.9523
Question 10	0.9516
Question 11	0.9517
Question 12	0.9512
Question 13	0.9527
Question 14	0.9515
Question 15	0.9494
Question 16	0.9498
Question 17	0.9513
Question 18	0.9508
Question 19	0.9511
Question 20	0.9538

For all the 20 items, internal consistency for the Tswana translation of the QDS reached a Cronbach's alpha of 0.9538. The Cronbach's alpha value exceeds 0.7, satisfying the Nunnally's criterion, indicating that the RMDQ is an internally consistent scale. This table includes the alpha value of each item. When the item is removed from the questionnaire this value would be the new overall Cronbach's alpha value. For example if question 1 is omitted from the QDS, the new overall Cronbach's alpha value would be 0.9527, which is lower than the overall alpha value of 0.9538 if the question is included and therefore justifies its inclusion. Coefficients ranged from 0.9494 (question 15) to 0.9538 (question 20). Although there were high levels of missing data for question 11 and 12, the Cronbach's alpha values of 0.9517 and 0.9512, respectively, indicate that both questions contribute significantly to the internal consistency of the scale.

Table 4.9 illustrates the internal consistency (Cronbach's alpha) of the WDI.

Table 4.9 Internal consistency (Cronbach's alpha) of the WDI (n=100)

Overall Cronbach's alpha coefficient= 0.7505 (WDI)	**Cronbach's alpha coefficient if question is omitted**
Question 1	0.7214
Question 2	0.7365
Question 3	0.7412
Question 4	0.6966
Question 5	0.7286
Question 6	0.7377
Question 7	0.7071
Question 8	0.7284
Question 9	0.7473

Internal consistency reliability for the Tswana translation of the WDI reached a Cronbach's alpha coefficient of 0.7505. The Cronbach's alpha value exceeds 0.7, satisfying the Nunnally's criterion, indicating that the RMDQ is an internally consistent scale. This table includes the alpha value of each item. When the item is removed from the questionnaire this value would be the new overall Cronbach's alpha value. For example if question 1 is omitted from the WDI, the new overall Cronbach's alpha value would be 0.7214, which is lower than the overall alpha value of 0.7505 if the question is included and therefore justifies its inclusion. Coefficients ranged from 0.6966 (question 4) to 0.7473 (question 9).

Table 4.10 illustrates the internal consistency (Cronbach's alpha) of the DRI.

Table 4.10 Internal consistency (Cronbach's alpha) of the DRI (n=100)

Overall Cronbach's alpha coefficient= 0.9401 (DRI)	**Cronbach's alpha coefficient if question is omitted**
Question 1	0.9395
Question 2	0.9367
Question 3	0.9329
Question 4	0.9356
Question 5	0.9336
Question 6	0.9334
Question 7	0.9349
Question 8	0.9337
Question 9	0.9390
Question 10	0.9313
Question 11	0.9337
Question 12	0.9358

For all 12 items, internal consistency for the Tswana translation of the DRI reached a Cronbach's alpha of 0.9401. The Cronbach's alpha value exceeds 0.7, satisfying the Nunnally's criterion, indicating that the RMDQ is an internally consistent scale. This table includes the alpha value of each item. When the item is removed from the questionnaire this value would be the new overall Cronbach's alpha value. For example if question 1 is omitted from the DRI, the new overall Cronbach's alpha value would be 0.9395, which is lower than the overall alpha value of 0.9401 if the question is included and therefore justifies its inclusion. Coefficients ranged from 0.9313 (question 10) to 0.9395 (question 1).

4.8 Test-retest reliability

Intraclass correlation coefficient values for the RMDQ, QDS, WDI, DRI and VAS (pain) are shown in Table 4.11.

Table 4.11 Test-retest reliability of RMDQ, QDS and WDI (n=31)

	Intraclass correlation coefficient (95% CI)
RMDQ	0.93
QDS	0.91
WDI	0.84
DRI	0.76
VAS(pain)	0.56

Test-retest reliability was assessed with a third of the sample on two occasions separated by a time interval of 24 hours. ICC values for the RMDQ, QDS and WDI were 0.93, 0.91 and 0.84, respectively. There was no significant difference between mean RMDQ, QDS and WDI scores on the two test occasions. All three questionnaires showed excellent test-retest reliability as evident by the high ICC values for the two test occasions. The DRI also showed good test-retest reliability, with ICC equal to 0.76. The VAS pain scale however showed poor test-retest reliability with ICC equal to 0.56.

4.9 Chapter conclusion

This chapter presented the results of the study. During the development of the Tswana versions of the QDS and WDI, certain words and questions had to be adapted to ensure comprehensibility. Both the floor and ceiling effects were less than 15% for all three questionnaires. The correlation between the RMDQ, QDS and WDI and the DRI was 0.74, 0.85 and 0.63, respectively. The correlation between the RMDQ, QDS and WDI and the VAS (pain) was 0.63, 0.68 and 0.74, respectively. The internal consistency of the RMDQ, QDS and WDI showed Cronbach's alpha values of 0.92, 0.95 and 0.75, respectively. The test-retest reliability of the RMDQ, QDS and WDI was 0.93, 0.91 and 0.84, respectively. The results will be discussed in the next chapter.

Chapter Five: Discussion

5.1 Chapter aims

This chapter aims to:

- Discuss the translation and cross cultural adaptation results of the questionnaires
- Discuss the results of the internal consistency of the questionnaires.
- Discuss test-retest reliability results of the questionnaires.
- Discuss the construct and concurrent validity results of the questionnaires.

5.2 Translation and cross cultural adaptation

The aim of the present study was to translate and cross-culturally adapt the RMDQ, QDS and WDI, for use with Tswana speaking patients in South Africa, and to examine the measurement properties of the Tswana versions produced. The process of translating and back translating the English RMDQ, QDS and WDI was carried out strictly in accordance with established guidelines (Beaton et al., 2000), in an attempt to produce reliable and valid Tswana versions of the questionnaires that would show a high degree of agreement with the original English versions.

The Tswana translation could be carried out with almost literal equivalence of most of the terms used. The only real problem encountered in the translation process from English to Tswana was the comprehensibility of certain words and questions in the QDS and WDI, due to certain cultural differences. For this reason some minor modifications to the initial translations of the QDS and WDI were required after the back translations, and after testing the pre-final versions in a pilot study (see Chapter 4). The process of translating the RMDQ appeared to be the most straightforward and was clearly understood by the pilot sample.

5.3 Missing data

If a questionnaire is to be a useful clinical outcome measure it must be comprehensible and acceptable to patients, and most patients should be able to complete the questionnaire correctly without assistance. No estimation of missing data was possible for the RMDQ and WDI because each item provides only a single response option. One way this could have

been overcome would have been to use a forced choice format (such as a YES or NO response) to elicit more responses. All the questions of the Tswana QDS had missing data rates of three percent and less, with the exception of question 11 (12%) ("Throw a ball") and 12 (10%) ("Run one block (100m)"). High levels of missing data may indicate a lack of understanding or acceptability among respondents (Streiner and Norman, 1995). Currently no recommendations exist for acceptable levels of missing data.

5.4 Scale range

This is also termed the floor and ceiling effects of a questionnaire and describes the percentage of subjects scoring maximal or minimal points for a given scale. As a benchmark questionnaires with more than 15% of subjects scoring at the floor (lowest possible score) or ceiling (highest possible score) should not be used. The reason is that any transition to an even more extreme status would therefore not be measurable with such a scale (An example can be found in Chapter 2, section 2.6.2). No significant floor or ceiling effect was found with the Tswana versions of the RMDQ, QDS and WDI using 15% as a criterion.

5.5 Validity

The correlation of LBP outcome measures with various other tests have been accepted as a measure of construct validity. Construct validity means that an instrument relates to other measures in a way that is to be expected (Trochim, 2001). The use of the DRI for measuring changes in functional status and pain in patients with both acute and chronic low back pain has been supported by the literature and has also been used in studies as a correlation tool to establish the construct validity of other disability scales (Feise et al,. 2001, Grotle et al., 2003, Grunnesjo et al., 2004). This as well as the fact that the content of the DRI fall into four of the six relevant ICF activities and participation categories was the primary motivating factor for its use as a correlation tool in this study.

As the RMDQ, QDS, WDI and DRI all measure the same construct, namely disability as a result of LBP, one would expect a significant association of the RMDQ, QDS and WDI scores with the DRI score. The Norwegian version of the RMDQ correlated with the DRI (0.68) (Grotle et al., 2003). A study done by Feise et al. (2001) to evaluate the psychometric

qualities of the Functional Rating Index (another low back disability questionnaire) found the Functional Rating Index correlated with the Disability Rating index (0.76) and the Short Form-12 Physical Component Score (0.76). Another study done by Mousavi et al. (2006) found that the Persian versions of the RMDQ and QDS correlated with the Short Form-12 Physical Component Score (0.62 and 0.69, respectively). These studies regarded these figures as significant correlations and in this regard the Pearson correlation coefficients of 0.74, 0.85 and 0.63 for the Tswana RMDQ, QDS and WDI, respectively, indicate significant correlation between them and the Tswana DRI.

In the concurrent validity analysis, moderate correlation was found among the RMDQ, QDS and WDI summed scores and the VAS pain scale. The correlation between the Tswana version of the RMDQ and the VAS pain scale was 0.63 which is higher than the Persian (0.36) (Mousavi et al., 2006), Norwegian (0.32) (Grotle et al., 2003) and Spanish (0.35) (Kovacs et al., 2002) versions of the RMDQ, respectively, but lower than the German (0.81) (Wiesinger et al., 1999) and Brazilian (0.79) (Nusbaum et al., 2001) versions. The Tswana version of the QDS also showed moderate correlation with the VAS pain scale (0.68) which is similar to the original English version (0.7) (Kopec et al., 1995) and lesser than the French (0.45) (Kopec et al., 1995) and Persian (0.46) (Mousavi et al., 2006) versions of the QDS. The Tswana version of the WDI correlated somewhat better with the VAS pain scale (0.74) than the Tswana RMDQ and QDS. It should however be noted that in the present study the VAS pain scale itself was not very reliable with a ICC value of only 0.56 which is below the generally considered acceptable level of 0.7 (Fayers & Machin, 2000). Mousavi et al. (2006) argues that although the association between LBP disability scales and pain rating scales is expected to be good, it should not be very high, otherwise it would suggest that the two instruments are carrying identical information.

5.6 Internal consistency

The internal consistency of the Tswana versions of the RMDQ, QDS and WDI was examined using Cronbach's alpha, an item correlation test that reflects the homogeneity of all the items.

The Cronbach's alpha for the Tswana version of the RMDQ of 0.92 is good when compared to previously reported values in the Persian (0.83)(Mousavi et al., 2006),German (0.81) (Wiesinger et al., 1999), Spanish (0.84) (Kovacs et al., 2002), Turkish (0.85) (Kucukdeveci et

al., 2001), Greek (0.88) (Boscainos et al., 2003), and Japanese (0.86)(Fujiwara et al., 2003), versions of the RMDQ. In this study, the Cronbach's alpha for the Tswana version of the QDS of 0.95 was higher than the Tswana RMDQ and WDI and somewhat similar to the alpha coefficient reported by the developers of the scale (0.96) (Kopec et al., 1995) and the Persian version (0.92) (Mousavi et al., 2006) of the QDS. The Cronbach's alpha of the Tswana version of the WDI was 0.75, which is similar to the coefficient previously reported by Davidson & Keating (2002).

Bland & Altman (1997) state that for comparing groups, alpha values of 0.7 to 0.8 are considered satisfactory but that for clinical application much higher values of alpha are needed and a minimum of 0.9 is desirable. Nunnally (1978) agrees that instruments used in basic research should have reliability of at least 0.7 or better. He adds that with instruments used in clinical settings, a reliability of 0.8 may not be high enough. Thus in this sense the Tswana versions of the RMDQ, QDS and WDI should all be suitable for group analysis. However the Tswana version of the WDI may not be suitable for the interpretation of individual scores in the clinical setting. The small number of items in the WDI probably contributed to the relatively low alpha value compared to the other two scales.

The Cronbach's alpha coefficient values for each question were comparable to the overall Cronbach's alpha coefficient for the QDS and WDI scales. This showed that the structure of the Tswana versions of the QDS and WDI was solid and closely focused on expression of disability in low back pain patients. This also held true for the RMDQ with the exception of question 15. It was interesting to note that question 15, which touched on the affect on appetite because of low back pain, when removed from the model scored higher than the overall alpha for the scale. According to Trochim (2001) a researcher may wish to drop items where the alpha if deleted is higher than the overall alpha as another way to improve the alpha level.

5.7 Test-retest reliability

A questionnaire's test-retest reliability indicates how stable it is over a predefined time interval, with the ICC indicating the strength of agreement between measurements recorded

on two occasions. According to Fayers & Machin (2000) ICC's greater than 0.7 are generally considered acceptable.

In this study, 31 patients with low back pain were asked to complete the second questionnaire booklet, containing the four disability questionnaires and the VAS pain scale. The RMDQ, QDS and WDI all showed excellent test-retest reliability with ICC values of 0.93, 0.91 and 0.84 for a time period between the repeated measurements of 24 hours.

It could be argued that ICC values over a shorter time interval of 24 hours may be higher than longer time periods due to a possible memory effect. However there is difficulty interpreting test-retest correlations in long time intervals, as low back pain symptoms may be altered and thus influence such an assessment. Marx et al. (2003) conducted a study to compare the test-retest reliability values obtained from a two day and two week retest interval for four knee-rating scales. They concluded that there was no statistically significant difference between the test-retest reliability values performed with a 2 day weighed against a 2 week interval. Stratford (2004) however argues that the researchers did not have a large enough sample size, which challenges the validity of the studies' conclusions. According to Gronblad et al. (1993) further research should be carried out to evaluate the interference of the time of application and reapplication of questionnaires and the type of low back pain involved in each study. A time interval of 24 hours was chosen in this study because it has been used successfully in numerous other studies. (Wiesinger et al., 1999, Mousavi et al., 2006, Osthus et al., 2006)

The ICC reported in the present study for the Tswana version of the RMDQ of 0.93 was higher than those reported in previous studies which used the same 24 hour retest interval, Persian (0.86) (31 subjects reteted) (Mousavi et al., 2006), German (0.82) (20 subjects retested) (Wiesinger et al., 1999). The ICC of the Tswana version of the QDS of 0.91 are in accordance with the ICC reported by the developers of the scale (0.93 for English speaking respondents, 0.88 for French speaking respondents) (Kopec et al., 1995) and the Persian version (0.86) (Mousavi et al., 2006). The ICC for the Tswana version of the WDI was 0.84 and although no studies have reported on the ICC of the WDI it is above the generally considered acceptable value of 0.7 (Fayers & Machin, 2000). These results show the high agreement between all the questionnaires' measurements recorded on two occasions over a 24 hour period.

5.8 Chapter conclusion

The results were discussed in this chapter. Minor modifications to the initial translations of the QDS and WDI were required after the back translations, and after testing the pre-final versions in a pilot study. No significant floor or ceiling effects were found for al three questionnaires. There was moderate correlation between the RMDQ, WDI and DRI. The correlation between the QDS and DRI was strong. All three questionnaires correlated moderately with the VAS (pain). The RMDQ, QDS and WDI appeared to be internally consistent scales. All three questionnaires showed excellent test-retest reliability.

Chapter 6: Conclusion

6.1 Chapter aims

This chapter aims to:

- Conclude on the findings of the study.
- Make further clinical recommendations.

6.2 Conclusion

Internal consistency was evaluated by means of Cronbach's alpha. The RMDQ, QDS and WDI all appear to be internally consistent scales with Cronbach alpha values of 0.92, 0.95 and 0.75, respectively. Cronbach's alpha values higher than 0.9 suggest that the Tswana version of the RMDQ and QDS may be suitable for the interpretation of individual scores in the clinical setting as well group analysis.

The test-retest reliability (ICC) of the RMDQ, QDS and WDI of 0.91, 0.93 and 0.84 show the high agreement between the measurements recorded on two occasions over a 24 hour period. These results are equal to or even better than the original English or other translated versions for the RMDQ and QDS. Although no studies have reported on the ICC of the WDI it is above the generally considered acceptable value of 0.7.

Significant correlation was found among the RMDQ, QDS and WDI and the DRI, providing evidence of their construct validity. In the concurrent validity analysis, significant correlation was found among the RMDQ, QDS and WDI summed scores and the VAS pain scale. No significant floor or ceiling effects were found for all the questionnaires.

The results suggest that the Tswana versions of the RMDQ, QDS and WDI validated in this study are easy to understand, valid and reliable instruments for the measurement of functional disability caused by LBP in a Tswana speaking population. Therefore these translated instruments may be useful clinical methods for collecting standardised data on activity limitations resulting from LBP in a Tswana speaking population.

6.3 Further clinical recommendations

The results of the present study suggest that the Tswana versions of the RMDQ, QDS and WDI are valid and reliable questionnaires for assessing the functional status of Tswana speaking patients with LBP. It is recommended that the QDS and RMDQ be used to improve the measurement of outcomes for Tswana speaking patients undergoing physiotherapy treatment for LBP in the clinical setting. Both of them had Cronbach's alpha values above the recommended 0.9. This will benefit Tswana speaking patients with LBP in that the physiotherapist can monitor the response to treatment, and results can be used to provide feedback to patients and set treatment goals accordingly. All three questionnaires can be recommended for clinical trails investigating the effectiveness of therapeutic interventions. The QDS and RMDQ however appear to be slightly superior to the WDI considering floor and ceiling effects, internal consistency, test-retest reliability and construct validity. The QDS and RMDQ show good correspondence with the original English and other translated versions with regard to wording and measurement properties and allows for intercultural comparisons.

When judging therapeutic interventions in both clinical and research settings it is important to measure both deterioration and improvement with high precision. It is thus recommended that the Tswana versions of the RMDQ, QDS and WDI be tested in the future to determine their ability to detect clinically meaningful change (responsiveness) for different forms of interventions.

Appendix A: Original English versions of the RMDQ, QDS, WDI, DRI and VAS (pain)

Waddell Disability Index (Waddell & Main, 1984)

When your back hurts, you may find if difficult to do some of the things you normally do.

Mark (√) only the sentences that describe you today….

1. Help required or avoid heavy lifting (30-40 pound suitcase child 3-4 years old) ( )
2. Sitting generally limited to less than one half hour ( )
3. Travelling in a car or bus generally limited to less than one half hour ( )
4. Standing in 1 place generally limited to less than one half hour. ( )
5. Walking generally limited to less than one half hour. ( )
6. Sleep disturbed regularly by low back pain (i.e. 2 times per week) ( )
7. Regularly miss or curtail social activities (excluding sports) ( )
8. Diminished frequency of sexual activity ( )
9. Help regularly required with footwear (tights socks tying laces etc.) ( )

Roland-Morris Disability Questionnaire (Roland & Morris, 1983)

When your back hurts, you may find if difficult to do some of the things you normally do.

Mark (√) only the sentences that describe you today….

1. I stay at home most of the time because of my back. ( )
2. I change position frequently to try to get my back comfortable. ( )
3. I walk more slowly than usual because of my back. ( )
4. Because of my back, I am not doing any jobs that I usually do around the house. ( )
5. Because of my back, I use a handrail to get upstairs. ( )
6. Because of my back, I lie down to rest more often. ( )
7. Because of my back, I have to hold on to something to get out of an easy chair. ( )
8. Because of my back, I try to get other people to do things for me. ( )
9. I get dressed more slowly than usual because of my back. ( )
10. I only stand up for short periods of time because of my back. ( )
11. Because of my back, I try not to bend or kneel down. ( )
12. I find it difficult to get out of a chair because of my back. ( )
13. My back is painful almost all of the time. ( )
14. I find it difficult to turn over in bed because of my back. ( )
15. My appetite is not very good because of my back. ( )
16. I have trouble putting on my sock (or stockings) because of the pain in my back. ( )
17. I can only walk short distances because of my back pain. ( )
18. I sleep less well because of my back. ( )
19. Because of my back pain, I get dressed with the help of someone else. ( )
20. I sit down for most of the day because of my back. ( )
21. I avoid heavy jobs around the house because of my back. ( )
22. Because of back pain, I am more irritable and bad tempered with people than usual. ( )
23. Because of my back, I go upstairs more slowly than usual. ( )
24. I stay in bed most of the time because of my back. ( )

The Quebec Disability Scale (Kopec et al. 1995)

This questionnaire is about the way your back pain is affecting your daily life. People with back problems may find it difficult to perform some of their daily activities. We would like to know if you find it difficult to perform any of the activities listed below, because of your back. For each activity there is a scale of 0 to 5. Please choose one response option for each activity (do not skip any activities) and circle the corresponding number.

Today, do you find it difficult to perform the following activities because of your back?

	0. Not difficult at all	1. Minimally difficult	2. Somewhat difficult	3. Fairly difficult	4. Very difficult	5. Unable to do
1. Get out of bed						
2. Sleep through the night						
3. Turn over in bed						
4. Ride in a car						
5. Stand up for 20-30 minutes						
6. Sit in a chair for several hours						
7. Climb one flight of stairs						
8. Walk a few blocks (300-400 m)						
9. Walk several kilometres						
10. Reach up to high shelves						
11. Throw a ball						
12. Run one block (about 100m)						
13. Take food out of the refrigerator						
14. Make your bed						
15. Put on socks (pantyhose)						
16. Bend over to clean the bathtub						
17. Move a chair						
18. Pull or push heavy doors						
19. Carry two bags of groceries						
20. Lift and carry a heavy suitcase						

Disability Rating Index (Salen et al., 1994)

We would like to know if you find it difficult to perform any of the activities listed below, because of your back. Place a vertical mark on the horizontal line below. A mark to the left indicates no difficulty with the task. A mark to the right indicates that you are unable to do the activity. Mark all the activities.

Dressing or undressing

No difficulty _____ Unable to do

Walking

No difficulty _____ Unable to do

Mounting stairs

No difficulty _____ Unable to do

Sitting still more than briefly

No difficulty _____ Unable to do

Leaning over a wash-stand

No difficulty _____ Unable to do

Carrying a bag

No difficulty _____ Unable to do

Making a bed

No difficulty _____ Unable to do

Running

No difficulty _____ Unable to do

Moderate physical work

No difficulty _____ Unable to do

Heavy physical work

No difficulty _____ Unable to do

Heavy lifting

No difficulty _____ Unable to do

Physical exercise or sports

No difficulty _____ Unable to do

V.A.S (pain) (Wewers & Lowe, 1990)

How severe is your pain today? Place a vertical mark on the line below to indicate how bad you feel your low back pain is today.

No pain _____ Very severe pain

Appendix B: Tswana versions of the RMDQ, QDS, WDI, DRI and VAS (pain)

Lenaane-tatelano la Bogole la Waddell

Fa mokwatla wa gago o le botlhoko, o ka fitlhela go le thata mo go wena go dira dilo dingwe tse o tlwaetseng go di dira.

Tshwaya fela dipolelo tse di go tlhalosang mo malatsing a no ….

1. Thuso e a tlhokega kgotsa o tila go tsholetsa dilo tse di boima (kheisi ya diaparo ya diponto di le 30-40; ngwana wa dingwaga di le 3-4). ( )
2. Go nna ka kakaretso go lekanyeditswe go nako e e fa tlase ga seripa sa ura. ( )
3. Leeto la sejanaga kgotsa bese le lekanyeditswe go nako e e fa tlase ga seripa sa ura. ( )
4. Go ema mo lefelong le le lengwe go lekanyeditswe go nako e e fa tlase ga seripa sa ura. ( )
5. Go tsamaya ka dinao go lekanyeditswe go nako e e fa tlase ga seripa sa ura. ( )
6. Boroko ka metlha bo tlhobaediwa ke setlhabi sa bokwatlase jwa mokwatla (ke gore, makgetlo a le 2 ka beke). ( )
7. O fetiwa kgotsa o kgaotsa ditiro tsa botsalano (go sa akaretse metshameko). ( )
8. Ngotla makgetlo a go tsena mo thobalanong. ( )
9. Thuso e tlhokega ka metlha mo go rwaleng mo maotong (dikausu tse di pitlaganyang, go bofa megala ya ditlhako, le tse dingwe.) ( )

Bukana-potso ya Roland-Morris ya Ditlhabi mo Bokwatlaseng jwa Mokwatla le Bogole

Fa mokwatla wa gago o le botlhoko, o ka fitlhela go le thata mo go wena go dira dilo dingwe tse o tlwaetseng go di dira.

Tshwaya fela dipolelo tse di go tlhalosang mo malatsing a no….

1. Ke nna fa gae nako e ntsi ka ntlha ya mokwatla wa me. ( )
2. Ke fetola mokgwa wa go nna kgafetsa-kgafetsa go leka go dira gore mokwatla wa me o phuthologe. ( )
3. Ke tsamaela ka bonya go feta tlwaelo ka ntlha ya mokwatla wa me. ( )
4. Ke retelelwa ke ditiro tsa selapa tse ken eng ke di kgona pele, ka ntlha ya mokwatla. ( )
5. Ka ntlha ya mokwatla wa me, ke dirisa seikokotlelo sa seatla go ya kwa bopalamelong jo bo kwa godimo. ( )
6. Ka ntlha ya mokwatla wa me, ke sekama gangwe le gape go ikhutsa. ( )
7. Ka ntlha ya mokwatla wa me, ke tshwanetse go itshwarelela ka sengwe go tloga mo setulong sa me se se bonolo. ( )
8. Ka ntlha ya mokwatla wa me, ke leka go batla batho ba bangwe go ntirela dilo. ( )
9. Ke aparela ka bonya go feta ka metlha ka ntlha ya mokwatla wa me. ( )
10. Ke emelela fela nako e khutshwane ka ntlha ya mokwatla wa me. ( )
11. Ka ntlha ya mokwatla wa me, ke leka gore ke se ka ka inama kgotsa go khubama. ( )
12. Go thata mo go nna go tloga mo setulong ka ntlha ya mokwatla wa me. ( )
13. Mokwatla wa me o na le ditlhabi e ka nna ka dinako tsotlhe . ( )
14. Go thata mo mo go nna go iphetola mo bolaong ka ntlha ya mokwatla wa me. ( )
15. Ga ke na keletso e e siameng ya dijo ka ntlha ya mokwatla wa me. ( )
16. Ke thatafalelwa ke go rwala kausu kgotsa kausu ya basadi ka ntlha ya setlhabi se se mo mokwatlang wa me. ( )
17. Ke kgona fela go tsamaya sekgala se se khutshwane ka ntlha ya setlhabi mo mokwatlang wa me. ( )
18. Ga ke robale monate, ka ntlha ya mokwatla. ( )
19. Ka ntlha ya setlhabi mo mokwatlang wa me, ke apara ka thuso ya motho yo mongwe. ( )
20. Ke nna fa fatshe nako e ntsi ya letsatsi ka ntlha ya mokwatla wa me. ( )
21. Ke tila ditiro tse di boima tsa fa gae ka ntlha ya mokwatla wa me. ( )
22. Ka ntlha ya setlhabi mo mokwatlang wa me, ke betwa ke pelo e bile ke felela batho pelo go gaisa ka metlha. ( )
23. Ka ntlha ya mokwatla wa me, ke ya kwa bonamelelong jo bo kwa godimo ka iketlo go feta ka metlha. ( )
24. Ke tlhola ke robetse bontsi jwa nako, ka nthla ya mokwatla. ( )

Selekanyetso (sekale) sa Quebec sa kgolofalo ka ntlha ya ditlhabi mo mokwatleng:

Bukanapotso e, e ka ga ka moo setlhabi sa mokwatla wa gago se nang le seabe mo bophelong jwa gago jwa letsatsi le letsatsi ka teng. Batho ba ba nang le mathata a mekwatla ba fitlhela go le boima go diragatsa ditiro dingwe tsa bona tsa letsatsi le letsatsi. Re rata go itse fa e le gore o ketefalelwa ke go diragatsa ditiro dingwe tse di kwadilweng fa tlase fa ka ntlha ya mokwatla wa gago. Tiro nngwe le nngwe e emetswe ke sekale sa 0 go ya go 5. Tswee-tswee tlhopha karabo e le nngwe boemong jwa tiro nngwe le nngwe (se tlole tiro e pe) mme o thale tshekeletsa go dikologa palo e e tsamaelanang le karabo ya gago.

	0. Ga go thata le e seng	1. Go thata go le go nnye	2. Go thata go se kae	3. Go thata go utlwala	4. Go thata mo go maswe	5. Ga a kgone go dira
1. Go tswa mo bolaong						
2. Go robala bosigo botlhe						
3. Go iphetola mo dikobong						
4. Fa ke palame koloi						
5. Go ema ka dinao metsotso e le 20-30						
6. Go nna mo setulong diura di le mmalwa						
7. Go tlhatloga ditepese						
8. Go tsamaya sekgalanyana (sa 300-400m)						
9. Go tsamaya dikilometara di se kae						
10. Go fitlhelela dillaiki tse di kwa godimo						
11. Go latlhela kgwele						
12. Go taboga sekgalanyana (sa 100m)						
13. Go ntsha dijo mo setsidifatsing						
14. Go alola bolao jwa gago						
15. Go rwala dikausu (dikausu tsa basadi)						
16. Go inama ke phepafatsa bata						
17. Go sutisa setilo						
18. Go goga kgotsa go kgarametsa mabati a a boima						
19. Go rwala dikgetse di le pedi tsa dijo tse di tswang go rekwa						
20. Go kuka le go rwala sutukheisi e kima						

Disability Rating Index (Tswana version)

Re rata go itse fa e le gore o ketefalelwa ke go diragatsa ditiro dingwe tse di kwadilweng fa tlase fa ka ntlha ya mokwatla wa gago. Bea mmaraka ka boleele mo mothalong o mo fatshe go supa bothloko jwa mokwatla wag ago gompieno. Ga o maraka ka mo lehlakoreng la molema la sekala, go supa gore ga o thata go dira ditiro tsa gago tsa letsatsi le letsatsi. Ga o maraka ka lehlakoreng la moja la sekala, go supa gore go thata go dira ditiro tsa gago tsa letsatsi le letsatsi.

Go apara (o sa thusiwe)

Ga go thata le e seng _____ Ga a kgone go dira

Go tsamaya

Ga go thata le e seng _____ Ga a kgone go dira

Go palama ditepisi

Ga go thata le e seng _____ Ga a kgone go dira

Go dula sebaka

Ga go thata le e seng _____ Ga a kgone go dira

Go inama mo sekotlolong sa gothlapa

Ga go thata le e seng _____ Ga a kgone go dira

Go kuka morwalo/ kgetse

Ga go thata le e seng _____ Ga a kgone go dira

Go alola

Ga go thata le e seng _____ Ga a kgone go dira

Go taboga

Ga go thata le e seng _____ Ga a kgone go dira

Tiro e e bonolo

Ga go thata le e seng _____ Ga a kgone go dira

Tiro e e boima

Ga go thata le e seng _____ Ga a kgone go dira

Go kuka morwalo o o boima

Ga go thata le e seng _____ Ga a kgone go dira

Go tsa karolo mo metshamekong

Ga go thata le e seng _____ Ga a kgone go dira

V.A.S (pain)

Bothloko jwa gag obo jwang gompieno? Bea mmaraka ka boleele mo mothalong o mo fatshe go supa bothloko jwa mokwatla wag ago gompieno.

Setlhabi sepe _____ Setlhabi se se tseneletseng

(O tlhabiwa ke setlabi)

Appendix C: Personal data questionnaire

Date / Letlha:

Name / Leina:

Age / Dingwaga:

Gender / Bong:

Education level / Thutego:

Appendix D: Copy of ethical clearance

Appendix E: Information sheet and consent form (English and Tswana)

Information sheet

Good Day,

I am Nicholas de Beer, a student at the University of the Witwatersrand currently studying for my Masters Degree in Physiotherapy. As part of my studies I am conducting research with the aim of translating and culturally adapting three questionnaires on the disability of low-back pain into Tswana. I need to test these questionnaires and I would be most grateful if you would consider participating in the research study.

Why am I doing this study?

The benefit of the Tswana versions of the three questionnaires is that it enables physiotherapists and researchers to more accurately assess the effectiveness of a certain type of low-back pain treatment when treating Tswana speaking patients.

What will I expect from participants in the study?

Each person will receive and complete a questionnaire booklet that contains Tswana versions of the Roland Morris Disability Questionnaire, the Quebec Disability Scale, the Waddell Disability Index, the Disability Rating Index as well as a Visual Analogue Scale (the latter will be used to assess pain). A Tswana speaking research assistant will be present to explain the study in Tswana and will read (not explain) each question of the Tswana version of the questionnaires from an overhead projector for those that can't read. The questionnaires will take approximately 25 minutes to complete.

Are there any benefits to the participants?

There are no direct benefits to you. Indirectly however, when treated for your back pain by a physiotherapist in your area, he or she will be able to more accurately assess whether the treatment is working for you and by doing so he or she will be able to adapt the treatment accordingly. All the physiotherapists (government and in private practice) in your area will be given the Tswana versions of the questionnaires to use.

What about confidentiality?

Confidentiality will be maintained on all questionnaire booklets by the use of numbers instead of participant names. Only the researcher will have access to the list containing names and numbers and this list will be kept in a secure place.

May I withdraw from the study?

Yes. The study is completely voluntary and you may do so at any time without having to provide a reason for withdrawing. You will not be disadvantaged in any way.

Should you have any questions, or need more information, please do not hesitate to contact me directly on my cell phone 084 583 0681.

If you are willing to participate in the study, please read and sign the attached consent form.

Thank you

_____

Nicholas de Beer

Consent form

I _____ hereby agree to participate in the study conducted by Nicholas de Beer as outlined in the information sheet.

_____ _____

Signed Date

Letlhare la tshedimosetso (Information sheet)

Dumela(ng),

Nna ke Nicholas de Beer, moithuti kwa yunibesithing ya Witwatersrand yo jaanong a ithutelang Gerata ya Masters ya dithuto tsa Kalafo ya dikgobalo le bogole (Physiotherapy). Jaaka karolo ya dithuto tsa me ke dira dipatlisiso ka maikaelelo a go fetolela dibukanapotso tse tharo tse di ka ga bogole jwa ditlhabi tsa botlase jwa mokwatla, go ya kwa puong le setsong sa Setswana. Ke batla go leka dibukanapotso tse mme ke tla leboga thata fa o ka nagana ka go tsaya karolo mo dipatlisisong.

Goreng ke dira dipatlisiso tse?

Dikungo tsa dibukanapotso tse tharo tse di mo Setswaneng ke gore di tla thusa dingaka tsa kalafo ya dikgobalo le bogole le babatlisisi go sekaseka ka manontlhotlho go thusa ga mofuta mongwe wa kalafo ya ditlhabi tsa botlase jwa mokwatla fa ba alafa balwetse ba ba buang Setswana.

Ke tla solofela eng mo go tseyeng karolo mo dipatlisisong?

Motho mongwe le mongwe o tla amogela le go tlatsa bukana e e nang le Bukanapotso ya Bogole ya Roland Morris, Sekale sa Bogole sa Quebec, Lenaane la Bogole la Waddell, Lenaane la Selekanyo sa Bogole le Sekale sa Tekatekanyo ya Pono (ya bofelo e tla dirisiwa go tlhatlhoba setlhabi). Mothusa-mmatlisisi yo o buang Setswana o tla nna teng go tlhalosa thuto mme o tla buisa (e seng go tlhalosa) potso nngwe le nngwe ya bukanapotso e e mo Setswaneng go tswa mo porojeketareng (sediriswa sa go godisa ditshwantsho kgotsa ditlhaka mo sesirong), boemong jwa batho ba ba sa kgoneng go buisa. Dibukanapotso di tla tsaya metsotso e ka nna 25 go di tlatsa.

A go na le meputso mengwe go batsaya karolo?

Ga go na meputso e e tla tlang kwa go wena ka tlhamalalo. Ka je lengwe, fa o alafelwa ditlhabi tsa mokwatla ke Ngaka ya Kalafo ya dikgobalo kgotsa bogole mo lefelong la lona, ene o tla kgona go tlhatlhoba gore a kalafo e a go thusa mme ka go dira jalo o tla kgona go fetola kalafo go ya ka se o. Dingaka tsotlhe tsa dikgobalo le bogole (tsa mmuso le tsa mafelo a poraefete mo lefelong la lona di tla newa dibukanapotso tse di mo Setswaneng go di dirisa.

Tshomarelo ya sephiri yona?

Khupamarama e tla somarelwa mo dibukang tsotlhe tsa dipotso ka tiriso ya dipalo boemong jwa maina a batsaya karolo. Ke mmatlisisi fela a tla kgonang go fitlhelela lenaane le le nang le maina le dipalo mme lenaane le le tla bewa mo lefelong le le bolokesegileng.

A nka ikgogela morago go tswa mo dipatlisisong?

Ee. Dipatlisiso tse ke tsa maithaopo ka botlalo mme o ka dira jalo ka nako nngwe le nngwe kwa ntle ga go naya lebaka la go ikgogela morago. O ka seka wa latlhegelwa ke sepe ka mokgwa ope.

Fa o ka nna le dipotso dingwe, kgotsa wa tlhoka tshedimosetso e nngwe, tswee-tswee o se ka wa okaoka go ikgolaganya le nna ka tlhamalalo mo mogaleng wa me wa letheka 084 583 0681.

Fa o batla go tsaya karolo mo dipatlisisong, ka kopo buisa o be o saene foromo e e tsentsweng fa ya tumelo.

Ke a leboga

_____

Nicholas de Beer

Consent form

Nna _____ ke dumela go tsaya karolo thutong e hlopiswang ke Nicholas de Beer jwalo ka ga go kwadilwe letlakaleng la tshedimosetso.

_____ _____

Signed Date

Appendix F: Letter of permission from hospital management

The ……. Hospital hereby grants Nicholas de Beer permission to conduct his research on the hospital premises.

We note that he has already obtained ethical clearance from the Human Research Ethics Committee.

The permission is granted subject to the following conditions:

1. That the hospital incurs no cost in the course of his research
2. That access to the staff and patients at the hospital will not interrupt the daily provision of services.
3. That prior to conducting the research he will liaise with the supervisors of the relevant sections to introduce himself (with this letter) and to make arrangements with them in a manner that is convenient to the sections.

_____ _____

Signed Date

Appendix G: Scatter diagrams of scores for the RMDQ, WDI and their association with the DRI

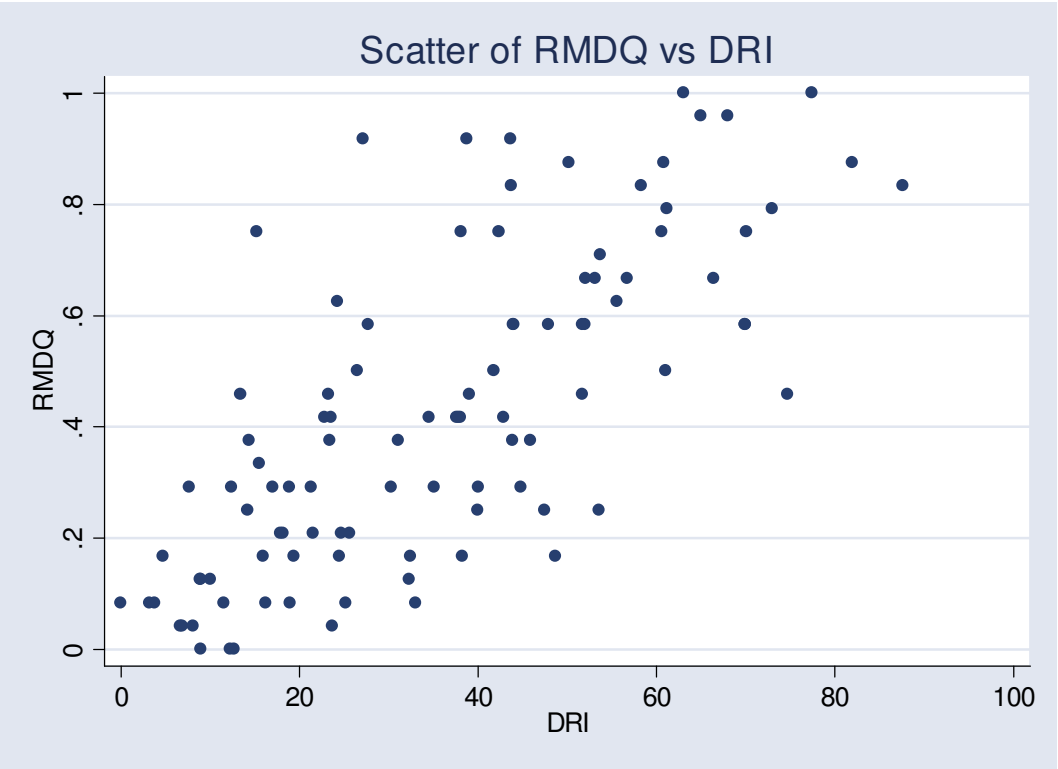

Figure A1 Scatter diagram of scores for the RMDQ and its association with the DRI

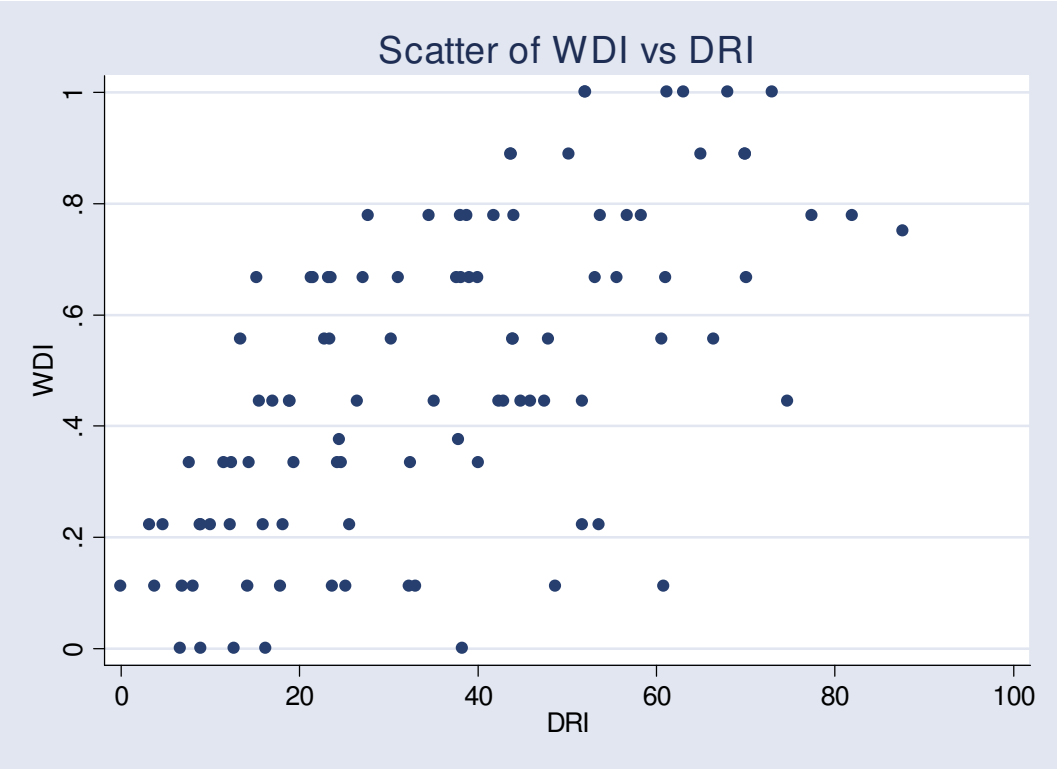

Figure A2 Scatter diagram of scores for the WDI and its association with the DRI

Appendix H: Scatter diagrams of scores for the RMDQ, QDS and their association with the VAS (pain)

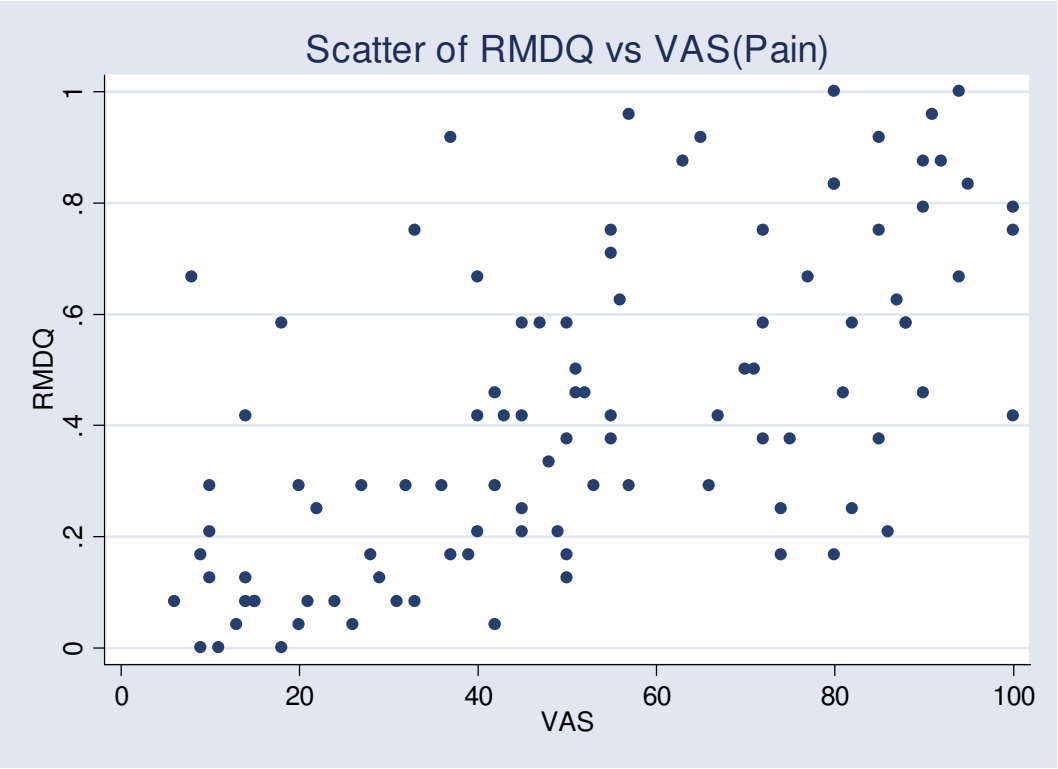

Figure A3 Scatter diagram of scores for the RMDQ and its association with the VAS (pain)

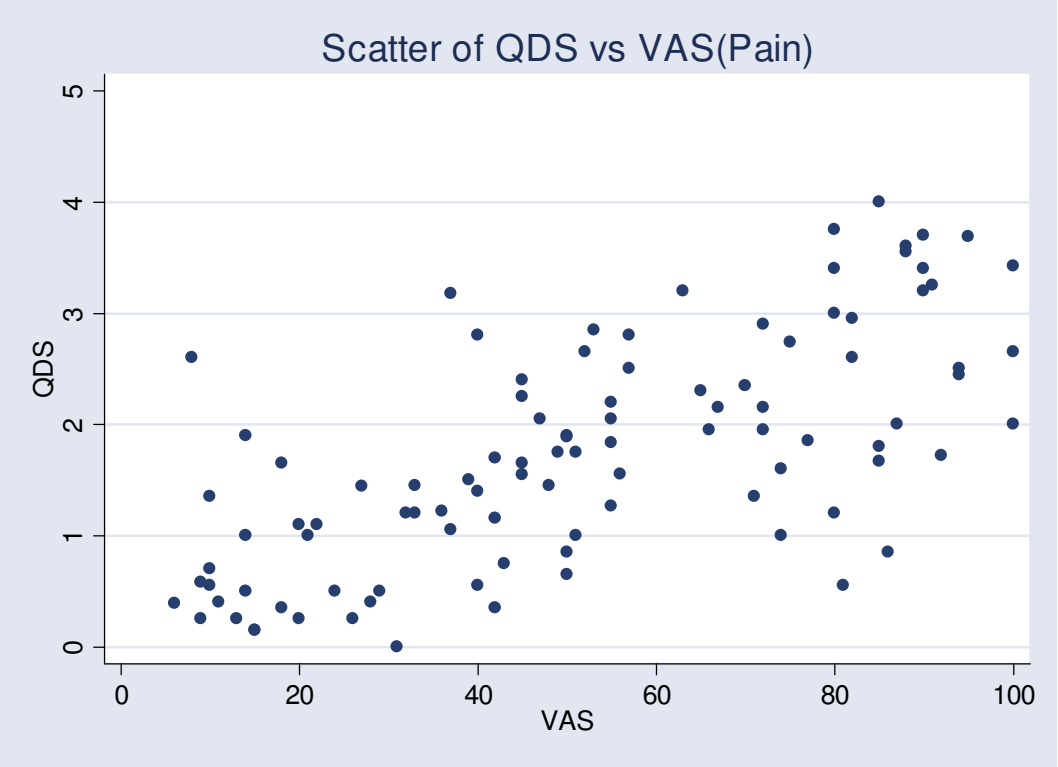

Figure A4 Scatter diagram of scores for the QDS and its association with the VAS (pain)

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