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A COMPARISON OF TWO SELF-REPORT METHODS
OF ASSESSING CHRONIC NON-MALIGNANT PAIN

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Thesis submitted as the requirement for the degree of
M.Phil. in Health Studies, Royal Free Hospital School of
Medicine, University of London.

June 1993

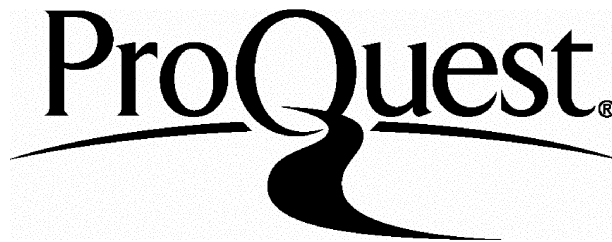
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Abstract

Two measures often used to assess a person's pain are: 1) the question 'where is your pain?' and 2) a pain drawing, where they shade the site(s) of their pain on a body outline. In this descriptive, cross-sectional study, responses to the pain question and the pain drawing are examined in a sample of 64 adults with chronic non-malignant pain. The influence of pain intensity, depression, anxiety and disability on the pain question and the pain drawing are evaluated. Using several scoring systems for the pain drawing and the pain question, data were obtained on the number of sites of pain, percentage of body surface area in pain and location of pain. Scoring the pain drawing and pain question was done by two raters. Results showed the inter-rater and test-retest reliability of the scoring systems was fair to good, with the more complex scoring systems being less reliable than the simpler scoring systems. Establishing the validity of the two measures proved to be difficult. However, patients responding to the pain question tended to report only one site of pain, whereas using the pain drawing, patients reported more sites of pain in different locations. These implications are discussed with regard to clinical use. The study only found moderately significant correlations between the number of sites of pain and the percentage of body surface area in pain against pain intensity and daily activities, such as work. No relationship was found between the number of

sites of pain and the percentage of body surface in pain, and anxiety and depression. The findings do not support the use of the pain question or the pain drawing as adequate measures of pain intensity, anxiety, depression or disability.

Acknowledgements

There are several people without whose assistance this thesis would not have been possible. Special thanks to Kate Seers and Theresa Marteau, my supervisors, who provided me with tremendous encouragement and support, enabling me to complete this work. I am especially grateful to Kate for her patience and guidance. Thanks are also due to all those in the Health Psychology Unit at the Royal Free Hospital School of Medicine and to Mike Walton, my husband.

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1.0 INTRODUCTION

Chronic non-malignant pain is a complex and subjective experience (McCaffery and Beebe, 1989). It can have a devastating affect on sufferers sometimes leading to depression, immobility or isolation from society (Fisher, Goldstein and Buongiorno, 1990). Health professionals have found these people difficult to treat, which has led to frustrations both in the sufferer and the professional carer. Therefore it is vital on first contact with these people to assess their pain carefully and attempt to understand their experience of pain in order to plan and implement effective and appropriate care (Harrison, 1991).

Many different measures of pain exist, but as Chapman, Casey, Dubner, Foley, Gracely and Reading (1985) caution:

"pain is a complex perceptual experience that can be quantified only indirectly." (p. 1)

McGuire (1984) identified three major problems with measurement of pain: the subjective nature of pain, a limited number of reliable and valid instruments that measure pain and a multiple of clinical issues such as type of pain, cause and patient sample characteristics. Turk (1989) adds that pain is not a single sensation, but a "complex integration of elements".

Despite these problems, efforts have been made to develop reliable and valid measures of pain (Chapman and Syrjala, 1990) and to correct the misconceptions that people, including health care professionals, hold which could hamper the assessment of a patient's pain (McCaffery et al, 1989). Chapman et al (1990) explored the difference between the assessment of acute and chronic pain. They concluded that the same technology can be applied to the measurement of either type of pain, but the goals of assessment and the interpretations of the measures are usually different. This study concentrates on patients with chronic non-malignant pain.

A variety of instruments have been developed to measure intensity of pain, but as Melzack (1983a) states:

"describing pain solely in terms of intensity is like specifying the visual world only in terms of light flux without regard to pattern, color, texture, and the many other dimensions of visual experience". (p. 2)

Recent research has tried to develop instruments, such as the pain drawing, to measure other aspects of pain, such as the extent of pain or the location of pain (Margolis, Tait and Krause, 1986; Toomey, Gover and Jones, 1983). Another measure of pain, the pain question, asking the patient where is their pain, is another way of assessing extent of pain and location of pain. Several scoring systems for quantifying the extent and location of pain

have been described in the literature (Margolis et al, 1986; Ransford, Cairns and Mooney, 1976; Schwartz and DeGood, 1983; Toomey et al, 1983), however only with using the pain drawing and not the pain question. Researchers have tried to correlate the extent of pain to other variables such as intensity of pain or depression for instance. However, controversy exists over what the pain drawing and certain scoring system are actually measuring (Karoly and Jensen, 1987).

1.1 PURPOSE

The current study aims to explore the relationship between the responses to the pain drawing and the pain question with regard to the number of sites of pain and the location of pain. It addresses the reliability and the validity of these measures to attempt to increase the understanding of pain assessment and measurement more generally. The study uses the Gate-Control theory of pain (Melzack and Wall, 1988) to support the responses given to the pain question and the pain drawing. The Gate-Control theory of pain attempts to explain the complex nature of pain and does not assume a one to one relationship between injury and pain. In addition, Loeser's (1982) model of pain is used to further support the multifactorial aspects of pain.

1.2 AIMS

The aims of the study are to:

- i) establish the relationship between the responses to the pain question and the responses to the pain drawing,
- ii) examine the relationship of these responses to the following outcome measures: the McGill Pain Questionnaire (Melzack, 1975), the Hospital Anxiety and Depression Scale (Zigmond and Snaith, 1983) and the Sickness Impact Profile (Bergner, Bobbit, Carter and Gilson, 1981),
- iii) determine the reliability and validity of the pain question and the pain drawing,
- iv) discuss the implications of the pain drawing and pain question in the management of chronic non-malignant pain.

1.3 DEFINITIONS

In the past three decades pain research has advanced rapidly and new developments emerge which contribute to a valuable knowledge of pain (Bonica, 1990a). This leads to new definitions and terms of pain, but a full understanding of pain has not yet been reached and many controversies and debates about various aspects of pain exist.

Below are several definitions of pain in general, definitions of specific types of pain, such as acute and chronic pain, and other terms frequently used in this study.

1.3.1 DEFINITION OF PAIN

Major difficulties are encountered in trying to define pain, because of it's complex nature (Bonica, 1990b).

The International Association for the Study of Pain (1979) defines pain as:

"An unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage". (p. 250)

In the note that follows they stress that pain is always subjective and that people can report pain in the absence of tissue damage. (See appendix A for complete note). Bonica (1990b) urges scientists and practitioners to accept universally this definition of pain.

Melzack and Wall (1988) argue that no satisfactory definition of pain exists, because the diversity of pain experiences are so great. They define pain as:

"A category of experiences, signifying a multitude of different, unique experiences having different causes, and characterized by different qualities varying along a number of sensory, affective and evaluative dimensions". (p. 46)

1.3.2 ACUTE PAIN

Bonica (1990b) defines acute pain as:

"Acute pain is a complex constellation of unpleasant sensory, perceptual, and emotional experiences and certain associated autonomic, psychologic, emotional, and behavioral responses". (p. 19)

He states that acute pain is rarely primarily due to psychopathology, but rather to noxious stimulation produced by injury and/or disease of skin, deep somatic structures or viscera, or abnormal function of muscles or viscera that does not produce actual tissue damage.

Melzack and Wall (1988) see the characteristics of acute pain as the combination of tissue damage, pain and anxiety. The pain makes the individual seek help to promote recovery and the anxiety assures the avoidance of further tissue damage and the best conditions for

treatment and recovery.

McCaffery and Beebe (1989) state acute pain subsides as healing takes place and therefore has a predictable end and it is of brief duration, at least less than 6 months.

1.3.3 CHRONIC PAIN

Bonica (1990b) defines chronic pain as:

"Pain that persists a month beyond the usual course of an acute disease or reasonable time for an injury to heal or that is associated with chronic pathologic process that causes continuous pain or the pain recurs at intervals for months or years". (p. 19)

Melzack and Wall (1988) add that the pain no longer plays a useful function and that it has become:

"a pain syndrome - a medical problem in its own right which requires urgent attention". (p. 36)

Controversy exists over exactly how to define chronic pain, because of the many types of chronic pain and the time period before pain becomes chronic. However, recently it is accepted that chronic pain rarely has a single cause, but instead a multiple of interacting causes and that it deserves different treatment and care to acute pain (Melzack and Wall, 1988).

1.3.4 PAIN DRAWING

The term "pain drawing" will be used frequently throughout this study. It is a measure of pain derived from a patient's drawing of their pain on a body outline. Some measures entail both a front and back view of the body. Appendix B shows the body outline used in this study with instructions above the body outline. For the purpose of clarity, the term "pain drawing" is used throughout this thesis, rather than the body outline.

1.3.5 PAIN QUESTION

The term "the pain question" represents the question "where is your pain?". The patients gives a verbal response which is recorded verbatim on an interview sheet. The term "pain question" will be used throughout the thesis to represent this measure.

1.3.6 RELIABILITY

An ideal measure must be reliable and valid. In the present study, the definition for reliability is taken from Williams (1988) who states a reliable measure has:

"the property of yielding consistent results under varying circumstances". (p. 240)

1.3.7 VALIDITY

Validity is linked to reliability, in that a measure that is unreliable cannot be valid. The definition of validity adopted by the study says:

"the degree to which an instrument measures what it is supposed to be measuring" (Polit and Hungler, 1987; p. 374-75).

1.3.8 PATIENT

Patient refers to the person who agreed to take part in the study and completed the pain drawing, pain question and other questions and questionnaires in the interview.

1.3.9 AUTHOR/RESEARCHER

The author of the study is a research nurse. She is referred to as the author throughout the thesis. The author completed the data collection together with another researcher, referred to as the researcher in this dissertation. This study is part of a larger study conducted during the same period.

2.0 LITERATURE REVIEW

The literature review addresses several aspects of pain, including pain assessment. Firstly, theories and models of pain are explored. Secondly, the difference between acute and chronic pain is described and some of the factors linked to chronic pain are examined. Thirdly, assessment and measurement of pain is looked at and finally, different scoring systems for the pain drawing and the pain question are described in detail.

2.1 THEORIES OF PAIN

Pain is a complex phenomenon and many different theoretical models of pain exist. They are not mutually exclusive and all provide some understanding of the complexity of pain. Some of the more common theories are described below.

2.1.1 SPECIFICITY THEORY

The specificity theory of pain, sometimes known as the "traditional theory" (Melzack and Wall, 1988) was first explained by Descartes (1664). He proposed the pain system was a straight through channel from the skin to the brain. VonFrey (1895) expanded this theory and other studies that had developed the idea of Descartes. VonFrey (1895) proposed that a number of specific pain receptors in the body tissue exist which project messages to a pain

centre in the brain. He developed the concept of a single sense of touch to four major cutaneous modalities: touch, warmth, cold and pain. Each receptor has its own specific nerve endings with presumably its own special projection system to the brain centre.

Other researchers dealt with the spinal cord, specific pathways and the pain centre. The spinothalamic tract which ascends in the anterolateral cord became known as the pain pathway. The location of the pain centre is still unknown amongst specificity theorists but it is held by some that the thalamus contains the pain centre and the cortex is assumed to exert inhibitory control over it.

This theory has been disputed by a number of scientists. Melzack and Wall (1965) felt its strength lay in the physiological specialisation, but its weakness lay in the assumption that sensation is achieved via a fixed direct-line communication system from the skin to the brain. Surgical lesions of the peripheral and central nervous system have been unsuccessful in abolishing pain permanently and the pain originating from phantom limb pain or from causalgias are all examples that contradict the specificity theory of pain.

2.1.2 PATTERN THEORY

Goldscheider (1894) was the first to propose that stimulus intensity and control summation are the critical determinants of pain. This theory, also known as the summation theory, holds that every sensory stimulus is capable of producing pain if it reaches a sufficient intensity. It denies the existences of specialised receptors or central neurons. It suggests that the particular patterns of nerve impulses that evoke pain are produced by the summation of skin sensory input at the dorsal horn cells. According to this concept, pain results when the total output of cells exceeds a critical level as a result of either excessive stimulation of receptors that are normally fired by non-noxious thermal or tactile stimulation, or of pathological conditions that enhance the summation of impulses produced normally by non-noxious stimuli.

In summary, pain is seen to travel along ordinary sensory stimuli routes, rather than along specific pathways. The pattern for pain is produced by intense stimulation of non-specific receptors.

All pattern theories recognise the concept of patterning of the input, however they ignore the physiological evidence that shows a high degree of receptor fibre specialisation (Bonica, 1990c).

2.1.3 AFFECT THEORY

The affect theory, dating back to Aristotle, considers pain as an emotion, the opposite to pleasure, rather than a sensation (Melzack and Wall, 1988). It is believed that the effects of pain take place in the heart. But the development in sensory physiology and psychophysiology during the 20th century neglected the role of the affective and the motivational processes involved in pain. However, recently it is "recognized that every physiological explanation of pain contains an implicit psychological concept" (Melzack and Dennis, 1978).

These theories all contain valuable concepts regarding the understanding of pain, yet they do not explain the whole picture. Another theory that has drawn on all these theories, incorporates the known facts about the nervous system, provides a plausible explanation for clinical pains, and stimulated experiments to test the theory, is the Gate-Control Theory proposed by Melzack and Wall (1965).

2.1.4 GATE-CONTROL THEORY

Melzack and Wall (1965) proposed that nerve impulses stimulated in the periphery are transmitted to three systems: the cells of the substantia gelatinosa in the dorsal horn, the dorsal-column fibres that project towards the brain and the first transmission (T) cells in

the dorsal horn. They proposed that:

1) The substantia gelatinosa functions as the gate control system, which modulates the transmission of nerve impulses from the afferent fibres to the spinal cord T cells.

2) The substantia gelatinosa is influenced by the activity in the small diameter fibres (A delta and C fibres, which transmit pain or open the gate) and activity in large diameter (A beta fibres, concerned with transmitting touch or closing the gate).

3) The gate mechanism is influenced by descending nerve impulses from the brain, including those concerned with motivational and cognitive processes.

4) A specialised system of large-diameter rapidly conducting fibres, known as the "central control trigger", can activate certain cognitive processes, which makes it possible for the brain to identify the location and nature of the stimulus and then selectively modulate the sensory input before the action system is activated.

5) When the output of the T cells exceeds a critical level, it triggers a sequence of responses by the action system, the complex sequential pattern of behavioural and experience characteristics of pain.

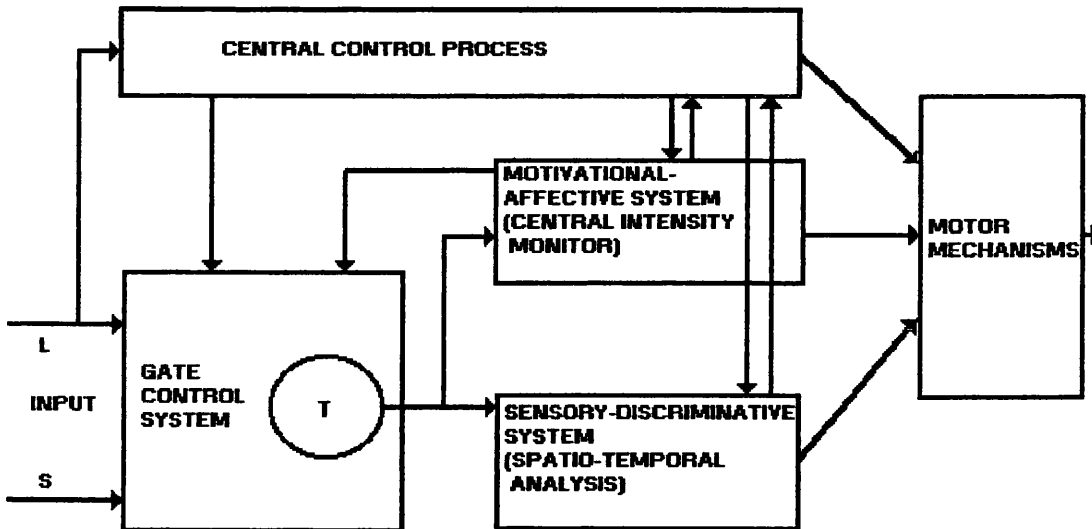
Melzack and Casey (1968) further developed the theory to involve the interaction of the neospinothalamic and paleospinothalamic projecting systems and the neocortical processes. They proposed that:

1) The selection and modulation of the sensory input through the neospinothalamic projection system provides, in part at least, sensory-discriminative information about location, intensity and duration of the stimulus.

2) Activation of the reticular and limbic structures, from impulses that pass through the paleospinothalamic tract and the paramedial ascending system, underlie the powerful motivational and aversive drive and unpleasant affect that triggers the organism into action.

3) Neocortical higher central nervous system processes, such as evaluation of the input in terms of past experiences, exert control over activity in both the discriminative and motivational systems.

FIGURE 1. CONCEPTUAL MODEL OF THE SENSORY, MOTIVATIONAL AND CENTRAL CONTROL DETERMINANTS OF PAIN. (FROM MELZACK AND CASEY, 1968)



In figure 1. Melzack and Casey (1968) outline the gate-control theory. The output of the T cells of the gate-control system projects to the sensory-discriminative system (via neospinothalamic fibres) and the motivational-affective system (via the paramedial ascending system). The central control trigger (comprising the dorsal column and dorsolateral projection systems) is represented by a line running from the large fibre system to the central control processes. These, in turn, project back to the gate-control system, and to the sensory-discriminative and motivational-affective systems. All three systems interact with one another, and project to the motor system.

To summarise, Melzack and Wall (1965) and Melzack Casey (1968) in their theoretical model of pain have highlighted that pain is not a single sensation, but that it has many dimensions including sensory, affective and evaluative. McCaffery and Beebe (1989) pointed out that the Gate-Control theory is:

"an integrated conceptual model for appreciating the many factors that contribute to individual differences in the experience of pain". (p. 36)

2.2 PAIN MODELS

During the past quarter of a century there has been an increase in literature on chronic pain, a pain which occurs in the absence of any obvious physical damage (Bonica, 1990a). This has partly led to other theoretical and conceptual models of pain. Certain behavioural and cognitive theories have been incorporated to the pain situation, furthering understanding of the multi-dimensional nature of pain and the critical role of motivational, affective and environmental factors in determining the behaviour of many chronic pain patients (Bonica and Loeser, 1990). Some of the more common and known models are described below.

Loeser (1982) conceptualised pain as having four components.

**FIGURE 2. CONCEPTUAL APPROACH TO THE COMPONENTS OF PAIN.
(TAKEN FROM LOESER, 1982)**

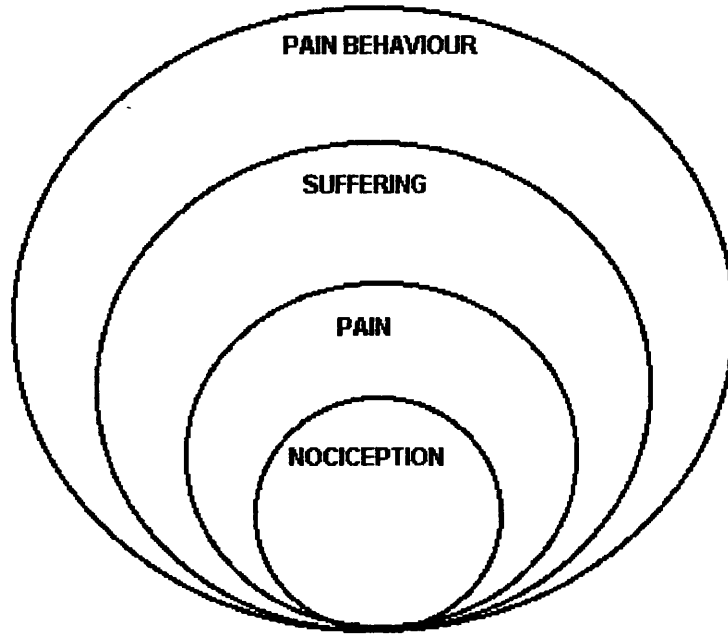


Figure 2. shows Loeser's (1982) concept of pain. The first circle represents nociception, "the potentially tissue-damaging thermal, mechanical or chemical energy impinging upon specialised nerve endings of A delta and C fibres". The second circle represents pain, which is the human perception of the noxious stimulus dependent on events in the nervous system. The third circle is suffering or a negative affective response generated in higher brain centres. Suffering can also be due to depression, fear, anxiety or feelings of isolation. Finally pain behaviour in the outer circle are the things a person says, does or does not do which imply to an external observer that tissue damage has occurred. They

include such things as taking medicine, talking about pain, seeing a doctor, lying down.

Loeser (1982) stressed that the first three terms are always personal, private events, whereas only pain behaviour can be observed and quantified by independent observers. The associations between the circles are not straightforward. Loeser stated that nociception can occur without the experience of pain or noxious stimulus and pain do not necessarily result in suffering. However to display pain behaviour, a person usually needs to experience suffering, pain and nociception.

Fordyce (1978) together with behavioural theory first introduced by Skinner (1953) used the concepts of respondents and operants. A respondent is where behaviour is said to occur in response to the antecedent stimulus. The response is automatic and reflexive and generally involves glandular and smooth muscle actions (Fordyce, 1978; Fordyce, 1990). An operant typically involves striated or voluntary musculature (Fordyce, 1978). An operant when elicited acts on the environment, that is it is likely to have effects on the environment. If the effects are reinforcement, it is likely to be repeated when cues occur that are present when the behaviour was previously elicited (Fordyce, 1990). Fordyce (1978) stated that initially pain behaviour is virtually all respondent in character. However, when a pain problem persists, there is a risk that contingent reinforcement

will influence and a problem of operant pain may evolve. This is especially true where pain persists over a long period of time.

Weisenberg (1989) reviewed a number of cognitive theories and described how they are relevant to pain. Ciccone and Grzesiak (1984) believe that cognitive error or mistaken inferences, such as awfulising, low frustration tolerance or external locus of control, are the primary causes of chronic pain. Weisenberg (1989) and Ciccone et al (1984) see the behavioural view of pain as too pragmatic and feel it pays insufficient concern to the underlying causal assumptions. They do, however, see the value of behavioural treatment as a means of correcting the cognitive error, in order for the patient to develop a new set of convictions about pain.

2.3 ACUTE VERSUS CHRONIC PAIN

As already reviewed in section 1.4.2 and 1.4.3, pain can be classified into two distinctive groups, acute or chronic pain (Melzack et al, 1988; Sternbach, 1987). A further distinction can be made in chronic pain into either chronic malignant pain (that is cancer pain), or chronic non-malignant pain such as intractable back pain (McCaffery and Beebe, 1989).

Sternbach (1989) reviewed the differences between these pains. Acute pain serves as a warning to impending tissue

damage or the need for convalescent rest. However chronic pain has no clear biological function. The physiological effects on acute pain show a dramatic sympatheticoadrenal reaction, whereas in chronic pain there is a habituation of the sympathetic response and an emergence of vegetative signs such as tiredness, irritability and decrease in motor activity. Anxiety is usually associated with acute pain and depression is linked to chronic pain. People with chronic pain sometimes take on the sick role, where they become increasingly housebound. Behaviours seen in the person with chronic pain are decreased activity levels, polypharmacy, polysurgery, a reduction in income levels and disruption in family relationships. Sternbach (1987) describes chronic pain as a syndrome:

"composed of a number of physical, emotional and behavioural changes that can convert otherwise healthy persons into invalids". (p. 31)

Sternbach (1989) emphasizes that the person with cancer tends to function better than the person with chronic non-malignant pain. He states:

"perhaps the knowledge of the fatal nature of the disease makes this group's responses different from the others". (p. 245)

2.4 LINKS WITH CHRONIC ILLNESS

People with chronic illness face a triple problem (Asvall, 1992). These are loss of basic function, secondary consequences of the predicament as regards the ability of the individual to function as socially and economically productive member of society and the negative impact of the situation with regard to self esteem, hope and drive of the individual. Pott (1992) adds that treatment aimed at acute illness are still used for the treatment of chronic illness and the belief is to cure a patient rather than to get the individual to accept that they are likely to live with a chronic illness for the rest of their life. Fisher, Goldstein and Buongiorno (1990) see chronic pain as:

"a syndrome or process of decompensation that shares all of the properties of any chronic illness, disease, or syndrome". (p. 191)

People with chronic pain suffer from lack of sleep, family disruption, depression and other psychological and physical disturbances and are often dependent on the health service (Sternbach, 1987; Williams, 1988).

2.4.1 ANXIETY AND DEPRESSION

As already discussed, people with pain can suffer from depression and/or anxiety. Craig (1989) observes that

the most common emotional attributes of pain are anxiety, fear and depression. However, controversy exists on the cause and effect relationship between the psychological factors and pain (Turner and Romano, 1990). Craig (1989) believes that emotional distress does not only serve as a component of pain but also as a consequence of pain, a cause of pain and as a concurrent problem with independent sources. He recommends to conceptualise "both pain and emotion as multidimensional processes with reciprocal dependence on each other".

In chronic non-malignant pain, depression is a common factor and different studies show that between 22 to 78% of people presenting with chronic pain suffer from clinical depression (Ward, 1990). Anxiety is usually linked to acute pain by common autonomic signs (Sternbach, 1989), however increased occupation with the symptom of pain and speculation about the cause of the pain can increase anxiety in the person with chronic non-malignant pain despite reassurance from health professionals (Sternbach, 1989).

Turner and Romano (1990) stress the usefulness of evaluation of psychological factors and outline the important components of a comprehensive assessment, because as Sternbach (1978) states the patient's emotional responses to pain can diminish or potentiate pain severity.

There are a number of instruments that evaluate depression and/or anxiety, however below only the Hospital Anxiety and Depression Scale is cited (Zigmond and Snaith, 1983).

2.4.1.1 HOSPITAL ANXIETY AND DEPRESSION SCALE

The outcome measure, the Hospital Anxiety and Depression Scale (HAD), is designed by Zigmond and Snaith (1983). It is a self assessment measure specifically designed to screen patients for anxiety and depression in a hospital medical outpatient department. There are 7 anxiety and 7 depression items each with the possibility of 4 responses. The responses can range between 1 and 4. There are three score ranges, the same for anxiety and depression, that is 7 or less for patients with no mood disorder or non cases, 8 to 10 for patients with possible mood disorder or doubtful cases and scores of 11 or above for definite cases or for patients either suffering from anxiety or depression or both. Zigmond and Snaith (1983) avoided using physical symptoms of depression and anxiety and based the items solely on the psychic symptoms of neurosis. They chose to base the depression scale on largely anhedonic states or the loss of the pleasure response since this is probably the central feature of depression. Also they tried to achieve maximum separation between the concepts of anxiety and depression so that two different mood disorders can be identified. (See appendix C, for full scale).

a) Reliability:

Zigmond and Snaith (1983) tested the internal consistency of the two subscales of anxiety and depression by calculating a Spearman's correlation between each item and the total score of the remaining items in the subscale. They only found one weak item in the depression subscale. They removed the item and in order to keep the balance between the number of depression and anxiety items removed the weakest anxiety items. This left 7 items in each subscale. The correlations for the anxiety items ranged from +0.41 to +0.76 and the significance of all these was $P < 0.01$. The depression items had correlations ranging from +0.30 to +0.60 all significant beyond $P < 0.02$.

Jack, Walker, Morley, Hanks and Finlay-Mills (1987) calculated the overall internal reliability of the anxiety and depression subscales by using a Cronbach's α . For the anxiety subscale it was 0.82 and for the depression subscale it was 0.81 ($P < 0.01$).

To test the reliability of the scoring system with the ranges described above, Zigmond and Snaith (1983) used the independent psychiatric assessment and considered various possible scores on the subscales in order to determine which would give the best separation between the cases, doubtful cases and the non-cases. They used the first 50 patients and then repeated this process on

the next 50 patients. The results were similar however no reliability figures were mentioned. Combining the data for the total 100 patients they found that with the depression scale there was one false positive and one false negative and for the anxiety scale there were 5 false positives and one false negative.

b) Validity:

Zigmond and Snaith (1983) tried to determine whether the scores of the subscales could be used as indications of the severity of depression and anxiety. Using Spearman's correlations the subscale scores and the psychiatric ratings were calculated. For depression the correlation was 0.70 and for anxiety it was 0.74. Both figures were significant ($P < 0.001$).

They examined whether the subscales actually differentiated between different aspects of mood disorder since they commented that many people suffer from similar degrees of both anxiety and depression. They selected a sample of patients in whom there was a distinct difference between the psychiatric assessments of the severity of anxiety and depression. There were only 17 patients in this sample. The interviewers' assessments correlated significantly with the appropriate mood disorder and non-significantly with the contrary disorders. The anxiety rating was +0.54 ($P < 0.05$) and the depression rating was +0.79 ($P < 0.01$).

Aylard, Gooding, McKenna and Snaith (1987) looked at concurrent validity of the HAD with the Montgomery-Asberg Depression Rating Scale (Montgomery and Asberg, 1979) and the Clinical Anxiety Scale (Snaith, Baugh, Claydon, Husain and Sipple, 1982). The data for the patients who had anxiety or depression according to the Montgomery-Asberg Depression Rating Scale or the Clinical Anxiety Scale were extracted. Using a Spearman's Rho, this subsample correlated with the depression subscale of the HAD at $r = +0.77$ ($P < 0.01$) and the anxiety subscale, $r = +0.67$ ($P < 0.01$).

Moorey, Greer, Watson, Gorman, Rowden, Tunmore, Robertson and Bliss (1991) used factor analysis to establish whether the subscales of anxiety and depression in the HAD could be used separately as a bidimensional scale. Their sample consisted of 568 patients with cancer. Two factors emerged and using an oblique rotation all items on the HAD loaded appropriately except the item "I can sit at ease and feel relaxed". The correlation between the two factors was 0.50, which suggests that depression and anxiety are not entirely dependent. Further analysis of the separate subscales produced unidimensional solutions.

c) Limitations:

Most of the studies have been conducted on samples of people with conditions other than chronic non-malignant

pain. Huston (1987) and Jack et al (1987) found in their research with people with chronic pain that the depression item "I feel as if I am slowed down" and the anxiety item "I can sit at ease and feel relaxed" and "I feel restless as if I have to be on the move" may be interpreted as a physical symptom. Huston (1987) recommends further research to look at reliability, validity of the measure and with other populations especially with chronic non-malignant pain patients, whereas Moorey et al (1991) feel more research is needed to establish how the HAD changes in response to treatment and over time.

2.4.2 DISABILITY

Bonica (1990d) estimates that between 20 to 30% of the American population has a chronic painful condition and of these 50 to 60% are partially or totally disabled for weeks, months or permanently. Brena and Meacham (1990) describe the effect that chronic pain can have on an individual. Disability does not only affect the physical state of an individual, like loss of mobility or sleep disturbance, but also the economic, psychological and social aspects of that individual (Bonica, 1990d; Brena et al, 1990). Chapman and Syrjala (1990) recognise in the comprehensive assessment of a person with chronic pain, disability needs to be measured. A measure they recommend is the Sickness Impact Profile, described below.

2.4.2.1 SICKNESS IMPACT PROFILE

The Sickness Impact Profile (SIP) measures health status by assessing the impact of sickness on daily activities and behaviour. It was designed by Bergner, Bobbit, Carter and Gilson (1981). It contains 136 statements about health related dysfunction in twelve different areas of activity. It can either be interviewer or self administered. Scoring the SIP yields measures for each of the 12 categories, three of the categories may be combined into a physical dimension and four into a psychosocial dimension. An overall SIP score can also be obtained.

a) Reliability:

Reliability was investigated and the researchers found that both reproducibility and internal consistency scored highly. Test-retest reliability was 0.92 and the internal consistency was 0.94 (Pollard, Bobbitt, Bergner and Gilson, 1976). They also found that the interviewer administered and the interviewer delivered self administered were more reliable compared to the mail delivered self administered which had an internal consistency of 0.81.

b) Validity:

The validity of the SIP was investigated by Bergner et al (1981) using several methods. Concurrent validity was tested by comparing the relationship between the SIP, subjects' and clinicians' assessments of dysfunction and sickness and other instruments such as the Activities of Daily Living Index and National Health Interview Survey. The highest correlation found was between the SIP and the subjects self assessment of dysfunction which was 0.69.

The construct validity was assessed using the multitrait multimethod technique and a multiple regression analysis was undertaken to confirm the data produced by the multitrait multimethod analysis. The authors concluded that the SIP was an adequately valid measure of dysfunction and sickness.

c) Limitations:

The reliability results are good and the validity is satisfactory. It remains to be seen whether it can assess any sickness and not be restricted to certain types of patients with certain pathologies. One criticism is that it is time consuming taking between 20 to 30 minutes to complete.

2.4.2.2 MODIFIED SICKNESS IMPACT PROFILE

For the purpose of this study, a shortened version of the SIP was used which was described by Watt-Watson and Graydon (1989). They used six categories: sleep-rest, emotional behaviour, home management, social interaction, work, and recreation-pastimes. They chose these six categories based on the researchers experience. They were able to obtain the percentage score for both the individual score and an overall score. (See appendix D for modified SIP).

a) Reliability and Validity:

Bergner et al (1981) showed that using categories separately was reliable and valid.

b) Limitations:

Using the shortened SIP needs to be assessed more carefully using different populations and larger sample sizes since in Watt-Watson and Graydon study (1989) there were only 34 subjects. No other studies could be found that had used this shorten form of the SIP, despite advantage of making the questionnaire shorter and thus quicker to complete.

2.4.3 OTHER FACTORS

Mendelson (1991) reviews a multiple of psychological and social factors that affect the person with chronic pain. These factors are age, gender, marital status, education level, employment, compensation status, intelligence, perceived locus of control and depression. This stresses that chronic pain is complex and that effective therapy requires the use of a multimodal approach, which is intended not only to reduce or remove the cause of the pain, but also to achieve physical, psychological, and psychosocial rehabilitation of the patient and the family (Bonica, 1990d). The next section discusses the assessment and management of chronic pain in some more detail.

2.5 MANAGEMENT OF CHRONIC NON-MALIGNANT PAIN

Medical and pharmacological interventions with people with chronic non-malignant pain have often failed (Seemann, 1992) and in the recent decades more psychological approaches and complementary treatments have been applied (DeGood, 1983). However as Karoly and Jensen (1987) state:

"chronic pain remains, for many clinicians, a matter of temporally extended acute pain, with a pro forma recognition that, if a person hurts for a long time there are inevitably emotional and vocational consequences". (p. 1)

Nevertheless many researchers and clinicians have come to realise that chronic non-malignant pain is an entity in itself which requires a different understanding of pain as compared to acute pain (Margoless, 1983; Philips, 1988; Sternbach, 1987). Bonica (1990d) states:

"pain is no longer considered exclusively as a neurophysiologic or a psychologic phenomenon. Such a rigid dichotomy, inherent in the Cartesian concept, is obsolete because pain is now recognized as a multidimensional process".
(p. 190)

Both the assessment, management and evaluation of care of people with chronic non-malignant pain needs to be approached with a clear understanding of the complexity of pain and that it can affect the patient in many different ways.

This has led to a growing interest in using a multidisciplinary approach in the management of chronic non-malignant pain utilising both traditional and complementary methods of treatment (Sternbach, 1987; Williams, 1988). Pain assessment and measurement have also interested researchers (Melzack, 1983b), however according to Chapman, Casey, Dubner, Foley, Gracely and Reading (1985) progress has been slow because pain is a complex and subjective experience and therefore difficult to measure.

2.6 ASSESSMENT AND MEASUREMENT

Pain assessment in both the clinical setting and treatment outcome research can be categorised into three main types of measurement: 1) physiological, 2) behavioural or observation of behaviour and 3) self report types of measurements (Beyer and Wells, 1989; Karoly and Jensen, 1987). Although a degree of overlap between these measurements exists, they form three distinct classes of assessment (Chapman et al, 1985; Turk, 1989). Some clinicians and researchers feel that all three types of measurement are required for a comprehensive assessment of a person's chronic non-malignant pain (Chapman et al, 1985; Turk, 1989), whereas others feel that one of the classes of measurement is sufficient in assessing different types of pain (Kremer and Block, 1981).

2.6.1 RELIABILITY AND VALIDITY OF MEASURES

In discussions about which method of measurement to use, researchers have argued over the reliability and validity of the specific tools being used. In the introduction, definitions of reliability and validity were reported and the difficulty of measuring pain was briefly outlined. Since pain is a subjective multidimensional experience it is impossible to measure pain directly and objectively (Turk, 1989; Williams, 1988). There are many factors involved in the person experiencing pain and Kent and

Dalgleish (1986) add:

"pain is a private experience, one that cannot be seen or felt by anyone other than the individual involved. People vary in their willingness to express pain as well as in their sensitivity to it". (p. 257)

2.6.2 PHYSIOLOGICAL MEASUREMENT

Assumptions about physiological measures being objective, such as heart rate, electromyography, respiration rate, have sometimes led to the false conclusion that these measures are more valid (Williams, 1988). As Williams (1988) points out:

"a well-controlled laboratory experiment, by superimposing contrived conditions and procedures on the subject, can produce indirect measures".
(p. 240)

This, therefore, can reduce the validity of what is actually being measured. Bradley and Lindblom (1989) reviewed several studies using physiological measures and concluded that there was no convincing evidence in the literature that a single physiological measure could serve as a reliable marker in the chronic pain experience. Turk (1989) adds that physiological markers are related to the sensory aspect of pain and that there are more appropriate in acute pain where rapid fluctuation of autonomic responses are expected. The

concerns in chronic pain would not be on these rapid fluctuations, but on long term changes in daily activities, such as work or leisure.

2.6.3 BEHAVIOURAL MEASUREMENT

Behavioural methods "do not quantify pain directly" (Chapman et al, 1985) and as Fordyce (1983) states:

"in clinical pain, one cannot measure 'pain'. One can only measure pain behavior or analogues thereof". (p. 152)

Keefe (1989) gives a comprehensive overview of behavioural methods for assessing pain, especially observation. He points out that the major advantage of behavioural observation is it provides a direct sample of behaviour, which is reliable and objective. However, some of the criticism of behavioural methods, especially direct observation, are that they only measure the frequency of certain limited behaviours in an environment, such as a health care setting (Keefe, 1989). Bradley et al (1989) add that many of the behaviours observed differ greatly according to the chronic pain syndrome and Fordyce (1983) stresses some of the ethical limitations in observing patients in a secretive manner.

2.6.4 SELF-REPORT

Self report measures are frequently used both in treatment outcome research and clinically (Chapman et al, 1985; Cleeland, 1989). They are not without criticism, as Turk (1989) states:

"unidimensional scaling, even sensitivity/magnitude and unpleasantness, may oversimplify and inadequately represent the complex subjective experience of pain". (p. 276)

However, McCaffery's definition of pain states:

"pain is whatever the experiencing person says it is and exists whenever he says it does" (McCaffery and Beebe, 1989, p.7)

This statement is crucial to the argument over the use of self report measures. It is about believing what the person in pain says about their pain and using that information to carefully assess their pain. As McCaffery et (1989) point out it is the professional responsibility to accept the patient's report of pain and act accordingly to help that patient. Both McCaffery et al (1989) and Cleeland (1989) discuss the difficulty in accepting this approach to pain, because of concerns that the patient is seeking attention, malingering or trying to gain compensation, for instance.

2.7 MEASUREMENT OF PAIN USING SELF-REPORT

There are several measures of pain sensation, however as already mentioned a major difficulty is the subjective nature of pain (Harrison, 1991). Below are a list of some quantifiable measures commonly used. There are three unidimensional self-rating scales and one self-report multidimensional questionnaire.

2.7.1 VERBAL RATING SCALE

The Verbal Rating Scale (VRS), first described by Keele (1948) is a list of adjectives that describe different levels of intensity such as mild or moderate. The patient is asked to consider the words and choose the best adjective which describes their pain. The words are usually ranked in order of intensity, that is, the lowest intensity word, for example no pain, has a score of one and the highest intensity word, such as excruciating, has a score of 5. There are several different VRS with different adjectives and ranging from 4 words scales to 15 words scales (Karoly et al, 1987). (See Appendix E for different Verbal Rating Scales)

2.7.2 VISUAL ANALOGUE SCALE

The Visual Analogue Scale (VAS) for pain was described by Huskisson (1974) and consists of a straight line, usually 10 cms long, the ends of which are defined as the extreme

limits of the sensation or response to be measured. For example, one end may be defined as pain as bad as it could be. To quantify the pain, patients are asked to make mark across the line at the point that best indicates the degree of severity. The distance from the no pain end to the mark defines the patient's pain intensity score. Scott and Huskisson (1976) found that the Visual Analogue Scale was more sensitive than the Verbal Rating Scale, but Kremer, Atkinson and Ignelzi (1981) found that older people had more difficulty in completing the Visual Analogue Scale. Karoly and Jensen (1986) found that photocopying the Visual Analogue Scale can change the length of the 10 cm line giving an inaccurate distance from the no pain to the mark, therefore making the scale unreliable. (See Appendix F)

2.7.3 NUMERICAL RATING SCALE

The Numerical Rating Scale (NRS) involves asking patients to rate their pain from 0 to 10 or 0 to 100, with 0 representing no pain and 10 or 100 representing pain as excruciating pain (Karoly et al, 1987). The number the patient gives, represents the pain intensity measure for that patient. Karoly et al (1986) recommend this unidimensional scale because it can be administered either in written or verbal form. It only requires one step, the patient needs to give a number which is the raw score, unlike the Visual Analogue Scale which requires two steps to score. It has a 101 response

categories, which is more acceptable than the limited response options with the Verbal Rating Scale. It has no worse incorrect response rate than other scales and is not associated with age.

2.7.4 MCGILL PAIN QUESTIONNAIRE

The McGill Pain Questionnaire is a self report measure used by patients to describe their subjective pain experience and was designed by Melzack and Torgerson (1971). The questionnaire (Melzack, 1975) consists of 78 adjectives divided into 20 groups which fall into 4 categories: sensory, affective, evaluative and miscellaneous. Three main types of data can be obtained from the questionnaire. Firstly, the Pain Rating Index (PRI) based on the summed rank values of the words chosen. A total score and a score for each category is obtained. Secondly, there is the total Number of Words Chosen (NWC) and thirdly, the Present Pain Intensity (PPI) a number-word combination chosen as the indicator of overall pain intensity at the time of administration of the questionnaire.

The questionnaire also contains a body outline and a list of accompanying symptoms and scales on sleep, food intake and activity (See Appendix G).

a) Reliability:

Few studies have evaluated the reliability of the McGill Pain Questionnaire (MPQ). Melzack (1975) found in preliminary studies that allowing a patient to fill out the questionnaire themselves was sometimes unreliable. Therefore careful administration is crucial to ensure the patient chooses no more than one word in every group of words, that they describe their pain at that moment in time.

Melzack (1975) asked 10 patients to complete the MPQ three times at intervals ranging from 3 to 7 days. The patients reported the same PPI level. The consistency of choice of subclasses among the 3 questionnaires ranged from 50 to 100% with a mean consistency of 70.3%.

Reading, Everitt and Sledmere (1982) tried to reconstruct the adjective groupings by using different methodology and different statistics. They attempted to replicate the groupings and intensity relationships of the words. A direct grouping technique was used whereby 90 subjects sorted the words into similar groups. A similarity matrix was constructed and finally subjected to cluster analysis. They found group of adjectives were similar to the MPQ groupings. They could distinguish between groups reflecting sensory words and affective/evaluative words. However they suggested that there was evidence for reducing the number of groups to a 16 group amalgamation.

b) Validity:

Dubuisson and Melzack (1976) compared responses to the MPQ given to patients with different kinds of pain. Using discriminant function analyses, they were able to correctly classify 77% of patients suffering pain from cancer, degenerative joint disease, menstruation, phantom limb, arthritis, tooth ache and posthepatic neuralgia.

The MPQ (Melzack, 1975) originally postulated to reflect three dimensions: sensory, affective and evaluative. Many studies have used factor analysis to indicate the dimensions.

Buckhart (1984) subjected the MPQ to oblique factor analysis and identified 6 factors. Four sensory factors and primarily affective factor emerged from data. The first factor the sensory- affective accounted for 29% of the variance. The affective subclasses heavily weighted the variance. Reading (1979) in a study on women with dysmenorrhoea found four factors emerged when he applied varimax rotated factor analysis to the MPQ. The study provided support for the distinction between affective and sensory dimensions but not for a distinctive evaluative component. Another study by Reading (1982) compared the dimensions which emerged for women with acute pain and women with chronic pain. The factor structure was less distinctive in women with acute pain, which possibly suggests that acute pain involves less

differentiation of the sensory, affective and evaluative language divisions. Turk, Rudy and Salovey (1985) used confirmatory factor analysis which supported the component structure of the PRI. However in subsequent analysis the 3 components of the PRI did not show adequate discriminant validity. They suggested only to use the total score of the PRI, in case inappropriate classification and treatment decisions are made.

In a more recent multi-centre study, the different results obtained from other studies, such as above, were explained by differences in patient samples and statistical analysis (Holroyd, Holm, Keefe, Turner, Bradley, Murphy, Johnson, Anderson, Hinkle, O'Malley, 1992). By using factor analytic techniques, the best model was a 4 factor model with 1 affective, 1 evaluative and 2 sensory. However, Holroyd et al (1992) argued about the clinical utility of the subscales of the MPQ, because they found no evidence of discriminant validity when comparing the subscales with scores from the Minnesota Multiphasic Personality Inventory (MMPI), supporting Turk et al's (1985) findings.

c) Limitations:

The MPQ is a widely used pain measure. When the questionnaire was designed Melzack wrote "the questionnaire so far is, to be sure, only a rough instrument". The validity studies using factor analysis

have not been able to show three clear dimensions of pain and Turk et al (1985) and Holroyd et al (1992) suggested only to use the total score of the PRI. However, the use of factor analysis has been criticised (Reading, 1989) and it may be demonstrated that using this technique is inappropriate to demonstrate the three dimensions of pain.

Although it remains hard to show that the MPQ reflects the different dimensions of pain, it remains a popular method to measure pain.

2.8 PAIN DRAWING

Many researchers argue that the pain drawing, a self report tool where the person in pain graphically represents their pain on a body outline, is an essential part of assessment in chronic non-malignant pain (Karoly et al, 1987; Margolis, Tait and Krause, 1986; Margolis, Chibnall and Tait, 1988; Schwartz and DeGood, 1984; Tait, Chibnall and Margolis, 1990; Toomey, Gover and Jones, 1983; 1984). The research literature on chronic non-malignant pain which uses outcome measures seldom includes a pain drawing. Especially in studies and reviews that have used the McGill Pain Questionnaire, a part of which includes a body outline, there is often no mention about the use of the body outline (Reading, Everitt and Sledmere, 1982; Turk, Rudy and Salovey, 1985; Waddell, Pilowsky and Bond, 1989; Wilkie, Savedra,

Holzemer, Tesler and Paul, 1990). Melzack (1975) did not suggest how to use the body outline as an outcome measure or how to administer it, he only mentioned that there is a line drawing of a body indicating the spatial distribution of pain and on the diagram of the body outline the question above it asked where your pain is and whether it is internal (I) or external (E).

From the literature review several potentially useful scoring systems for the pain drawing were identified.

2.8.1 PAIN DRAWING SCORING SYSTEM 1

Ransford, Cairns and Mooney (1976) suggested a penalty scoring system for interpreting the pain drawing. This system has been used in a number of studies (Dennis, Rocchio and Wiltse, 1981; Margolis et al, 1986; Taylor, Stern and Kubiszyn, 1982; Waddell et al, 1989), however Ransford et al's (1976) methodology is questionable. Firstly, they did not review any past literature on pain measurement or pain drawings and assumed from one article that the hypochondriasis (Hs) and hysteria (Hy) scores on the Minnesota Multiphasic Personality Inventory (MMPI) questionnaire were the best "prognosticators of the outcome of treatment for disc disease". The pain drawing scores were correlated with the Hs and Hy scores and an assumption was made that the pain drawing would then allow doctors to screen patients for psychological stability and recovery. VonBaeyer, Bergstrom, Brodwin and

Brodwin (1983) questioned Ransford et al's (1976) methodology and raised the issues of whether the MMPI is an appropriate assessment tool for chronic non-malignant pain patients. They found that only 44% of the patients with an elevated Hs score were correctly identified by their drawing scores. This was in contrast to Ransford et al (1976) who found that 93% of the patients with pain drawings of scores of 3 or above had elevated Hs or Hy scores. A further criticism of the paper was the way in which the pain drawing was evaluated. "Only certain anatomic distributions of back pain and sciatica be accepted as normal" (Ransford et al, 1976) which meant that anything considered abnormal such as total leg pain, back pain radiating to the iliac crest or circling painful areas, for example, were labelled as "poor psychometrics", that is, they were given penalty points to obtain a high score on the pain drawing. No attempt was made to look at what the pain drawing was actually measuring and no reasoning was given to the assumptions made as to why certain pains were considered unreal. Inter-rater reliability of the pain drawings was not investigated.

Several other studies used the Ransford et al (1976) methods, but similarly did not address validity (Dennis et al, 1981; Taylor et al, 1982, Waddell, Pilowsky and Bond, 1990). The relationship between the pain drawing and psychopathology varied in the studies with Ransford et al's (1976) finding being the highest correlation

between the Hs and Hy levels of the MMPI and the pain drawing scores. Further studies have shown a weak relationship between body surface area and psychological state and they did not feel that the pain drawing was sufficiently sensitive to be used as a screening tool for psychological problems in patients with chronic non-malignant pain (Ginzburg, Merskey and Lau, 1988; VonBaeyer et al, 1983). Karoly et al (1987) recommended the pain drawing should not be used as a measure of psychopathology.

2.8.2 PAIN DRAWING SCORING SYSTEM 2

Schwartz and DeGood (1984) used a similar hypothesis for their pain drawing to Ransford et al (1976) by basing it on the "overall appropriateness of the drawing". Factors such as "dermatomal distributions, degree of body involvement, and anatomic sensibility" were taken into consideration when rating the pain drawing. They argued that "only certain anatomic distributions of pain can be accepted as appropriate or reasonable", but did not explain what was meant by anatomical sensibility. They did not assign a penalty point system but a rating scale of 1 to 5 or from completely appropriate to completely inappropriate respectively. They did not question what the pain drawing was actually measuring or whether their interpretations of the pain drawing were correct. They did mention the "predictive validity of such a global measure has yet to be empirically assessed" and that it

"appears to require further study". In the results and discussion they were concerned about the reliability of using their "global appropriateness measure", but did not mention what they actually had measured on the pain drawing and whether their assertions of their ratings could be considered relevant to people with chronic non-malignant pain. They did check inter-rater reliability by scoring the first 20 pain drawings. An interesting speculation from this study was that the highly inappropriate drawings were probably a reflection of a poor cognitive style of coping with the pain rather than psychopathology or disability per se.

2.8.3 PAIN DRAWING SCORING SYSTEM 3

This pain drawing method was described by Toomey, Gover and Jones (1983) to measure the number of sites of pain. It consisted of right and left displays of the face and neck, displays of the upper and lower part of the jaw and anterior and posterior displays of the lower body. There are 32 sites in total, with 12 sites are in the head and neck region, 12 in the trunk region and 8 in the extremities. They counted the number of sites marked and to aid data analysis collapsed the numbers of sites into 3 categories : low (1-2 sites); medium (3-5 sites) and high (6-18 sites) (See Appendix H).

a) Reliability and Validity:

They did not address either reliability or validity. In the analysis they explored how the results from the pain drawing would relate to certain outcome measures, but did not question what they were actually measuring when they scored the pain drawings.

b) Limitations:

Their sample over-represented patients with facial pain. Facial pain was reported by 65% of their sample, whereas only 10% of patients reported low back pain. This over-emphasis of facial pains was reflected in the scoring system with separate displays of the face, neck and jaw. In a multidisciplinary pain clinic where patients present with a wide variety of pain, this scoring system would be too specialised.

2.8.4 PAIN DRAWING SCORING SYSTEM 4

This pain drawing was devised by Margolis, Tait and Krause (1986) to measure the number of sites of pain and the percentage of body surface in pain. They used a front and back view of the human body dividing it into 45 sites, making the divisions mainly at joints (See Appendix I). Each site marked was given a score of one. Weights were assigned to sites equal to the percentage of body surface they covered. To score the drawings, the sum

of the sites marked and the weighted equivalent could be calculated. The weighted score reflected the total percentage of body surface that the patient shaded as painful. These weightings are similar to ones used with burn patients (Feller and Jones, 1973). However examining the weightings they seem to have been decided arbitrarily.

a) Reliability:

They calculated the inter-rater reliability for scoring the pain drawing by adding all the number of sites marked as painful by the patient. Secretaries blind to the patient's identity scored the pain drawing. They used a components-of-variance method and found a high reliability of 0.997. Using a percentage of agreement the reliability was 98.4%.

To look at the reliability of the weighted scores they correlated the weighted scores with the raw scores obtained by adding up the painful areas. They used a Pearson's product-moment correlation which was 0.974 ($P < 0.001$). This is highly significant, which means either raw or weighted scores could be used.

In a further study, Margolis, Chibnall and Tait (1988) found the pain drawing for extent of pain to be reliable over time. The average length of time between administrations of the pain drawing was 71.3.days (S.D.=

49.76). The ratings for the percentage of body surface were found to be highly reliable ($P < 0.001$).

b) Validity:

The validity of the scoring system was not assessed. They did ask themselves in the literature review what is actually being measured with regard to rating systems for pain drawings. However they did not take this any further.

c) Limitations:

They used parametric statistics in their analysis of reliability and correlating their scoring system with another system described by Ransford, Cairns and Mooney (1976). However it is debatable whether it is appropriate to use parametric statistics since as Merskey (1989) points out the data are ordinal.

Both the raw scores and the weighted scores could be used since they correlated highly, but it is not clear whether they do measure extent of pain, since validity was not addressed.

The authors found that when they correlated their findings with the Ransford et al (1976) penalty point method it was surprisingly high. They found that the weighted scores of body area accounted for 56.25% of the

variance in penalty point ratings. This is interesting since the two scoring systems claim to measuring different constructs.

2.8.5 PAIN DRAWING SCORING SYSTEM 5

In a scoring system described by Gray, Rothwell and Wastell (1986) and by Wastell and Gray (1987), they tried to develop an objective typology for classifying facial pain in terms of its spatial distribution. They only approached people with temporomandibular joint pain. Their outline consisted of the lateral profile of the face. They asked the patients to trace the boundaries of their pain with the tip of their index finger. The examiner recorded the pain on the outline. The drawing was shown to the patient and adjustments were made until the patient was satisfied.

To quantify the pain drawings a grid was superimposed on the outline. It was ruled in a 0.5 cm square and indexed A-Z horizontally and 1-30 vertically. The squares that had been marked or fell within the perimeter of the painful area were scored with one and the rest of the squares with zero. The drawing could be rendered into a matrix of 26x30 binary variables. Cluster analysis was then undertaken, using Ward's hierarchical method.

a) Reliability:

Reliability for the method of recording the drawing on the lateral profile of the face was assessed. They looked at test-retest reliability by taking 10 patients and asking them to outline their areas of pain and the examiner recorded this on the charts. Two days later the patient was asked to return to the hospital for further treatment and to repeat the completion of the pain drawing. The two drawings were compared for overlap and the percentage of agreement was 82.99% (Gray et al, 1986).

The method of scoring was not examined for reliability.

b) Validity:

They used another method to score the drawings, an arbitrary visual method. Two examiners divided the drawings into a series of groups with similar patterns. These groupings were compared with the mathematically compiled groups. The degree of similarity ranged from 40% to 100% (Gray et al, 1986). This gives some evidence of criterion-related validity, but caution needs to be taken since neither scoring system has as yet been established as a reliable and valid measure.

Wastell et al (1987) attempted to address whether the results they obtained with the Ward's hierarchical method

were valid. They did this by using different algorithms. They also attempted to cross validate the findings by applying the cluster analysis to different subsamples.

c) Limitations:

Looking at the different types of pain distributions they obtained, it is questionable whether these constitute different groups and whether it can be used as a classification system. Class A and class C1 seem to be similar as do B1 and C2 (Wastell et al, 1987).

2.9 PAIN QUESTION

The previous section reviewed five scoring systems for the pain drawing which had been identified from the literature. No specific scoring systems for the pain question were found, but several methods described below could be applied to scoring the pain question.

2.9.1 PAIN QUESTION SCORING SYSTEM 1

Kabat-Zinn (1983) devised the Body Part Problem Assessment (BPPA) scale to assess the extent to which different regions of the patient's body represent a problem to the patient. It consists of a list of 53 body regions with a numerical scale of 0 to 5 listed next to each region. The patient is asked to circle the number that best describes the degree of the problem or

discomfort associated with each region in a time frame of the "past week including today". Zero represents "no discomfort, no problem" and five represents "great discomfort, very problematic".

a) Reliability:

The reliability was not discussed in this paper. However, Kabat-Zinn (1983) did find a significant difference in BPPA group mean scores on medical students on two occasions separated by 10 days ($p < 0.01$). He also found that the mean percentage change which is based on the net change for each individual was -8.3% indicating a deterioration in body image rather than an improvement as suggested by the reduction in mean. He felt this inconsistency might be due to several reasons, but felt that the actual difference observed on retesting the students although statistically significant did not reflect a major change in body image.

This casts doubt on whether this scale is reliable since there was a significant difference in retesting the medical students, where it could be assumed that their body image would remain stable over time.

b) Validity:

Validity was not mentioned and it was slightly confusing as to what the questionnaire was asking. It was unclear

whether the author wanted to know about the location of pain, how many body regions were involved in the pain syndrome or about body image. He does write "The BPPA scale probes the patient's feelings about his or her body. It does not mention the word pain. Strictly speaking it is not a pain measure." However he goes on to say that the BPPA gives a clear picture of the current problem from the patient's perspective and specific body regions can be monitored.

c) Limitations:

No reliability and validity studies have been undertaken on this questionnaire. Most of the data presented in this paper were from unpublished data. The author did not mention what type of pain the patients suffered and did not list any demographic data when discussing the use of the questionnaire as an outcome measure.

2.9.2 PAIN QUESTION SCORING SYSTEM 2

The second system was described by Toomey, Gover and Jones (1984). They divided their patients into four groups: 1) head and/or neck; 2) low back; 3) head/neck and low back; 4) neither head/neck nor low back but extremities, trunk or upper back. They wanted to compare patients with head or neck pain with patients with low back pain.

a) Reliability and Validity:

Neither reliability nor validity were addressed.

b) Limitations:

They used a large group of patients with predominantly head or facial pain. However, Krause, Tait and Margolis (1989) used this scoring system for location of pain with a preponderance of patients with low back pain, but they too did not question the reliability nor the validity of using this method.

2.9.3 OTHER POSSIBLE PAIN QUESTION SCORING SYSTEMS

Two other possible scoring systems emerged from the literature. They are not actually scoring systems but lists of frequencies that have been calculated by the respective researchers. They could be used as check-lists to code the number of sites and the location of pain from the pain question.

The first of these was described by Savedra, Tesler, Holzemer, Wilkie and Ward (1989). They assessed the validity and reliability of pain drawings by children and adolescents, and arrived at a list of 10 sites. They used this list to establish the frequencies of pain sites marked by the children and adolescents.

The second list of pain sites was described by Tait, Chibnall and Margolis (1990). Describing their data they found that the pain distributions were quite varied for the sample. They categorised these distributions into 8 groups.

a) Reliability and Validity:

No reliability or validity checks were undertaken. The scores were presented as part of the descriptive statistics in the respective studies.

b) Limitations:

Savedra et al (1989) worked with a sample of children and adolescents with mainly acute pain who were in-patients. Their list may not apply to the person with chronic non-malignant pain who is usually treated as an outpatient. Tait et al (1990) did work with adults with chronic non-malignant pain who attended a multi-disciplinary outpatient clinic. This may be more appropriate for the current study, since they also had a large sample. Tait et al (1990) had 416 patients complete a pain drawing, so the distributions may reflect the types of pain and location of pains these patients suffer with.

2.10 SUMMARY OF SCORING SYSTEMS FOR THE PAIN DRAWING AND PAIN AND THE PAIN QUESTION

The previous sections evaluated several scoring systems for the pain drawing and the pain question. As the sections revealed, the reliability and validity of some of the scoring systems were not sufficiently explored. In the Ransford et al's (1976) study, the methodology used to investigate the penalty scoring system was so poor that this system cannot be considered. The Schwartz et al's (1984) study based it's scoring system on "anatomical sensibility", but as Margoles (1983) states frequently the paresthesias of the chronic orthopaedic pain patient are nonanatomical. He believes all pain is real and that caution must be taken in rating pain drawings.

The Toomey et al's (1983), the Margolis et al's (1986) and the Gray et al's (1986) scoring systems will be used and adapted in this study. The reliability and the validity will be assessed by measuring the number of pain sites, the percentage of body surface area in pain and the location of pain when using the pain drawing. Other scoring systems will be explored in the pilot studies.

For the pain question, all the scoring systems will be examined to measure the number of sites of pain and location of pain.

3.0 METHODS

This cross sectional descriptive study focused on patients with chronic non-malignant pain and their responses to a pain drawing and to a pain question.

3.1 AIMS

To reiterate, the aims of the study were to:

i) establish the relationship between the responses to a pain drawing and the responses to a pain question,

ii) examine the relationship between the pain drawing and the pain question, and various outcome measures,

iii) determine the reliability and validity of the pain drawing and the pain question,

iv) discuss the implications of the pain drawing and pain question in the management of chronic non-malignant pain.

3.2 SETTING

The study took place in a large teaching hospital and in a smaller district general hospital. This study was part of a larger study that had already obtained ethical approval from the two hospital ethical committees.

3.3 METHODS OF REFERRAL

To recruit the sample, the co-operation of the anaesthetic consultants specialising in pain control at each hospital was sought. Consultants in orthopaedics, neurology and neurosurgery at the teaching hospital were also contacted. These consultants agreed to refer patients who met the study's inclusion criteria. Either the author or the other researcher were present during the pain clinic outpatient sessions at the teaching hospital every week to recruit patients into the study. The researchers relied on the consultants to refer patients into the study. This could have biased the sample, either consciously or subconsciously, in that the consultants could have referred patients whose pain was more difficult to manage and treated the patients whose pain was easier to manage themselves. Nevertheless, the consultants were frequently reminded about the inclusion criteria. These are described below.

3.4 SAMPLE

The sample consisted of patients who were 18 years old or over, had been in pain for at least 3 months, had no malignant cause for their pain and where no surgical treatment or change in medical treatment was proposed at present. They were excluded from the study if they did not speak English or were suffering from a psychotic illness or dementia.

3.5 MEASURES

The study investigated in detail two measures, the pain drawing and the pain question. In addition four self-report measures were used to establish the relationship between them and the pain question and the pain drawing. All measures used are described below and were administered by the author or the researcher reading them out aloud.

3.5.1 PAIN DRAWING

As already mentioned in section 1.4.1, the pain drawing comprised of a front and back view of the human body on an A4 sheet of paper. The patient was given the sheet of paper with the pain drawing and was asked to shade in where their pain was. To aid the patient left and right were written on the side of both the front and back view of the human body. (See appendix B)

3.5.2 PAIN QUESTION

The patient was asked the question "where is your pain?" and the author or the other researcher recorded their verbal response on the interview schedule. The patient was encouraged to give a verbal response and not point to their pain.

3.5.3 NUMERICAL RATING SCALE

The Numerical Rating Scale was used, where the patient was asked to rate their pain on a scale of 0 to 100 where 0 represented 'no pain' and 100 'pain as bad as it can be'. It was used to rate pain now, worst pain and least pain. The response of the patient was written down on the interview schedule.

3.5.4 THE MCGILL PAIN QUESTIONNAIRE

The McGill Pain Questionnaire used was the Mount, Melzack and MacKinnon (1978) version. One adaption in the layout was made after the pilot study. The pain drawing was removed from the list of 78 words, present pain intensity and the list of accompanying symptoms onto a separate sheet of A4 paper to become the measure described above in 3.4.1. (Appendix G)

The instruction were read aloud to the patient making it clear that only one word in a group could be chosen. The patient was asked to think of their pain at the present moment. The responses the patients gave were ticked on the sheet.

3.5.5 THE HOSPITAL ANXIETY AND DEPRESSION SCALE

The Hospital Anxiety and Depression Scale (HAD) (Zigmond and Snaith, 1983) was administered by the author or the

researcher. The patient was asked to reply to the item that came closest to how they had been feeling in the last week. The appropriate responses were ticked accordingly on the questionnaire. (Appendix C)

3.5.6 MODIFIED SICKNESS IMPACT PROFILE

For the purpose of this study, a shortened version of the SIP was used which was described by Watt-Watson and Graydon (1989). They used six categories including sleep-rest, emotional behaviour, home management, social interaction, work, and recreation-pastimes. (Appendix D)

The patient was reminded they should only respond to those statements that described them that day and were related to their state of pain.

3.5.7 OUTCOME MEASURES NOT USED IN THE PRESENT STUDY

In the main study as mentioned in section 3.2, measures of self-efficacy and coping were used. These were the Self-Efficacy Questionnaire described by Nicholas (1989) and the Coping Strategy Questionnaire described Rosenstiel and Keefe (1983). However, these were not used in the present study because from the literature no evidence was found to show a theoretical link between self-efficacy and coping with either the number of sites of pain and the location of pain, but links with depression, anxiety and disability had been reported.

3.5.8 ADDITIONAL DATA

Information on age, sex, marital status, ethnic group, religion, education, employment status, social class and duration of pain was also obtained.

3.6 SCORING SYSTEMS

The author needed to quantify the pain drawing and the pain question. From the literature review several scoring systems were found to be suitable for scoring the pain drawing and the pain question. These are described below. For clarity and in order to aid the reader, each scoring system will be given a name for the remainder of this thesis.

3.6.1 SCORING SYSTEMS FOR THE PAIN DRAWING

a) Toomey, Gover and Jones (1983) described a scoring method to measure the total number of sites of pain with the pain drawing, as described in section 2.8.3. (see Appendix H). Only the anterior and posterior displays of the body were used in this study and the additional displays of the face, neck and the jaw were disregarded, because the present sample did not have many patients with head or facial pain as did Toomey et al's (1983) sample. This left in total 22 sites. (see Appendix J) The author used a plastic template marked with the 22 sites and placed it over the patients' drawings. Each site

marked was given a score of one and each unmarked site a score of 0. The criteria to determine whether marks were present in the sites were:

- 1) Any area was scored 1 if any portion of it was shaded, no matter how slightly.
- 2) Marks were not scored which clearly serve to direct the scorer's attention to the intensity of pain in an area rather than its distribution.
- 3) Areas which were circled were to be treated as if the entire circled area had been shaded.
- 4) Marks outside the drawing were to be disregarded.

For location of pain the area was given a specific number. The numbered areas which had been shaded were recorded on the coding sheet. (see appendix K). This scoring system will be known as the adapted Toomey scoring system.

b) Another scoring system was devised by Margolis, Tait and Krause (1986) to measure the number of sites of pain and the percentage of body surface in pain. It was described in section 2.8.4 (see appendix I). The author used a plastic template with the 45 sites marked to cover the patients' drawings. As in the adapted Toomey scoring system the same criteria were used to quantify the number of pain sites. In addition, weights were assigned to sites equal to the percentage of body surface they covered. To score the drawings, the number of sites in

pain and the weighted equivalent were calculated. The weighted score reflected the total percentage of body surface that the patient shaded as painful. Also the specific numbered areas in pain were recorded as the location of pain. This scoring system will be known as the Margolis scoring system.

c) A further scoring system for the pain drawing was described by Gray, Rothwell and Wastell (1986) and by Wastell and Gray (1987). (see section 2.8.5) A similar method was used to score the pain drawing. The author used a grid which was ruled in a 1.0 cm squares and the front of the body was indexed from A-I horizontally and 1-19 vertically and the back of the body again A-I horizontally and 1-19 vertically. A plastic template with the grid and the body outline on it was superimposed onto the drawing and a score of one given to every square marked or enclosed in a circle of pain. This scoring system will be known as the Gray scoring system.

3.6.2 SCORING SYSTEMS FOR BOTH THE PAIN DRAWING AND THE PAIN QUESTION

a) Kabat-Zinn (1983) devised the Body Part Problem Assessment (BPPA) which consists of a list of 53 body regions. This list was used as a check-list to tick any body region which had been marked on the pain drawing or recorded in the pain question. The total number of sites of pain were counted and the location of pain recorded.

This scoring system will be known as the Kabat-Zinn check-list.

b) Toomey, Gover and Jones (1984) grouped their patients into 4 groups: head and/or neck; low back; both (head/neck and low back) and neither (head/neck nor low back but extremities, trunk or upper back). This was used by the author to classify the pain locations from the responses of the pain question and the pain drawing. This scoring system will be known as Gover check-list.

c) Savedra, Tesler, Holzemer, Wilkie and Ward (1989) arrived at a list of 10 areas of pain by calculating the frequencies of pain sites marked by the children and adolescents in their study. This list of areas of pain was used as a check-list to code the number of sites and location of pain from the responses of the pain question and the pain drawing. This scoring system will be known as the Savedra check-list.

d) Another list of frequencies of pain areas was described by Tait, Chibnall and Margolis (1990). Describing their data they found that the pain distributions were quite varied for their sample. They categorised these areas of pain into 8 groups. These groups or list of pain areas were used by the author to count the number of sites recorded and the locations were ticked if they were present in the response to the pain question and the pain drawing. This scoring system will

be known as the Tait check-list.

3.7 PROCEDURES

The patients were either approached personally in the pain clinic or by letter after being referred by a consultant. They were told about the larger study, given an information sheet about the study and informed that at the initial interview they would be asked some questions about their pain. They were also told the interview would last about an hour and a half. If they agreed to take part in the study, arrangements were made and a date and time set for the initial interview.

The interview took place either in the large teaching hospital or at the patient's home. Each patient was given the choice of whether they wanted their appointments at the hospital or at home.

3.7.1 INTERVIEW

At the beginning of the interview, the patient had the outline of the larger study explained. They were free to ask any questions at this time. Then they were asked to sign a consent form which said they were interested in taking part in the larger study which involved assessing their pain thoroughly.

They were told they would be asked some general questions about their pain. Then the author or the other researcher would be interested in carefully assessing their pain and its effects on them. To do this they had some questionnaires which they would help the patient complete.

The author and the other researcher practised being neutral throughout the interview, not expressing their personal opinions. They avoided using any leading questions but adhered to the structure of the interview using open ended questions. Some rapport was necessary, but this mainly consisted of showing empathy towards the patient especially when they were distressed by their difficult circumstances.

The pain question was the first question asked to half of the patients. Towards the end of the interview approximately an hour later the pain drawing was given to the patient. For the other half of the patients, this procedure was reversed. The interview started with the pain drawing and an hour later they were asked the pain question. This was to assess whether the interview, or conversing for approximately an hour, affected the responses to the pain question or the pain drawing being administered towards the end of the interview.

For eleven patients both the pain question and the pain drawing were given to them at the beginning of the

interview and again an hour later. This was done to assess test-retest reliability. The patient was told when given the pain drawing and the pain question the second time "I would like to review my understanding of where your pain is, where is your pain" and then "I would like your help in finding out whether pain changes during the interview. So this is to help us, not to test you I'd like you to shade in again on this body outline where your pain is".

3.7.2 DATA COLLECTION

The data for this study were collected by the author and the other researcher between December 1990 and February 1992.

3.7.3 SAMPLE SIZE

There were 64 participants in the main study and 9 participants in the pilot study. Thirty two patients were asked the pain question first and the pain drawing later. Thirty two were asked the pain drawing first and the pain question later. Eleven were asked the two measures twice. There were missing data on one of the patients.

3.7.4 CODING

Coding sheets and a coding book were prepared for the pilot studies and the main studies. The author scored the

pain drawings using the different plastic templates and the pain question and the pain drawing using the different check-lists. The numbers of sites were counted and the locations of pain ticked on the coding sheets.

3.7.5 DATA ENTRY

Data Entry, a module of SPSS/PC was used to enter the data after it had been coded.

3.7.6 DATA CLEANING

Frequencies on each variable were computed and the value labels checked with the code book to see whether any undefined value labels had been coded into Data Entry (Barhyte and Bacon, 1985).

The other researcher coded 10 randomly selected pain questions and pain drawings using all the scoring systems and check-lists to establish the inter-rater reliability. In addition, the coding of 10% of the outcome measures was cross checked.

3.7.7 STATISTICS

Non-parametric statistics were used due to the ordinal nature of the data. These will be explained in more detail in section 4.1.

3.7.8 COMPUTING

SPSS/PC version 4.0 was used.

3.8 PILOT STUDY 1

In the pilot study the first question the patient was asked was "where is your pain". After approximately an hour the patient was handed the MPQ on which they were asked to draw, on the pain drawing, where their pain was.

The scoring systems were used to quantify the responses of the pain drawing and the pain question.

3.8.1 AMENDMENTS

The body outline on the MPQ was enlarged and put on a separate sheet of A4 paper. This facilitated the patient in shading in their pain onto the drawing and the author and researcher in coding the pain drawing.

It was decided that the interview could have an effect on the measures, so half the patients were asked the pain question first and an hour later completed the pain drawing whereas the other half of patients started the interview with the pain drawing and later answered the pain question.

To test for reproducibility, a test-retest situation was created. Eleven patients were asked where their pain was, immediately followed by the pain drawing. About an hour later the patients again were asked where their pain was followed by the pain drawing.

The scoring systems needed to be amended considerably. The adapted Toomey was easy to use and no problems arose. The Margolis scoring system was not difficult to use but the cross checking by the other researcher revealed it was not very reliable. The unmarked pain drawings after photocopying had changed their shape sufficiently for the plastic template not to match up perfectly. This made it difficult to score the marks which were on the borderline of sites. A new criterion was to match the drawing with the plastic template as closely as possible in the area a rater was looking at.

The Gray scoring system had the same problem as the Margolis scoring system. It was found to be unreliable. The new rule was to match up the site with the area under investigation as closely as possible. For example if looking at the hand to match the template up with the hand rather than the head first for example.

The Kabat-Zinn check-list was dropped because only two pain questions and two pain drawings out of nine were able to be coded. The author was only able to code both the pain question and the pain drawing in one case. The

patient would often not indicate in the pain question whether their pain was on the right or left side of the body. Also there was no category or site for groin.

The Gover check-list worked well for the pain question but only four pain drawings out of nine were able to be coded. The researcher was not able to count the number of sites involved using this scoring system. The scoring system was not felt to be useful so was abandoned.

The Savedra check-list scored 6 pain questions and 4 pain drawings. The criticisms were that the head and neck needed to be separate categories and that it had been difficult on the pain drawing to distinguish between lower back and buttocks. Again there was no category for groin and it was unclear whether this could belong to the category abdomen or the category genital.

The Tait check-list scored 8 pain questions and 3 pain drawings. The criticisms were similar to the Savedra check-list. It was unclear whether the buttocks should belong to the category extremities or lower back. The head, neck and shoulders could not be counted as separate sites and the total number of sites could not be calculated because several sites were in two or more categories.

3.9 PILOT STUDY 2

The new rule was used on the Margolis and Gray scoring systems. A new scoring system was devised by the author and the other researcher. It only had 10 sites, because the fewer the sites the more reliable the measure was and it tried to match the newly devised pain sites check-list (see appendix L) This scoring system will be known as the KF scoring system.

Two new check-lists were devised mainly from the Savedra and Tait check-lists for the number of sites of pain and location of pain. The first list was used for number of sites of pain. It consisted of a list of ten sites with the head, neck and shoulder as separate sites. The back became two sites, the upper and middle back one site and the lower back and the buttocks another site. The groin and genital became one site. The feet and legs became one site as did the hands and arms. This scoring system will be known as pain sites check-list (see appendix M).

The second list was for location of pain. There were four categories of location of pain: upper quadrant, ventral, back and extremities. The upper quadrant contained the head, neck or shoulders. Ventral specified chest, abdomen, genital or groin. The back included the buttocks and extremities were the arms, hands, legs and feet. Combination of these in twos or threes or all led to fifteen categories. This scoring system will be known as

the pain location check-list (see appendix N).

3.9.1 AMENDMENTS

The Gray scoring system was unreliable even with the new rule. In cross checking, the author and the other researcher only agreed in 3 out of 7 randomly chosen pain drawings. For the Margolis scoring system there was total agreement as with the KF scoring system.

In the pain sites check-list, it was difficult to distinguish in two cases whether the patient meant upper/middle back or lower back. It was decided to collapse these two categories into one and call it back and buttocks.

3.10 MAIN STUDY

The main study was carried out using the adapted Toomey, Margolis and the KF scoring systems for the pain drawing and the pain sites check-list and the pain location check-list for both the pain drawing and the pain question.

4.0 RESULTS

Non-parametric statistics were used to describe the data obtained in the study. This section explains why non-parametric statistical tests were used and presents the results with the aid of tables and figures.

4.1 STATISTICAL TESTS USED

Non-parametric tests were used to analyze the data on pain sites and pain location. These tests were chosen for two reasons. Firstly, because the level of measurement from the data obtained was of ordinal or nominal nature, respectively, and secondly, the data were not normally distributed. Clegg (1982) stated that parametric tests need to conform to three requirements:

1. Both samples are normally distributed.
2. The variance of the samples are similar to each other.
3. The samples comprise scores of at least interval measurement.

Both the location of pain and site of pain could not be justified as a measurement of interval nature. Mersky (1989) argued that non-parametric statistical tests should be used when dealing with body surface in pain because they were not graded in equal intervals and the distribution were not normal. However, Tait and Margolis (1989) believed that the data was interval and therefore

used the more powerful parametric tests.

Siegal and Castellan (1988) discussed the advantages and disadvantages of non-parametric statistical tests. A clear advantage is that non-parametric test make fewer assumptions about the data and therefore may be more relevant to particular situations. They argued that non-parametric tests can be made as powerful as parametric tests with increased sample sizes.

The main variables were location of pain, number of sites of pain, and total percentage of body surface in pain. The location of pain was categorised into 15 different groups which had no relation to each other. This data was treated as nominal data. Both the number of sites of pain and total percentage of body surface in pain were treated as ordinal data. Stevens (1946) defined an ordinal scale as an operation where rank ordering occurs. The interval scale is quantitative and consists of all positive linear transformations (Marcus-Roberts and Roberts, 1987). Neither the number of sites nor the total percentage of body surface area could be treated as interval data. A site of pain was based on an arbitrary area, therefore two sites of pain for instance, head and back or extremities and abdomen did not represent the same thing. Since the total percentage of body surface area in pain was based on the number of sites of pain, this measure too can only be treated as ordinal.

The mode was used with the nominal data. The median and the range were used to describe the ordinal data. Bar charts were used to make the data more presentable. The mean and the standard deviations were included when describing some of the data. Marcus-Roberts and Roberts (1987) felt it was always appropriate to calculate means, medians and other descriptive statistics, no matter what kind of scale of measurement was applied, however they warned against making certain statements from the statistics obtained. They felt it was meaningful to use or compare means with ordinal data in special situations. Seers (1987) used means for some of her data which was measured on ordinal scale.

Univariate statistics were used rather than more complex multivariate statistics since after consultation with a statistician it was felt that neither multiple regressions nor factor analysis were appropriate for the data collected.

For tests of difference, the Wilcoxon signed ranks test and the chi-square test were used. The Wilcoxon test was used on matched data which had ordinal level of measurement. The chi-square test was used on categorical data or nominal level of measurement. Two-tailed tests were used. For correlations, Spearman rank-order correlation coefficient was used. The Kruskal-Wallis one-way analysis of variance was used on ordinal data to test whether k independent samples were from different

populations. The level of significance or α was set at 0.05.

When applying the Kruskal-Wallis test, the responses to the pain drawing and the pain question were collapsed into a low, medium or high number of pain sites group. Toomey et al (1983) used this method in their study to enable the Kruskal-Wallis test to be undertaken and simplify the interpretations of the results. The groups were split into thirds, that is, a third of the number of sites of pain were in the low group, a third in the medium group and a third in the high group. The nearest whole number for the number of sites of pain was used to divide the number of sites of pain into thirds. The number of sites of pain in each group depended on the scoring system used. These are explained in detail throughout the results.

For the inter-rater reliability of the different scoring systems, the formula for the percentage of agreements used was the number of agreements divided by the number of cases multiplied by a 100.

4.2 SAMPLE SIZE

There were 9 participants in the pilot study, 64 in the main study. Another 11 patients were asked each measures twice in the interview for the purpose of calculating test-retest reliability. There was missing data on one

case from the main study.

4.3 BACKGROUND DATA

Data on a number of background variables were collected. The following section describes the background variables from the 64 people who participated in the main study.

4.3.1 AGE

The median age was 56.5 with a range from 21 to 86 years. The mean age was 54.7 years with a standard deviation of 17.1.

FIGURE 3. AGE

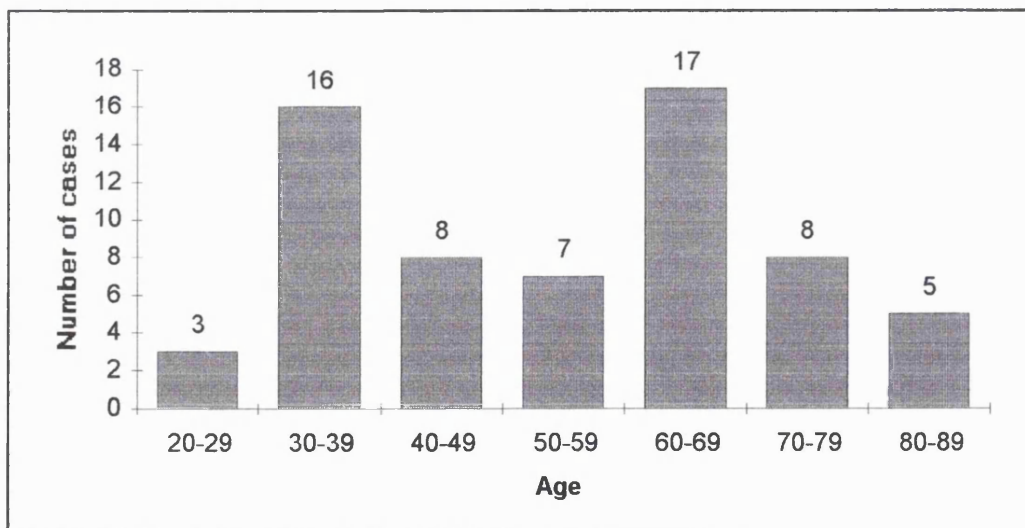


Figure 3 showed that, although there was a broad spread across all age groups, there were more people in their thirties or sixties than other age groups. Just over 53%

(34/64) of the sample were under 60 years of age.

4.3.2 GENDER

There were 48 women and 16 men in the study.

FIGURE 4. GENDER

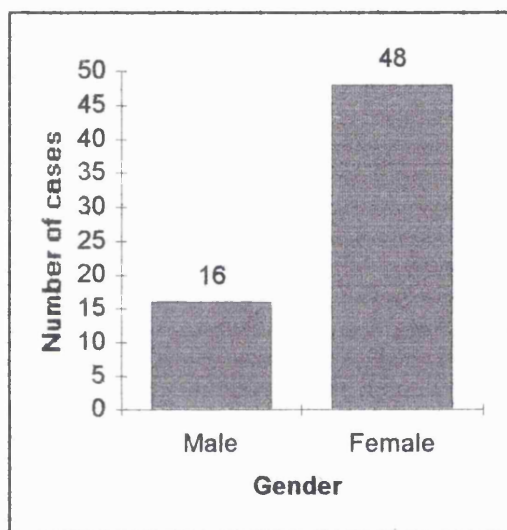
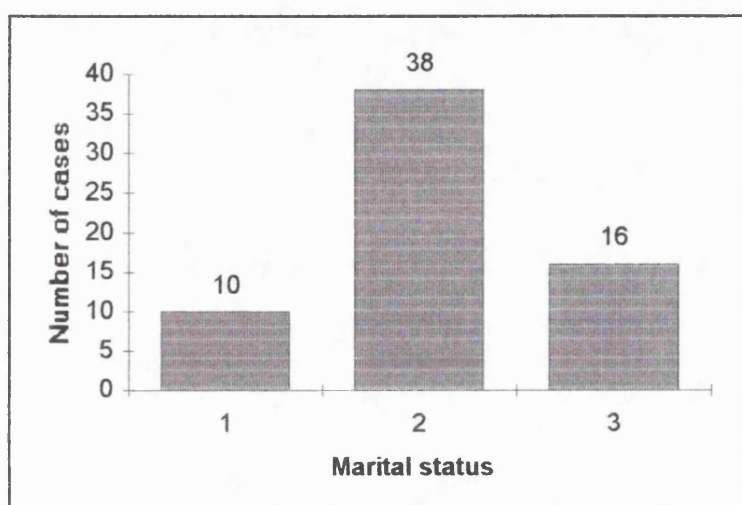


Figure 4 showed more women than men in the study, that is 75% (48/64).

4.3.3 MARITAL STATUS

Figure 5 below showed 59.4% (38/64) in the main study were married or living with a partner.

FIGURE 5. MARITAL STATUS



Key 1 Single
2 Married or living with partner
3 Divorced, widowed or separated

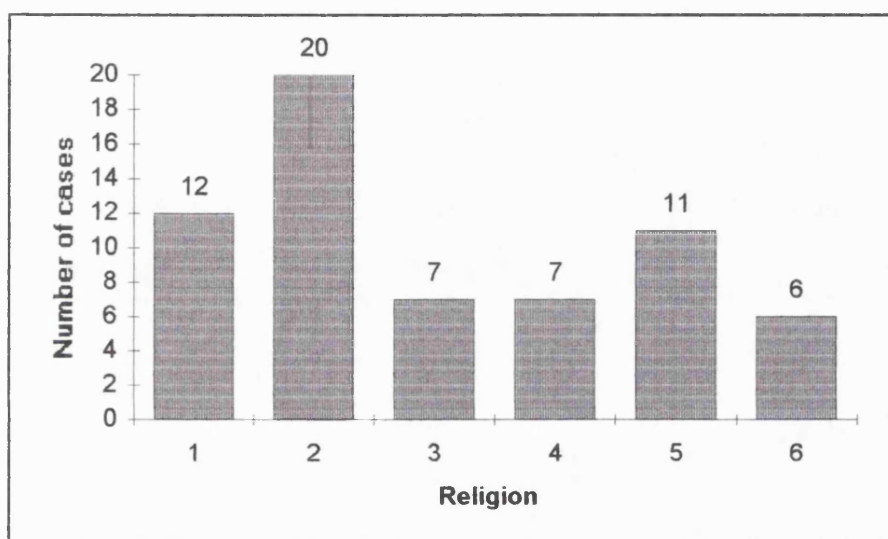
4.3.4 ETHNIC GROUP

The majority of the sample in the study were Caucasian, that is 95.3% (61/64). Only two people were classified as afro-caribbean and one person as other.

4.3.5 RELIGION

The figure 6 below showed the Church of England to be the most frequently reported religion, that is 31.8% (20/63). There was missing data on one person.

FIGURE 6. RELIGION



Key 1 None
2 Church of England
3 Roman Catholic
4 Jewish
5 Not practising
6 Other religion

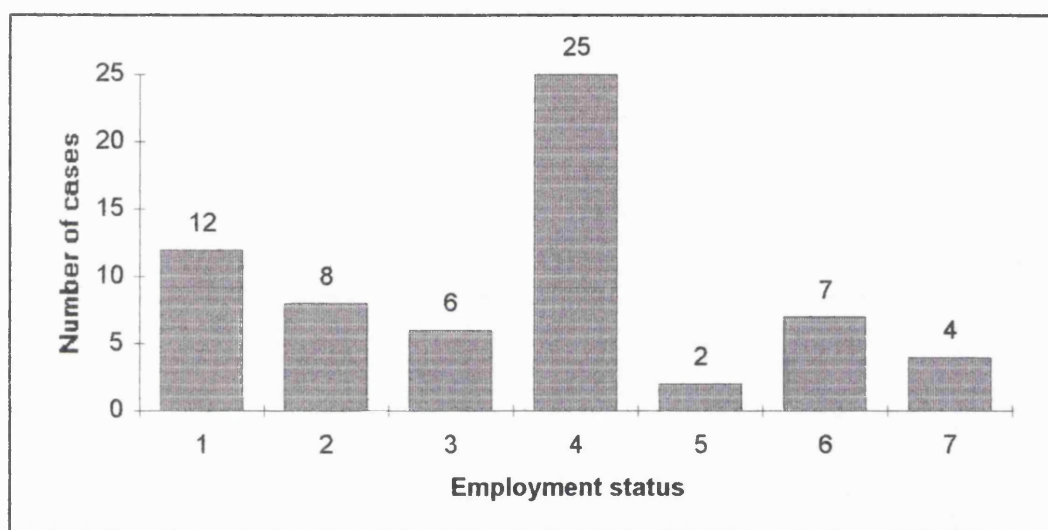
4.3.6 EDUCATION

Up to 59.4% (38/64) of the sample had the minimum statutory education and 40.6% (26/64) of the sample had some form of further education.

4.3.7 EMPLOYMENT STATUS

Figure 7 below showed that 39.1% (25/64) in the study had retired. Only 18.8% (12/64) of the sample were in full-time employment.

FIGURE 7 EMPLOYMENT STATUS

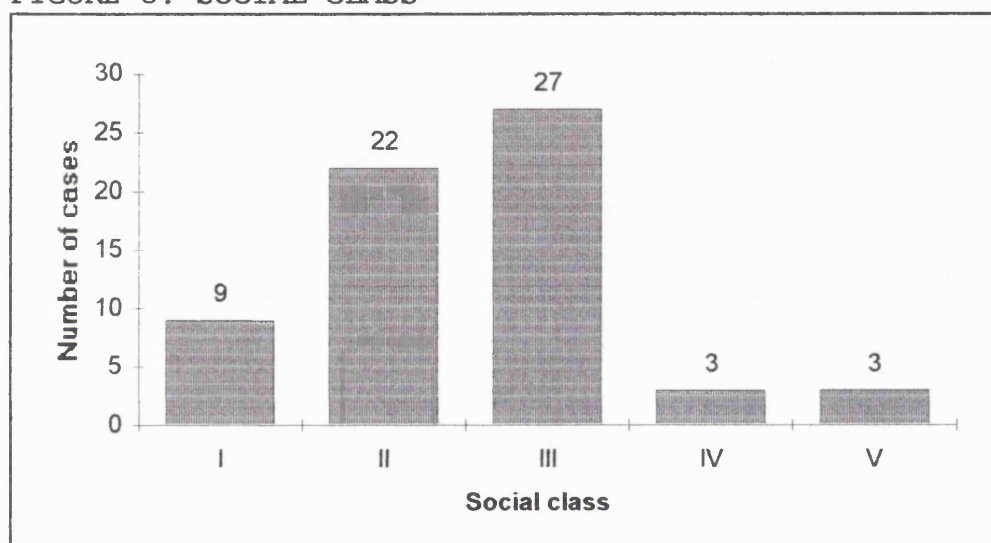


Key 1 Full-time employment
2 Part-time employment
3 Unemployed
4 Retired
5 Houseperson
6 Other
7 Off sick

4.3.8 SOCIAL CLASS

Figure 8 below showed 42.2% (27/64) were in social class III, 34.4% (22/64) in social class II, 14.0% (9/64) in social class I and only 9.4% (6/64) in social classes IV and V.

FIGURE 8. SOCIAL CLASS



Key Social Class Categories

- I - Professional
 - II - Managerial and technical occupations
 - III - Skilled occupations
 - IV - Partly skilled occupations
 - V - Unskilled occupations
- (OPCS, 1991)

4.3.9 DURATION OF PAIN

The mean duration of pain was 8.4 years. This ranged was from 6 months to 47 years in pain.

FIGURE 9. DURATION OF PAIN

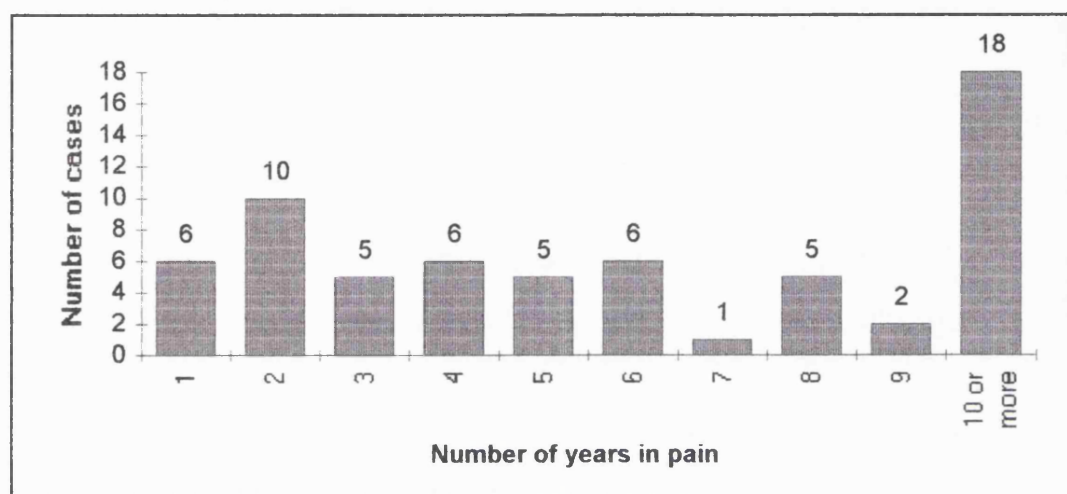


Figure 9 showed just over 28% (18/64) of the sample had pain for 10 years or more.

4.4 MAIN VARIABLES

The main variables being investigated were number of sites of pain, total percentage of body surface area in pain and location of pain. The outcome measures assessed pain, depression, anxiety and disability.

The main variables are first described separately before looking at the correlation and tests of differences.

4.4.1 NUMBER OF SITES OF PAIN

Several methods were used to count the number of sites of pain which have been described in sections 3.5.1, 3.5.2, 3.7.1 and 3.8.1. The KF, adapted Toomey and the Margolis scoring systems were used for scoring the pain drawing. The pain sites check-list was used for both the pain drawing and the pain question.

4.4.1.1 NUMBER OF SITES OF PAIN USING THE PAIN DRAWING

a) The KF scoring system

This pain drawing scoring system contained 10 possible sites. (See appendix L) The median number of sites of pain was 2. The range was from 1 to 10 sites. The mean was 2.92 with a standard deviation of 1.91.

TABLE 1. NUMBER SITES OF PAIN SCORING THE PAIN DRAWING WITH THE KF SCORING SYSTEM

Number of sites	Frequency	Percent
1	11	17.7
2	27	43.5
3	5	8.1
4	7	11.3
5	7	11.3
6	2	3.2
8	2	3.2
10	1	1.6
Missing	2	
Total	64	99.9 *

* Total was less than 100% due to rounding error

It can be seen from table 1 that 61.2% of the patients had either 1 or 2 sites of pain.

b) The adapted Toomey scoring system

The adapted Toomey scoring system had 22 sites marked on the body outline. (See appendix J) The median number of sites was 4.5, with a range of 1 to 21 sites. The mean number of sites was 5.31 and a standard deviation of 4.03.

TABLE 2. NUMBER OF SITES OF PAIN SCORING THE PAIN DRAWING WITH THE ADAPTED TOOMEY SCORING SYSTEM

Number of sites	Frequency	Percent
1	4	6.5
2	13	21.0
3	7	11.3
4	7	11.3
5	10	16.1
6	6	9.7
7	3	4.8
8	3	4.8
9	2	3.2
10	1	1.6
11	1	1.6
13	1	1.6
14	1	1.6
16	2	3.2
21	1	1.6
Missing	2	
Total	64	99.9 *

* Total was less than 100% due to rounding error

Table 2 showed that 50.1% of patients had between 1 to 4 sites of pain when the adapted Toomey scoring system had

been used to score the pain drawing.

c) The Margolis scoring system

This scoring system had 45 sites. (See appendix I) The median was 6.5 sites of pain, ranging from 1 to 34 sites. The mean number of sites was 8.08 with a standard deviation of 6.60.

TABLE 3. NUMBER OF SITES OF PAIN SCORING THE PAIN DRAWING WITH THE MARGOLIS SCORING SYSTEM

Number of sites	Frequency	Percent
1	3	4.8
2	5	8.1
3	5	8.1
4	10	16.1
5	3	4.8
6	5	8.1
7	4	6.5
8	6	9.7
9	5	8.1
10	5	8.1
13	1	1.6
15	3	4.8
16	2	3.2
17	1	1.6
23	1	1.6
26	1	1.6
27	1	1.6
34	1	1.6
Missing	2	
Total	64	100.0

The table 3 revealed that the most common number of sites was 4. Half of the patients had between 1 and 6 sites of pain when the Margolis scoring system was used to code

the pain drawing.

d) The pain sites check-list

The pain site check-list had a maximum of 9 sites (See Appendix M). The median number of sites of pain was 2 with a range from 1 to 8 sites. The mean number of sites of pain was 2.41 with a standard deviation of 1.51.

TABLE 4. NUMBER OF SITES OF PAIN SCORING THE PAIN DRAWING WITH THE PAIN SITE CHECK-LIST

Number of sites	Frequency	Percent
1	18	28.6
2	26	41.3
3	6	9.5
4	6	9.5
5	4	6.3
6	2	3.2
8	1	1.6
Missing	1	
Total	64	100.0

Table 4 showed that the 69.9% of patients had 1 or 2 sites of pain when this scoring system was applied to their pain drawing. The most common number of sites of pain was 2.

4.4.1.2 NUMBER OF SITES OF PAIN USING THE PAIN QUESTION

The number of sites of pain were assessed by using the pain sites check-list, the same check-list used in the above section 4.4.1.1d. (See Appendix M). The median number of sites of pain was 2 ranging from 1 to 6 sites of pain. The mean number of sites was 2.06 with a standard deviation of 1.23.

TABLE 5. NUMBER OF SITES OF PAIN SCORING THE PAIN QUESTION WITH THE PAIN SITE CHECK-LIST

Number of sites	Frequency	Percent
1	25	39.1
2	25	39.1
3	4	6.3
4	6	9.4
5	3	4.7
6	1	1.6
Total	64	100.2 *

* Total was more than 100% due to rounding error

As can be seen from table 5, 78.2% of the sample recorded either 1 or 2 sites of pain when the pain site check-list was applied to the pain question. This can be compared to the 69.9% of patients recording 1 or 2 sites of pain when the pain site check-list was applied to the pain drawing, as table 4 revealed.

4.4.1.3 RELATIONSHIP BETWEEN THE PAIN DRAWING AND THE PAIN QUESTION WHEN USING THE PAIN SITE CHECK-LIST

The relationship between the pain drawing and the pain question using the pain site check-list described above was examined. Calculating a Spearman's rho, the correlation was 0.627, which was highly significant ($P < 0.001$). However using the non-parametric test Wilcoxon, there was a significant difference between the two measures.

TABLE 6. WILCOXON TEST OF THE PAIN DRAWING AND THE PAIN QUESTION USING THE PAIN SITE CHECK-LIST

Wilcoxon Matched Pair Signed- rank Test Z = -2.301 P = 0.021	Cases	
	18	Question < Drawing
	7	Question > Drawing
	38	Question = Drawing
	Total	63

Table 6 showed a significant difference between the pain drawing and the pain question and using the pain site check-list. There were 38 ties where the pain question and the pain drawing scored the same number of sites. In 18 cases the pain question scored fewer number of sites than the pain drawing and in 7 cases the pain question scored a higher number of sites than the pain drawing.

FIGURE 10. SCATTERGRAM OF THE PAIN DRAWING AND THE PAIN QUESTION USING THE PAIN SITE CHECK-LIST

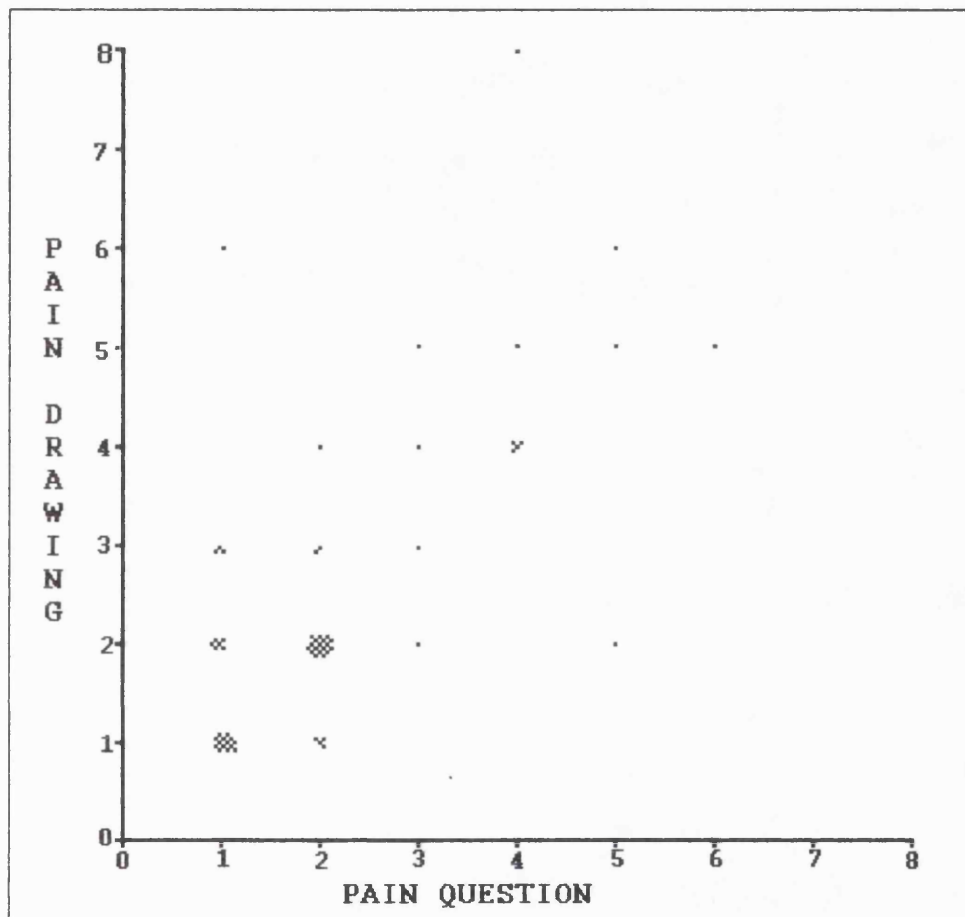


Figure 10 showed the similarity between number of sites on the pain drawing and the number of sites from the pain question when using the pain site check-list. The scattergram also revealed that a higher number of sites of pain were reported when using the pain drawing. The pain drawing scored 28.6% higher number of pain sites than the pain question.

4.4.2 PERCENTAGE OF BODY SURFACE AREA IN PAIN

This was an extension of the Margolis scoring system as described in section 3.5.1. The median percentage of body surface area in pain was 15.13, ranging from 2.5% to 76%. The mean percentage of body surface area in pain was 19.76 with a standard deviation of 16.68. There were two missing cases.

4.4.3 RELATIONSHIP BETWEEN THE DIFFERENT SCORING SYSTEMS FOR THE NUMBER OF SITES OF PAIN AND THE PERCENTAGE OF BODY SURFACE AREA IN PAIN

Using the Spearman's Rho correlation, the similarity of the following scoring systems for the number of sites of pain and the percentage of body surface area were investigated.

TABLE 7. CORRELATIONS BETWEEN DIFFERENT MEASURES FOR NUMBER OF SITES OF PAIN AND PERCENTAGE OF BODY SURFACE AREA IN PAIN:

	1	2	3	4	5
2	0.627*				
3	0.476*	0.811*			
4	0.451*	0.697*	0.729*		
5	0.550*	0.698*	0.735*	0.875*	
6	0.482*	0.602*	0.615*	0.827*	0.930*

* = $P < 0.001$

Key 1 Pain question & the pain site check-list

2 Pain drawing & the pain site check-list

3 Pain drawing & KF scoring system

4 Pain drawing & the adapted Toomey scoring system

5 Pain drawing & the Margolis scoring system

6 Pain drawing & weighted Margolis scoring system

Table 7 showed that the different scoring systems correlated well with each other and these correlations were highly significant. The highest correlation was between the Margolis scoring system and the weighted Margolis scoring system. The lowest correlations were between the pain question with the pain site check-list and the pain drawings with the various scoring systems.

4.4.4 LOCATION OF PAIN

The location of pain was measured by using the location check-list described in section 3.8. This check-list consisting of 15 different locations or categories was used to code both the pain drawing and the pain question (See Appendix N).

4.4.4.1 LOCATION OF PAIN USING THE PAIN DRAWING

TABLE 8. FREQUENCIES AND PERCENTAGES OF LOCATION OF PAIN USING THE PAIN DRAWING

No	Pain Location	Frequency	Percent
1	Upper quadrant	6	9.5
2	Ventral, groin	5	7.9
3	Back, buttocks	9	14.3
4	Extremities	3	4.8
5	Upper quadrant & ventral	1	1.6
6	Upper quadrant & back	2	3.2
7	Upper quadrant & extremities	2	3.2
8	Ventral & back	4	6.3
9	Ventral & extremities	1	1.6
10	Back & extremities	14	22.2
11	Upper quadrant, ventral & back	1	1.6
12	U.quadrant, ventral & extremities	1	1.6
13	U.quadrant, back & extremities	9	14.3
14	Ventral, back & extremities	1	1.6
15	All	4	6.3
	Total	63	100.0
	Missing cases	1	

The most common location was "back and extremities". The back was shown as a source of pain by 69.8% (44/63) of patients in response to pain drawing.

4.4.4.2 LOCATION OF PAIN USING THE PAIN QUESTION

Table 9 below showed the frequencies and percentages of the different locations of pain when using the pain question. The most common area was "back and extremities", with 16 people complaining of pain at this particular location. The back was mentioned as a source of pain by almost 61% (39/64) of patients in response to the pain question.

TABLE 9. FREQUENCIES AND PERCENTAGES OF PAIN LOCATION USING THE PAIN QUESTION

No	Pain Location	Frequency	Percent
1	Upper quadrant	6	9.4
2	Ventral, groin	8	12.5
3	Back, buttocks	10	15.6
4	Extremities	3	4.7
5	Upper quadrant & ventral	1	1.6
6	Upper quadrant & back	3	4.7
7	Upper quadrant & extremities	4	6.3
8	Ventral & back	3	4.7
9	Ventral & extremities	0	0
10	Back & extremities	16	25.0
11	Upper quadrant, ventral & back	1	1.6
12	U.quadrant, ventral & extremities	3	4.7
13	U.quadrant, back & extremities	3	4.7
14	Ventral, back & extremities	0	0
15	All	3	4.7
	Total	64	100.2

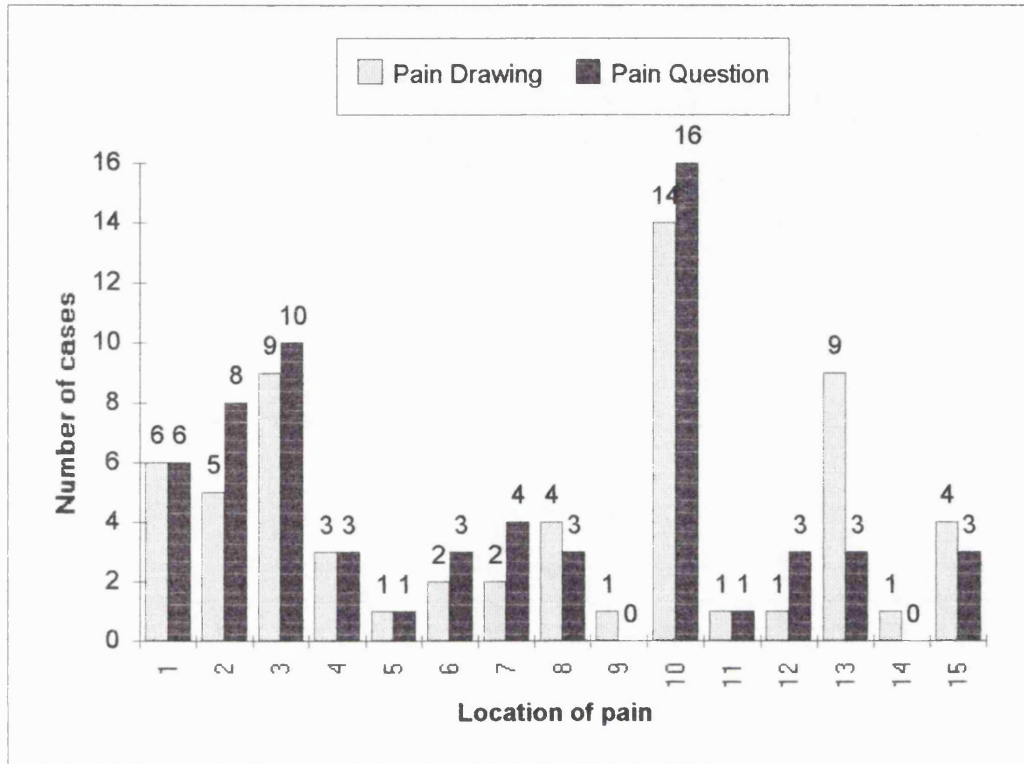
4.4.4.3 RELATIONSHIP BETWEEN PAIN DRAWING AND PAIN QUESTION USING THE PAIN LOCATION CHECK-LIST

From table 8 and table 9 the frequencies first appeared to be similar for both the pain drawing and the pain question, with the location "back and extremities" being the most common for both measures.

A chi-square test was considered, but as Siegal and Castellán (1988) stated that the requirements for chi-square test to be meaningful were that in the crosstabulations fewer than 20 percent of cells have expected frequencies of less than 5 and no cell has an expected frequency of less than 1. This was not possible with this sample and the pain location check-list. There were too many categories of pain location in the crosstabulations. Collapsing the categories was not considered appropriate because they would lose their meaning as a distinct location of the body.

Looking at the raw data, there were differences despite the responses obtained from the two measures seeming similar (Figure 11).

FIGURE 11. FREQUENCIES OF LOCATION OF PAIN USING THE PAIN DRAWING AND THE PAIN QUESTION



- Key
- 1 Upper Quadrant (head, neck & shoulder)
 - 2 Ventral, groin, genital
 - 3 Back, buttocks
 - 4 Extremities
 - 5 Upper quadrant & ventral
 - 6 Upper quadrant & back
 - 7 Upper quadrant & extremities
 - 8 Ventral & back
 - 9 Ventral & extremities
 - 10 Back & extremities
 - 11 Upper quadrant, ventral & back
 - 12 Upper quadrant, ventral & extremities
 - 13 Upper quadrant, back & extremities
 - 14 Ventral, back & extremities
 - 15 All

Figure 11 showed the pain location "upper quadrant, back and extremities" was mentioned nearly 9.6% more times when using the pain drawing rather than the pain question. This was 6 more people with "back, extremities and upper quadrant" pain when the patient used the pain drawing rather than the pain question. With all the other pain locations there was less than a 5% difference.

4.5 THE EFFECT OF THE INTERVIEW ON THE MAIN VARIABLES

The author investigated whether the interview made a difference to the responses to the two main measures, the pain drawing and the pain question. There were two samples: 32 patients completed the pain drawing first and an hour later the pain question and another 32 patients completed the pain question first and an hour later the pain drawing.

4.5.1 NUMBER OF SITES OF PAIN

In this section, the author examined whether any differences in the number of pain sites were reported when the measures were placed either at the beginning or later on in the interview. Two different methods were used to examine whether a difference existed. The pain site check-list was used.

In the first method, the author looked at either the pain drawing or the pain question in the two different

samples.

TABLE 10. DIFFERENCE IN NUMBER OF SITES OF PAIN BETWEEN THE PAIN DRAWING ASKED FIRST AND THE PAIN DRAWING ASKED SECOND

Mann-Whitney U Test U = 464 P = 0.644	Mean Rank	
	31.00	32 cases when the pain drawing was asked first
	33.03	31 cases when the pain drawing was asked second

Table 10 showed the Mann-Whitney U Test used on the two independent samples, where the first sample responded to the pain drawing at the beginning of the interview and the second sample responded to the pain drawing an hour later in the interview. The results showed that the two samples were not significantly different.

TABLE 11. DIFFERENCE IN NUMBER OF SITES OF PAIN BETWEEN THE PAIN QUESTION ASKED FIRST AND THE PAIN QUESTION ASKED SECOND

Mann-Whitney U Test U = 459 P = 0.448	Mean Rank	
	34.16	32 cases when the pain question was asked first
	30.84	32 cases when the pain question was asked second

Table 11 showed the Mann-Whitney U test applied to the pain question in two independent samples. In the first

sample, the patients responded to the pain question at the beginning of the interview and in the second sample the patients responded to the pain question later in the interview. As with the pain drawing, no significant difference was found between the two samples.

In the following tables a different method was used to determine whether the interview made a difference to the responses to the pain drawing and the pain question. The same sample was used to look at the difference in response between the pain drawing and the pain question.

TABLE 12. DIFFERENCE IN NUMBER OF SITES OF PAIN WHEN USING THE PAIN QUESTION FIRST

Wilcoxon Matched Pair Signed-rank Test Z = -1.577 P = 0.115	Cases	
	11	Question < Drawing
	5	Question > Drawing
	15	Question = Drawing
	Total	31

Table 12 showed the Wilcoxon test used on the sample of patients who completed the pain question at the beginning of the interview and the pain drawing an hour later. There were 15 ties, which meant the patient's response was the same when either using the pain question or the pain drawing. In 11 cases the patient reported a higher number of sites when using the pain drawing and in 5 cases the patient reported a higher number of pain sites using the pain question. There was one missing case.

TABLE 13. DIFFERENCE IN NUMBER OF SITES OF PAIN WHEN USING THE PAIN DRAWING FIRST

Wilcoxon Matched Pair Signed-rank Test Z = -1.481 P = 0.139	Cases	
		Question < Drawing
		Question > Drawing
		Question = Drawing
	Total	32

Table 13 showed the Wilcoxon test used when the pain drawing was asked at the beginning of the interview. There were 23 ties where the patient reported the same number of sites using either measures, the pain drawing or the pain question. In 7 cases the patient reported a higher number of pain sites using the pain drawing and in 2 cases the patient reported a higher number of pain sites using the pain question.

From table 12 and 13, it can be seen that the patient reported a higher number of pain sites more frequently when completing the pain drawing regardless of whether the pain drawing was at the beginning of the interview or an hour later. However, there were a high number of ties, which may have accounted for there not being a significant difference in the responses to the pain drawing and the pain question in the same sample. In addition, from tables 10 and 11, the responses to the two measures were not significantly different when asked at the beginning or later in the interview when using two independent samples.

4.5.2 LOCATION OF PAIN

The author investigated whether the interview changed the patient's response to pain location when using the pain drawing and the pain question. The chi-square test was considered but found not be appropriate because of a small sample and incongruence of collapsing several categories for pain location without loosing the meaning of the distinct pain locations.

When the pain question was asked at the beginning of the interview, the raw data showed that there were 21 ties where the patient reported the same location of pain when using the pain drawing or the pain question, in 10 cases the patient gave different responses to the pain drawing and the pain question and there was 1 missing case.

When the pain drawing was asked first in the interview, there were 22 ties where the patient reported the same location when completing the pain drawing and the pain question and in 10 cases the patient reported different locations of pain when using the pain drawing and the pain question. There were no missing cases.

4.6 OUTCOME VARIABLES

Several outcome measures were used. The descriptive statistics of these measures can be seen in appendix 0.

4.7 RELATIONSHIP OF NUMBER OF SITES OF PAIN WITH THE OUTCOME MEASURES

In this section the number of sites of pain, total percentage of body surface area in pain and the location of pain using the pain drawing and the pain question were examined against the outcome measures of pain, depression, anxiety and disability.

4.7.1 BACKGROUND VARIABLES

There were no significant relationships between the background variables and the various measures of number of sites of pain.

4.7.2 NUMERICAL RATING SCALES

Below using Spearman's Rho correlation and the Kruskal-Wallis one-way analysis of variance, the results between the various scoring systems, the pain drawing and the pain question together with pain now, the worst pain and the least pain are presented.

TABLE 14. SPEARMAN'S RHO CORRELATION BETWEEN THE NUMBER OF SITES OF PAIN USING THE DIFFERENT SCORING SYSTEMS AND THE NUMERICAL RATING SCALES

	1	2	3	4	5
PAIN NOW	0.305 *	0.242	0.193	0.263 *	0.313 *
WORST PAIN	0.228	0.076	0.005	0.220	0.174
LEAST PAIN	0.253 *	0.214	0.140	0.155	0.280 *

* = $P < 0.05$

Key 1 Pain question & the pain site check-list

2 Pain drawing & the pain site check-list

3 Pain drawing & the KF scoring system

4 Pain drawing & the adapted Toomey scoring system

5 Pain drawing & the Margolis scoring system

Table 14 showed the Spearman's rho correlations of the raw scores from the numerical rating scales and pain question and the pain drawing with the different scoring systems for number of pain sites. The pain question correlated significantly with pain now and least pain. The pain drawing with the adapted Toomey scoring system and the Margolis scoring system correlated significantly with pain now. The pain drawing with the Margolis scoring system correlated significantly with least pain. The pain drawing with the pain site check-list and the pain drawing with the KF scoring system did not correlate with any of the pain measures.

There were no significant differences between the numerical scales of pain now, worst pain and least pain

and the pain question with the pain site check-list, the pain drawing with the pain sites check-list, the pain drawing with the KF scoring system and the pain drawing and the adapted Toomey scoring system.

TABLE 15. MEAN DIFFERENCES AMONG THE NUMERICAL RATING SCALES AND THE NUMBER OF SITES OF PAIN USING THE PAIN DRAWING AND THE MARGOLIS SCORING SYSTEM

	LOW	MEDIUM	HIGH	K-W
PAIN NOW	20.65	29.44	37.24	8.130 *
WORST PAIN	26.00	26.83	35.35	3.882
LEAST PAIN	20.12	31.19	36.45	7.657 *

* = $P < 0.05$

The raw scores from the Margolis scoring system were combined to make low 1 to 3 sites, medium 4 to 6 sites and high 7 to 45 sites. Two significant results were obtained, one with pain now and the other with least pain. The mean ranks of pain now increased with the low, medium and high groups of pain sites, in other words, a patient with a lower number of sites of pain had a lower pain score and a patient with a higher number of sites had a higher pain score.

4.7.3 THE MCGILL PAIN QUESTIONNAIRE

There were a number of significant results with the different measures of number of pain sites and the McGill

Pain Questionnaire. These are described below.

TABLE 16. SPEARMAN'S RHO CORRELATION BETWEEN THE NUMBER OF SITES OF PAIN USING THE DIFFERENT SCORING SYSTEMS AND THE MCGILL PAIN QUESTIONNAIRE

	1	2	3	4	5
PRI S	0.049	0.178	0.201	0.309 *	0.231
PRI A	0.085	0.062	0.178	0.454 **	0.303 *
PRI E	0.187	0.238	0.156	0.267 *	0.189
PRI MS	0.081	0.081	0.093	0.266 *	0.182
PRI MAE	0.075	0.102	0.107	0.141	0.137
PRI T	0.134	0.197	0.217	0.436 **	0.298 *
NWC	0.134	0.180	0.201	0.448 **	0.340 **
PPI	0.255 *	0.225	0.244	0.296 *	0.291 *

* = $P < 0.05$ ** = $P < 0.01$

Key 1 Pain question & the pain site check-list
 2 Pain drawing & the pain site check-list
 3 Pain drawing & the KF scoring system
 4 Pain drawing & the adapted Toomey scoring system
 5 Pain drawing & the Margolis scoring system
 PRI Pain Rating Index
 S sensory; A affective; E evaluative
 MS miscellaneous sensory
 MAE miscellaneous affective & evaluative
 T total; NWC Number of words chosen
 PPI Present pain intensity

Table 16 showed the correlations of the MPQ and the different scoring systems for number of pain sites. The pain drawing using the adapted Toomey and the Margolis scoring systems correlated most significantly with several of the measures on the MPQ. The pain question using the pain site check-list correlated significantly with the Present Pain Intensity (PPI) on the MPQ.

The following tables show the significant results obtained when calculating the Kruskal-Wallis analysis of variance. There were no significant results with the pain question and the pain drawing when using the pain site check-list and the KF scoring system.

TABLE 17. MEAN DIFFERENCES AMONG THE MCGILL PAIN QUESTIONNAIRE AND THE NUMBER OF SITES OF PAIN USING THE PAIN DRAWING AND THE ADAPTED TOOMEY SCORING SYSTEM

	LOW	MEDIUM	HIGH	K-W
PRI S	22.47	33.44	35.33	5.578
PRI A	20.38	32.83	37.83	9.420 *
PRI E	23.82	32.92	34.80	4.198
PRI MS	26.62	29.85	36.10	2.838
PRI MAE	29.50	30.46	32.92	0.404
PRI T	20.68	32.69	37.75	8.876 *
NWC	22.03	31.10	38.50	7.970 *
PPI	21.53	34.29	33.74	6.790 *

* = $P < 0.05$

Key - see table 16

Table 17 showed the results obtained with the Kruskal-Wallis test between the MPQ and the pain drawing using the adapted Toomey scoring system. The pain drawing was recoded to low 1 to 2 sites, medium 3 to 5 sites and high 6 to 22 sites. The significant results were between the Pain Rating Index Affective and Total (PRIA & PRIT), the Number of Words Counted (NWC) and the Present Pain Intensity (PPI) and the number of sites of pain. The PPI did not increase linearly, however the medium and large group of number of pain sites had a much larger mean rank than the group with a low number of sites.

TABLE 18. MEAN DIFFERENCES AMONG THE MCGILL PAIN QUESTIONNAIRE AND THE NUMBER OF SITES OF PAIN USING THE PAIN DRAWING AND THE MARGOLIS SCORING SYSTEM

	LOW	MEDIUM	HIGH	K-W
PRI S	25.74	36.72	31.90	3.952
PRI A	25.41	32.83	35.78	3.970
PRI E	26.41	33.72	33.83	2.604
PRI MS	29.72	26.61	36.42	3.145
PRI MAE	28.50	31.47	33.45	0.907
PRI T	25.00	34.81	34.47	4.230
NWC	25.00	32.72	36.35	4.648
PPI	24.07	32.39	36.50	6.039 *

* = $P < 0.05$

Key - see table 16

Table 18 showed the results obtained with the Kruskal-Wallis test between the MPQ and the pain drawing using the Margolis scoring system. The pain drawing was recoded to low 1 to 4 sites, medium 5 to 8 sites and high 9 to 45 sites. The only significant result was between the Present Pain Intensity (PPI) and the number of pain sites. With increasing number of pain sites the mean rank of the PPI scale increased.

4.7.4 HOSPITAL ANXIETY AND DEPRESSION SCALE

There were no significant results with the Hospital Anxiety and Depression scale. Table 19 below showed the correlations of the HAD and the different scoring systems. As can be seen the correlations were very weak.

TABLE 19. SPEARMAN'S RHO CORRELATION BETWEEN THE NUMBER OF SITES OF PAIN USING THE DIFFERENT SCORING SYSTEMS AND THE HOSPITAL ANXIETY AND DEPRESSION SCALE

	1	2	3	4	5
DEPRESSION	0.202	0.221	0.132	0.199	0.177
ANXIETY	0.043	0.124	0.021	0.202	0.043

* = $P < 0.05$

- Key 1 Pain question & the pain site check-list
 2 Pain drawing & the pain site check-list
 3 Pain drawing & the KF scoring system
 4 Pain drawing & the adapted Toomey scoring system
 5 Pain drawing & the Margolis scoring system

No significant differences were found when the Kruskal-Wallis one-way analysis of variance was applied. In table 20, the adapted Toomey scoring system with the pain drawing was recoded to low 1 to 2 sites, medium 3 to 5 sites and high 6 to 22 sites.

TABLE 20. MEAN DIFFERENCES AMONG THE HOSPITAL ANXIETY AND DEPRESSION SCALE AND THE NUMBER OF SITES OF PAIN USING THE PAIN DRAWING AND THE ADAPTED TOOMEY SCORING SYSTEM

	LOW	MEDIUM	HIGH	K-W
DEPRESSION	25.91	32.42	33.63	1.987
ANXIETY	24.12	31.25	36.55	4.514

* = $P < 0.05$

4.7.5 MODIFIED SICKNESS IMPACT PROFILE

There were a number of significant results with the different measures and the various scoring systems for

number of sites of pain and the Sickness Impact Profile. These are described below.

TABLE 21. SPEARMAN'S RHO CORRELATION BETWEEN THE NUMBER OF SITES OF PAIN USING THE DIFFERENT SCORING SYSTEMS AND THE SICKNESS IMPACT PROFILE

	1	2	3	4	5
SIP TOT	0.191	0.184	0.062	0.333 **	0.238
SIP SR	0.181	0.134	-0.044	0.088	0.042
SIP EB	0.072	0.109	0.020	0.260 *	0.154
SIP HM	0.284 *	0.312 *	0.187	0.306 *	0.235
SIP SI	0.137	0.095	0.049	0.220	0.152
SIP W	0.143	0.145	0.032	0.373 **	0.290 *
SIP RP	0.154	0.189	0.055	0.257 *	0.262 *

* = $P < 0.05$

** = $P < 0.01$

Key 1 Pain question & the pain site check-list
 2 Pain drawing & the pain site check-list
 3 Pain drawing & the KF scoring system
 4 Pain drawing & the adapted Toomey scoring system
 5 Pain drawing & the Margolis scoring system
 SIP Sickness Impact Profile
 TOT total; SR sleep and rest;
 EB emotional behaviour; HM home management
 SI social interaction; W work
 RP recreation and pastimes

Table 21 showed the correlations of the Sickness Impact Profile and the various scoring systems for the number of sites of pain. The pain question and pain drawing with the pain site check-list correlated significantly with the home management (HM) on the SIP. The adapted Toomey scoring system with the pain drawing correlated with the total score of the SIP and several subscales, including

emotional behaviour, home management, work and recreation and pastimes. The Margolis scoring system correlated with work and recreation and pastimes.

The following tables showed the results obtained when calculating the Kruskal-Wallis analysis of variance. There were no significant results with the pain question and the pain drawing when using the pain site check-list or the KF scoring system.

TABLE 22. MEAN DIFFERENCES AMONG THE SICKNESS IMPACT PROFILE AND THE NUMBER OF SITES OF PAIN USING THE PAIN DRAWING AND THE ADAPTED TOOMEY SCORING SYSTEM

	LOW	MEDIUM	HIGH	K-W
SIP TOT	24.12	31.25	36.55	4.514
SIP SR	26.88	34.48	30.33	1.885
SIP EB	26.29	29.98	36.22	3.017
SIP HM	25.62	29.85	36.95	3.941
SIP SI	27.47	30.02	35.17	1.852
SIP W	23.82	30.46	37.75	6.645 *
SIP RP	24.76	32.23	34.83	3.146

* = $P < 0.05$

Key - see table 21

Table 22 showed the results obtained with the Kruskal-Wallis test between the SIP and the pain drawing using the adapted Toomey scoring system. The pain drawing was recoded to low 1 to 2 sites, medium 3 to 5 sites and high 6 to 22 sites. There was only one significant result. The mean ranks increased significantly for work with a rise in number of sites of pain.

TABLE 23. MEAN DIFFERENCES AMONG THE SICKNESS IMPACT PROFILE AND THE NUMBER OF SITES OF PAIN USING THE PAIN DRAWING AND THE MARGOLIS SCORING SYSTEM

	LOW	MEDIUM	HIGH	K-W
SIP TOT	27.22	28.78	37.35	3.885
SIP SR	27.89	34.39	31.52	1.394
SIP EB	29.37	27.56	35.97	2.451
SIP HM	27.11	32.44	34.17	1.879
SIP SI	29.91	26.64	36.17	2.874
SIP W	26.09	27.89	39.45	7.992 *
SIP RP	26.57	30.42	36.63	3.469

* = $P < 0.05$

Key - see table 21

Table 23 showed the results obtained with the Kruskal-Wallis test between the SIP and the pain drawing using the Margolis scoring system. The pain drawing was recoded to low 1 to 4 sites, medium 5 to 8 sites and high 9 to 45 sites. There was only one significant results. The change in the mean ranks increased significantly for work with a rise in number of sites of pain.

4.8 RELATIONSHIP OF THE PERCENTAGE OF BODY SURFACE AREA IN PAIN WITH THE OUTCOME MEASURES

The outcome measures were correlated using the Spearman's Rho with the percentage of body surface area in pain by using the pain drawing with the weighted Margolis scoring system. The Kruskal-Wallis analysis of variance was used to look at the difference of mean ranks and the percentage of body surface area was recoded to low (1% to 8%), medium (9% to 19.25%) and high (20.5% to 100%).

4.8.1 NUMERICAL RATING SCALES

TABLE 24. SPEARMAN'S RHO CORRELATION BETWEEN THE PERCENTAGE OF BODY SURFACE AREA (PBSA) AND THE NUMERICAL RATING SCALES

Spearman's Rho Correlation	PBSA
Pain now	0.344 **
Worst pain	0.246
Least pain	0.310 *

* = $P < 0.05$

** = $P < 0.01$

Table 24 showed the correlations between the percentage of body surface area and the numerical rating scales of pain intensity. The strongest correlation was between pain now and the percentage of body surface area.

TABLE 25. MEAN DIFFERENCES AMONG THE NUMERICAL RATING SCALES AND THE PERCENTAGE OF BODY SURFACE AREA

	LOW	MEDIUM	HIGH	K-W
PAIN NOW	20.62	30.83	39.44	11.14 **
WORST PAIN	20.97	33.92	35.08	7.105 *
LEAST PAIN	21.09	31.40	38.66	9.778 **

* = $P < 0.05$

** = $P < 0.01$

Table 25 showed the mean differences for pain now, worst pain and least pain were significant when using the pain drawing with the weighted Margolis scoring system. The

patient with a larger percentage of body surface area in pain reported a higher pain score.

4.8.2 THE MCGILL PAIN QUESTIONNAIRE

TABLE 26. SPEARMAN'S RHO CORRELATIONS BETWEEN THE PERCENTAGE OF BODY SURFACE AREA (PBSA) AND THE MCGILL PAIN QUESTIONNAIRE

	PBSA
PRI S	0.301 *
PRI A	0.359 **
PRI E	0.152
PRI MS	0.240
PRI MAE	0.127
PRI T	0.343 **
NWC	0.413 **
PPI	0.273 *

* = $P < 0.05$

** = $P < 0.01$

Key - PRI Pain Rating Index

S sensory; A affective; E evaluative

MS miscellaneous sensory

MAE misc. affective & evaluative

T total

NWC Number of words chosen

PPI Present pain intensity

Table 26 showed the correlations between the MPQ and the total percentage of body surface area. There were highly significant correlations between the Affective Pain Rating Index, the Total Pain Rating Index and the Number of Words Chosen.

TABLE 27. MEAN DIFFERENCE AMONG THE MCGILL PAIN QUESTIONNAIRE AND THE PERCENTAGE OF BODY SURFACE AREA IN PAIN

	LOW	MEDIUM	HIGH	K-W
PRI S	25.88	27.85	37.25	5.031
PRI A	24.24	29.55	37.00	5.416
PRI E	27.74	31.30	33.06	0.956
PRI MS	26.15	28.92	36.17	3.642
PRI MAE	27.68	29.90	34.27	1.587
PRI T	24.88	28.27	37.60	5.824
NWC	24.18	26.48	39.60	9.519 **
PPI	25.82	29.25	35.91	4.073

** = $P < 0.01$

Key - see table 26

Table 27 showed that the only significant result was for Number of Words Chosen. However there was a trend where scores on the PRI sensory, affective and total and the PPI scales increased with higher percentage of body surface area.

4.8.3 THE HOSPITAL ANXIETY AND DEPRESSION SCALE

There were no significant results between the measure of body surface area in pain and the Hospital Anxiety and Depression Scores.

4.8.4 THE MODIFIED SICKNESS IMPACT PROFILE

TABLE 28. SPEARMAN'S RHO CORRELATIONS BETWEEN THE SICKNESS IMPACT PROFILE AND PERCENTAGE OF BODY SURFACE AREA IN PAIN

	PBSA
SIP TOT	0.225
SIP SR	0.060
SIP EB	0.158
SIP HM	0.193
SIP SI	0.156
SIP W	0.309 *
SIP RP	0.217

* = $P < 0.05$

Key - SIP Sickness Impact Profile
TOT total; SR sleep and rest
EB emotional behaviour
HM home management
SI social interaction; W work
RP recreation and pastimes

Table 28 showed the Spearman's Rho correlations between the measures of the SIP and the percentage of body surface area in pain. There was only one association between work and percentage of body surface area in pain.

There were no significant difference in the low, medium and high groups of total percentage of body surface area when the Kruskal-Wallis test was applied.

4.9 RELATIONSHIP OF PAIN LOCATION WITH THE OUTCOME MEASURES

The relationships of the pain location using the different scoring systems and the outcome variables of pain, anxiety, depression and disability were considered by using the chi-square test. However this was not undertaken, because there were too many categories for pain location and the sample was too small, to justify the rules for a chi-square test, as already discussed in section 4.4.4.3.

4.10 RELIABILITY OF THE PAIN QUESTION AND THE PAIN DRAWING USING THE DIFFERENT SCORING SYSTEMS

Two types of reliability were investigated, inter-rater reliability and test-retest reliability for both the pain question and the pain drawing and the various scoring systems.

4.10.1 INTER-RATER RELIABILITY FOR SCORING THE NUMBER OF SITES OF PAIN WHEN USING THE PAIN QUESTION AND THE PAIN DRAWING

Two raters, the author and the other researcher coded the pain question and the pain drawing using the different scoring systems. The author coded all the pain questions and the pain drawings. The researcher coded 10% of the pain questions and 10% of the pain drawings using the

various scoring systems. The 10% of cases were chosen at random. The inter-rater reliability of the different scoring systems are described below.

TABLE 29. INTER-RATER RELIABILITY FOR NUMBER OF SITES OF PAIN USING THE DIFFERENT SCORING SYSTEMS FOR THE PAIN QUESTION AND THE PAIN DRAWING

MEASURE OF PAIN SITES	% OF AGREEMENT
1	100 %
2	82 %
3	100 %
4	90 %

- Key 1 Pain question & the pain site check-list
 2 Pain drawing & the pain site check-list
 3 Pain drawing & the KF scoring system
 4 Pain drawing & the adapted Toomey scoring system

Table 29 showed the percentage of agreements between two raters scoring the pain question and the pain drawing and using the different scoring systems.

TABLE 30. INTER-RATER RELIABILITY OF THE NUMBER OF SITES OF PAIN USING THE PAIN DRAWING AND THE MARGOLIS SCORING SYSTEM

5	BLIND	TOGETHER
1rst CHECK	60 %	90 %
2nd CHECK	60 %	100 %
3rd CHECK	86 %	100 %

- Key 5 Pain drawing & the Margolis scoring system

The inter-rater reliability of the Margolis scoring

system was weaker than the other scoring systems. A researcher scored the raw data blindly to the author and moderate percentage of agreements were obtained. After checking the two ratings higher figures of inter-rater reliability were acquired.

4.10.2 TEST-RETEST RELIABILITY FOR SCORING THE NUMBER OF SITES OF PAIN WHEN USING THE PAIN QUESTION AND THE PAIN DRAWING

As was mentioned in section 4.2, 11 patients were asked to complete the pain question and the pain drawing twice in the interview for the purpose of calculating the test-retest reliability. This is described below.

TABLE 31. SPEARMAN'S RHO CORRELATIONS OF TEST-RETEST RELIABILITY FOR THE NUMBER OF SITES OF PAIN WITH THE PAIN QUESTION AND THE PAIN DRAWING AND THE DIFFERENT SCORING SYSTEMS

SCORING SYSTEM	SPEARMAN'S
1	0.896 **
2	0.929 **
3	1.00 **
4	0.902 **
5	0.688 *

* = $P < 0.05$

** = $P < 0.01$

- Key
- 1 Pain question & the pain site check-list
 - 2 Pain drawing & the pain site check-list
 - 3 Pain drawing & the KF scoring system
 - 4 Pain drawing & the adapted Toomey scoring system
 - 5 Pain drawing & the Margolis scoring system

Table 31 showed all correlations were significant. The pain drawing with the Margolis scoring system had the lowest correlation.

4.10.3 TEST-RETEST RELIABILITY FOR SCORING THE PERCENTAGE OF BODY SURFACE AREA IN PAIN

TABLE 32. SPEARMAN'S RHO CORRELATIONS OF TEST-RETEST RELIABILITY FOR THE PERCENTAGE OF BODY SURFACE AREA IN PAIN (PBSAP)

	SPEARMAN'S
PBSAP	0.734 *

* = $P < 0.05$

4.10.4 RELIABILITY OF LOCATION OF PAIN

The author scored all the pain questions and the pain drawings with the pain location check-list. The researcher scored 10% of the sample choosing them at random. Inter-rater reliability was 100% when pain location was scored by using the pain location check-list with the pain question and pain drawing.

Test-retest reliability for pain location was considered, but the chi-square test was not appropriate. As in section 4.9, the expectant frequencies were lower than 5 in more than 20% of the cells in the crosstabulation of

the pain question and the pain drawing. In the figures below, visual correlation are presented in forms of scattergrams.

FIGURE 12. SCATTERGRAM OF LOCATION OF PAIN OF PAIN USING THE PAIN QUESTION TWICE IN THE SAME INTERVIEW

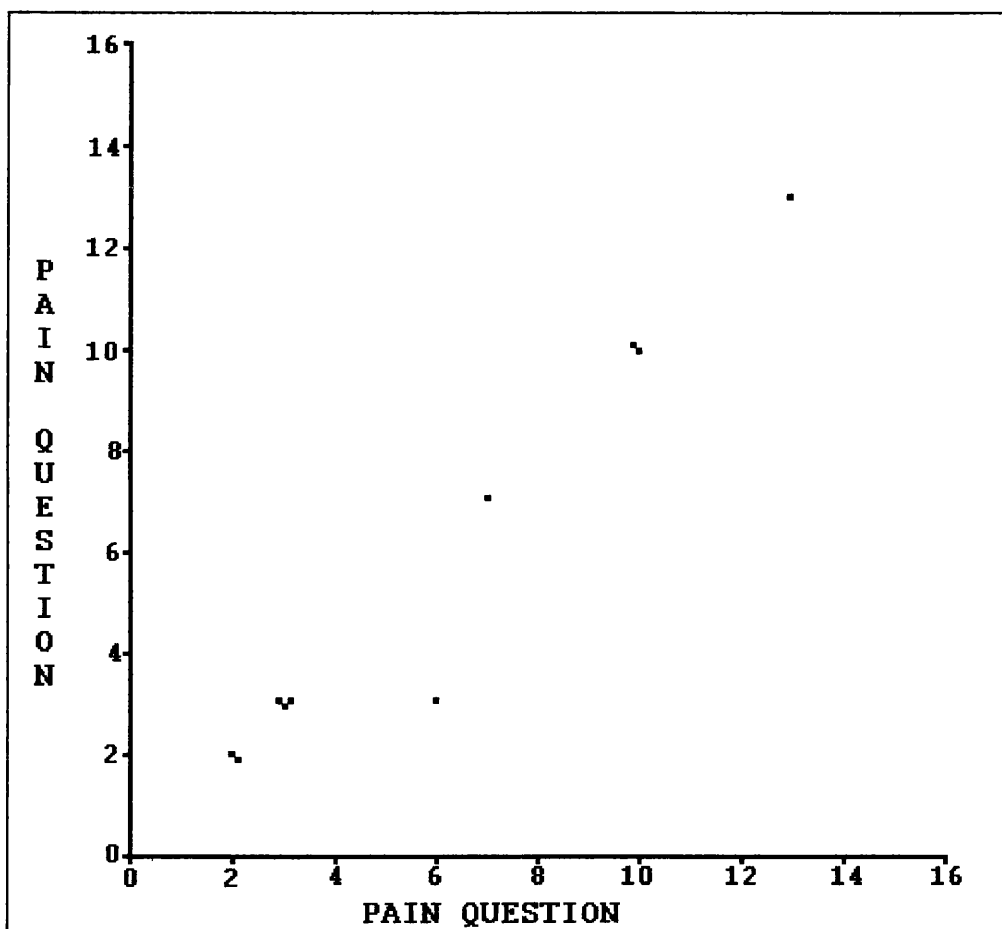


Figure 12 showed the scattergram of the pain location when using the pain question twice in the same interview. It demonstrated that the test-retest reliability was high, since the scattergram represented a very good positive correlation.

FIGURE 13. SCATTERGRAM OF LOCATION OF PAIN USING THE PAIN DRAWING TWICE IN THE SAME INTERVIEW

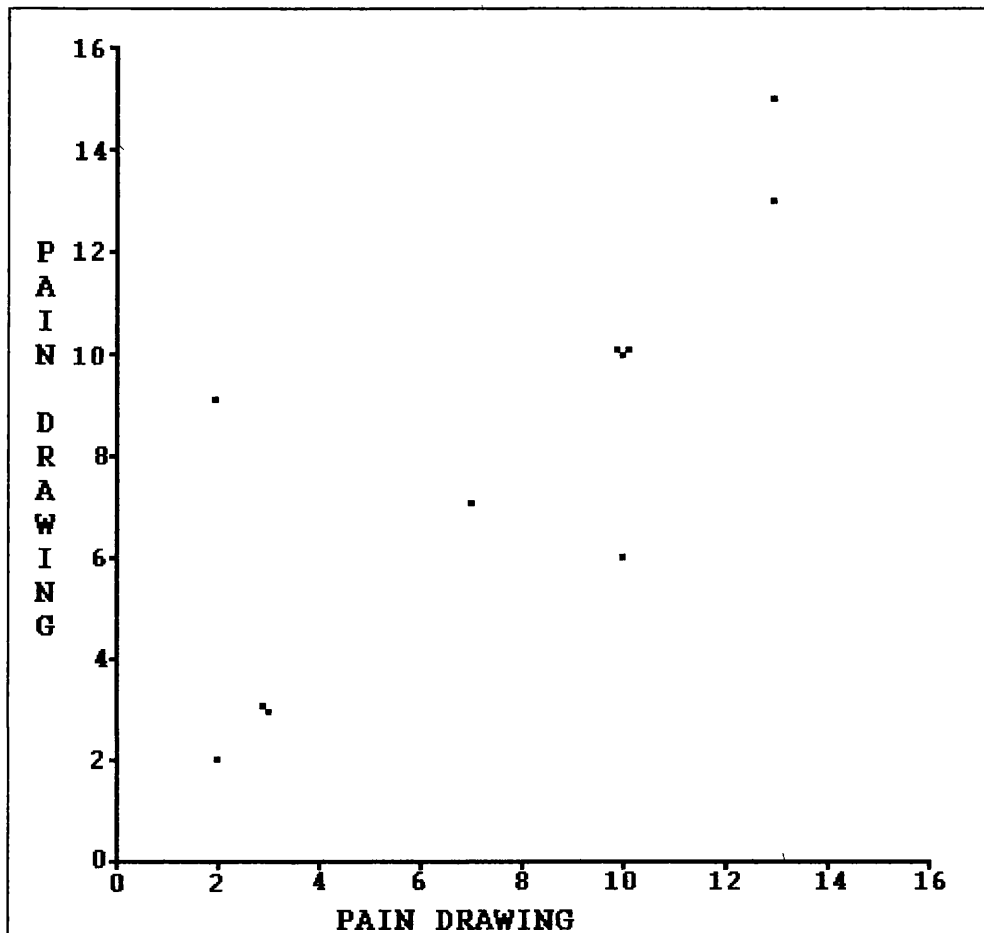


Figure 13 showed the scattergram of pain location but using the pain drawing. The correlation was not as good as for the pain question.

4.11 VALIDITY

The Multitrait Multimethod Matrix (MTMMM) described by Campell and Fiske (1959) was considered to assess construct validity of the two measures, the pain question and the pain drawing. The two traits were site of pain

and location of pain. However the MTMM was not appropriate because the location of pain was categorical data and could therefore not be used since the MTMM requires numbers of at least ordinal level.

5.0 DISCUSSION

The current study has highlighted several important factors in trying to measure aspects of pain with the pain drawing and the pain question in people who have chronic non-malignant pain. The following chapter will firstly, summarize the results; secondly discuss in more detail the findings in relation to the aims and the literature review; thirdly, outline the limitations of the study; fourthly, recommend further research in pain assessment and management and finally conclude the study.

5.1 SUMMARY OF RESULTS

The number of sites of pain measured by the various scoring systems revealed a number of factors. All the scoring systems correlated significantly with each other (see section 4.4.3). The lowest correlations were between the pain question scored with the pain site check-list and the pain drawing scored with all other scoring systems.

The relationship between the pain question and the pain drawing using the pain site check-list showed that the two measures were significantly correlated, but there was a also significant difference between the measures (see section 4.4.1.3).

Using the pain question or the pain drawing to score the location of pain gave similar results with the "back and extremities" being the most common location for both measures. However, the location "upper quadrant, back and extremities" was recorded more often when using the pain drawing rather than the pain question (section 4.4.4.3).

The interview seem unlikely to have an effect on the responses to the pain question and the pain drawing (see section 4.5.1 and section 4.5.2), since the responses to the pain drawing tended to mention more sites of pain irrespective of administering the measure at the beginning or end of the interview.

The correlations between the outcome measures and the number of pain sites measured by various scoring systems showed that the adapted Toomey, the Margolis and the weighted Margolis scoring systems were significantly correlated with scores on the numerical rating of pain, MPQ and the SIP. (section 4.7.2 to 4.8.4). The HAD did not correlate with any of the scoring systems for number of pain sites.

The Kruskal-Wallis analysis of variance showed that there were significant differences between the low, medium and high number of sites of the different scoring systems and the outcome measures. For the numerical rating scale of pain, only the Margolis and the weighted Margolis scoring system were found to be significant, in other words, a

patient with a lower number of sites of pain had a lower pain score and a patient with a higher number of sites had a higher pain score (section 4.7.2 and 4.8.1). For the MPQ, the Toomey scoring system had several significant differences in mean ranks for low, medium and high number of sites, for instance, a patient with a lower total Pain Rating Index (PRI) score reported a lower number of sites of pain and a patient with a higher total PRI score reported a higher number of sites of pain (section 4.7.3). The HAD showed no significant differences with any of the scoring systems. With the SIP, the Toomey, Margolis and adapted Margolis scoring systems showed a significant difference with work, that is patients reporting a higher number of sites of pain, also reported more problems with work.

The inter-rater reliability figures of the different scoring system were satisfactory (between 82% and 100%) except for the Margolis and the adapted Margolis system, which needed to be checked by two raters together to improve the reliability (section 4.10.1). For test-retest reliability, again the Margolis and adapted Margolis had the lowest correlation using a Spearman's rho correlation (section 4.10.2).

The inter-rater reliability for measuring pain location was good and the scattergrams showed very good positive correlations for the test-retest reliability (section 4.10.4).

5.2 DISCUSSION OF FINDINGS IN RELATION TO THE AIMS AND LITERATURE REVIEW

The four aims outlined in the introduction and repeated in the methods will now be discussed in relation to the results and the literature review.

5.2.1 RELATIONSHIP BETWEEN THE RESPONSES TO THE PAIN QUESTION AND THE RESPONSES TO THE PAIN DRAWING

The first aim was to look at the relationship between the responses to the pain drawing and the responses to the pain question. No other study was found in the literature search that looked specifically at the pain question. There were a number of studies that looked at the pain drawing but not directly in relation to the pain question. Only McCaffery and Beebe (1989) and Margoles (1983) mentioned verbal description of pain location. McCaffery et al (1989) said:

"When asking a patient about the location of pain, do not rely solely on a verbal description of the location. Ask the patient to point to or trace with two fingers the area of pain. Verbal descriptions of pain location can be confusing and nonspecific." (p. 22)

Similarly, Margoles (1983) felt that the pain drawing provided a more accurate record of pain than the verbal or written record and said:

"the pain chart has the capability of demonstrating areas of involvement that are not always completely disclosed or understood in the verbal recording of pain complaints." (p. 218)

The results indicated that responses to the pain drawing and the pain question were not identical. Two aspects of pain were measured, number of sites of pain and location of pain. To compare the responses to the pain question and the pain drawing, the same scoring system was used for the measures, that is, the pain site check-list was used for the number of sites of pain and the pain location check-list was used for the location of pain (See Appendix M and Appendix N).

For the number of sites of pain, scoring the pain drawing and the pain question revealed that in 18/63 or 28.6% the pain drawing scored a higher number of sites than the pain question. Regardless of whether the pain question or the pain drawing was asked at the beginning or later in the interview, the pain drawing scored a higher number of sites more often. In addition, the correlations between the different scoring systems for the number of sites of pain revealed that the weakest correlations were between the pain question with the pain-site check-list and the pain drawing with the KF, adapted Toomey and Margolis

scoring systems.

For the location of pain, the responses to the pain drawing seemed to reveal larger locations of pain such as "upper quadrant, back and extremities" whereas the responses to the pain question were more often coded to smaller locations such as "ventral" or "upper quadrant and extremities".

These findings suggest that the pain drawing and the pain question were measuring different aspects of pain. It was possible that the patient only mentioned their major pain with the pain question and reported other pains with the pain drawing. Perhaps when a patient was asked the pain question, they did not have the space to expand on their answer, because other questions were being fired at them and when they drew their pain they had more time to think about their pain or pains and therefore greater freedom to report more. It was possible that the author or the researcher wanted to know about the major pain when asking the pain question and subconsciously a patient would only give one site of pain and location. Or the patient felt it was important to stress only one site of pain when asked the question, because they wanted the author or researcher to know where it hurt as they were directly talking to them. With the pain drawing, the patient was not directly facing the author or researcher but looking at the paper and drawing their pain on the paper. This may have allowed the patient to draw more

sites of pain rather than just talk about the most important pain. The body outline on the paper may have given the patient a prompt to think about different areas of the body and therefore revealed more sites of pain and larger locations of pain. The pain question is an open question and did not prompt the patient to think about the whole body, but possibly made the patient concentrate on where the central or most important pain was. With this in mind, the scoring systems for the two measures were probably scoring different aspects of pain and therefore suggests why the correlations between the pain drawing with the scoring systems and the pain question with the pain site check-list were the weakest.

In addition, the pain drawing revealed more precise locations of pain, especially regarding whether the pain was on the right or left side of the body. From the first pilot study (section 3.7.1), the author could not code several pain questions with the Kabat-Zinn scoring system, because it demanded details about whether the pain was on the left or right side of the body. This detail was given in the pain drawings, but not necessarily in the pain question. With the pain drawing the patient is forced to think about which side the pain is on, but not with the pain question.

Clinically, the pain question is possibly not adequate to assess all the number of sites of pain and the precise location of pain, even though asking "where is your pain"

is a common question asked by health professionals at the initial examination or assessment of a person's pain and may be the only such question. This study suggests that a pain question may only report some of the patient's pain and possibly not give a precise location. The study supports McCaffery et al (1989) and Margoles (1983) statements that the verbal description of pain is not adequate in disclosing all the pain sites and locations of pain. If a health professional were to only ask the pain question, other questions need to be asked about possible other sites of pain and where exactly the pain is, right or left, in the lower or upper part of the body, for example.

5.2.2 THE RELATIONSHIP BETWEEN THE RESPONSES TO THE PAIN QUESTION AND THE PAIN DRAWING AND THE OUTCOME MEASURES

The second aim was to examine the responses to the pain drawing and the pain question to the outcome measures of pain, anxiety, depression and disability. Several studies have shown relationships between these outcome measures and the responses to a pain drawing, but no studies were found in relation to the responses of the pain question. The relationship to the outcome measures will now be discussed.

Only the number of sites of pain and the percentage of body surface area were examined against the outcome measures. The location of pain was not examined, because

of its categorical status and incompatibility with using any type of inferential statistics.

The different scoring systems for the number of sites of pain and the percentage of body surface area in pain revealed several things. Firstly, the pain question and the pain drawing with the pain site check-list revealed different results. The pain question correlated significantly with several measures on the numerical rating scales of pain and on the MPQ and with home management on the SIP. However, the pain drawing only correlated significantly with home management on the SIP. In this case, the same scoring system was used, but from the previous section, the responses to the pain drawing revealed more sites of pain than the pain question. The responses to the pain question are more sensitive in correlating with outcome measures than the responses to the pain drawing when using the pain site check-list.

Secondly, the pain drawing with the KF scoring system did not correlate with any of the outcome measures. The other scoring systems with the pain drawing, that is the adapted Toomey, Margolis and the weighted Margolis, correlated with several measures on the numerical rating scales of pain, the MPQ and the SIP. It shows that the scoring system with only 10 sites did not correlate with any outcome measures, whereas the more complex scoring systems with 22 or 45 sites or the percentage of surface area did show a relation to the outcome measures.

These results suggest a number of things. It was possible that with the pain site check-list, the pain question was more sensitive to outcome measures, such as pain and disability, because the patient had only mentioned the most important pain or pains. This supports the argument that the pain question elicits the pain that most affects the patient. In the pain drawing, other pains were revealed which distorted the relationship to outcome measures. However, with a scoring system with more sites represented, such as the adapted Toomey scoring system, other sites of pains became important in relation to the outcome measures.

In the following section, the findings with the various outcomes measures will be discussed in more detail.

a) Pain

There were some interesting findings between the scoring systems and pain measured either by a numerical rating scale of pain or with the MPQ.

On the numerical rating scale, only pain now and least pain correlated significantly with some of the scoring systems, or in other words, patients who reported more number of sites of pain or percentage of body surface area in pain, also reported higher intensities of pain for pain now and least pain, respectively. Worst pain did not correlate significantly with any of the scoring

systems. These results support Toomey, Mann, Abashian and Thompson-Pope (1991) findings who used the pain drawing with the weighted Margolis scoring system and a visual analogue scale to measure pain intensity. They found a significant difference between a low and high percentage of body surface area group with pain intensity increasing in the high group. However, Toomey et al (1983) found only a weak correlation between number of pain sites and pain intensity and no significant difference between a low, medium and high group of number of sites of pain and pain intensity when using a 10 point scale. Looking more carefully at the present study's results, it showed that the correlations were weak and many other factors could have increased the pain intensity in people with more pain sites, such as pain in a certain location or deep or superficial pain which could make a difference to the reporting of number of pain sites and intensity of pain.

With the MPQ, again several of the measures correlated significantly with the more complex scoring systems such as the adapted Toomey scoring system. The present results support Toomey et al (1983) who found that all measures of the MPQ correlated significantly with the number of sites obtained. Krause et al (1989) found that all the scores on the MPQ were significant when using a MANOVA with the percentage of body surface area in pain as the independent variable. However, both these studies found a stronger correlation or significant difference with the sensory PRI score, which was not reflected in the present

study. The present study did, however, find a stronger correlation and significant difference with the affective PRI score which had not been suggested in past literature. The different findings could be attributed to the samples. The present sample was recruited by consultants referring suitable patients to the study, whereas both Toomey et al (1983) and Krause et al (1989) recruited their patients from their own pain clinic. It is possible that the present sample had more patients who had pain for longer, had sought more treatments and have seen more people for their pain than in Toomey et al and Krause et al's sample. Toomey et al also had a majority of patients with head and face pain which was different to the present study.

Toomey et al (1991) found that the low and high groups of percentage of body surface area in pain were significantly different with the number of words counted and the total PRI score on the MPQ. This is more consistent with the present findings, that the greater the percentage of surface area in pain the more verbal descriptors of higher and more intense pain are mentioned.

b) Anxiety and Depression

There were no significant relationships between the Hospital Anxiety and Depression Scale and the various scoring systems for the number of sites of pain. In

contrast, Huston (1987) found that patients who indicated pain in all four limbs in addition to the trunk or vertex of the skull, 47% had an abnormal HAD score on one or both of the subscales. However, Ginzburg, Merskey and Lau (1988) and Hildebrandt, Franz, Choroba-Mehnen and Temme (1988) found the association between psychological involvement and the responses to the pain drawings were weak and questioned whether the pain drawing should be used as a measure of psychological disturbance. The present study would not recommend the pain question or the pain drawing to be used as a measure of anxiety or depression, because no associations could be found. The assumption that more pain would make a person more or less anxious or depressed was not found. A number of other factors found in the chronic non-malignant pain patient could contribute to a patient being anxious or depressed, but as this study showed, the number of sites of pain was unlikely to be a factor. Clinically, pain drawings which have been used as a screening tool for psychological well being, such as in the Ransford et al's study (1976) are not recommended by the present findings.

A possible reason for the lack of association between the number of sites of pain and the percentage of body surface area in pain and the HAD, is the HAD itself. It is possible that the HAD is not a sensitive measure to assess anxiety and depression in this sample.

why not

c) Disability

The pain drawing with the adapted Toomey scoring system had the most correlations with the different scores on the SIP. It correlated significantly with the total SIP score, emotional behaviour, home management, work and recreation and pastimes. The adapted Toomey scoring system also scored a significant difference with work and a low, medium and high number of sites. This suggests that the higher number of pain sites the more problems there are with work. These results support Toomey et al (1991) who found that the group with the higher percentage of body surface area was more likely to report a pain related job change. However, as Toomey et al (1991) stressed the change in the job could be for a number of other reasons such as moving to a more appropriate job, retirement, or dismissal for instance.

5.2.3 RELIABILITY AND VALIDITY OF THE PAIN QUESTION AND OF THE PAIN DRAWING

The third aim was to explore the reliability and validity of the pain question and the pain drawing.

a) Reliability

Both inter-rater reliability and test-retest reliability were tested. The pain question scored with the pain site check-list and the pain drawing scored with the KF

scoring system were the most reliable with regard to inter-rater reliability. The Margolis and the adapted Margolis were not as reliable in scoring the pain drawing. This is different from the findings of Margolis et al (1986; 1988). They found that the pain drawings had been easy to score. However, the present study found that the more sites a pain drawing scoring system had the more unreliable it became to score the pain drawing. For the Margolis scoring systems two raters needed to check all their codings to enhance the reliability. why

For test-retest reliability, the same was found. The lowest correlations, using a Spearman's Rho, were with the Margolis scoring systems. The more sites the scoring system contained the lower the correlation was when retesting the scoring systems a second time. These findings are interesting, in that the KF scoring system was the most reliable, in terms of inter-rater and test-retest reliability, however, it was also the least sensitive measure in relation to the outcome measures.

The inter-rater reliability for the pain question and the pain drawing using the pain location check-list was 100% and considered very reliable. With the test-retest reliability, the scattergrams showed that there was a very good correlation and that the reliability was satisfactory.

b) Validity

The validity of the two measures, the pain question and the pain drawing proved to be difficult. However, from the discussion in section 5.2.1, it seemed likely that the pain question and the pain drawing were measuring slightly different aspects of a person's pain. The pain question may have measured the most important pain to the patient, whereas the pain drawing probably measured most pains that concerned the patient.

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pain
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5.2.4 IMPLICATIONS OF THE PAIN DRAWING AND THE PAIN QUESTION IN THE MANAGEMENT OF CHRONIC NON-MALIGNANT PAIN

The implications of the pain drawing and the pain question in the management of chronic non-malignant pain, which is the fourth aim, are several. Certainly the pain drawing should be included into any assessment of chronic non-malignant pain, because it could reveal more pain sites and different pain locations. Clinically, this is important for the health professional who aims to improve or alleviate a patient's pain to know where exactly the pain is.

The study showed that the correlations between the pain drawing and the pain question and the outcome measures were moderate. The strongest correlations were between intensity of pain and with work on the SIP. This showed that there was a relationship between the number of sites

of pain or percentage of body surface area in pain and these outcome measures. The Kruskal-Wallis analysis of variance showed that the more the number of pain sites or surface area, the more intense the pain was or the more work problems existed. However, caution needs to be taken about making conclusive decisions about the relationship between these variables. Pain is multifactorial and the relationships reflected this. A number of other factors could have influenced the number of pain sites.

The Gate-Control theory of pain explains the subjective nature of pain and how people are affected by the pain in many different ways and therefore, can express pain differently. There is no straight one to one relationship between injury and pain, but pain is influenced by a multitude of factors such as mood, culture, experience and expectations for instance. Pain is complex. Probably a number of factors were operating when the patient was asked the pain question or asked to complete the pain drawing. For instance, asking a direct question to the patient with chronic non-malignant pain was not necessarily getting at all the patient's pains and only asked about one aspect of pain and not all of them. The multifactorial aspects of pain also support the moderate relationships between number of pain sites and the outcome measures.

Loeser's model of pain further supports the different responses to the pain question and the pain drawing and

the moderate relationships with the outcome measures. When a patient was asked about their pain, what they said to the observer was influenced by nociception, pain and suffering. The pain question and the pain drawing were not just asking about nociception. Other components of pain, such as the perception of noxious stimulus and suffering, disability for instance, came into operation. It is possible that these components operated to different degrees when asking the pain question or the pain drawing.

Clinically, neither the pain question nor the pain drawing should be used to measure anxiety and depression. The present study agrees with Karoly and Jensen (1987), who do not recommend the pain drawing as a measure of "psychopathology" but solely as a measure for location of pain and percentage of body surface area in pain. With regard to the pain question and the pain drawing being used as a measure of pain intensity or disability, the study has shown that the relationships were only moderate to weak and therefore does not recommend the use of the pain question or pain drawing to measure pain intensity and disability. False assumptions would be made if health professionals started using the pain question and the pain drawing for these purposes. Certainly, the pain drawing should not be used as a measure of psychological outcome as described by Ransford et al (1976), but which has been used by a number of researchers and clinicians (Frymoyer, 1988; Waddell, Bircher, Finlayson and Main,

1984; Waddell and Richardson, 1992).

5.3 LIMITATIONS OF THE STUDY

Several limitations were encountered in the present study, which are described in this section.

Firstly, the sample size was only moderate and any further studies should aim at bigger sample sizes to improve the power and efficiency of the statistical tests.

Non-parametric statistics were used throughout the study, because of the ordinal nature of the data. New ways of scoring the data could be investigated to use the more powerful parametric and multivariate statistics.

The majority of patients in the sample had back and buttock pain and a large number of patients also reported extremities as another source of pain. A more heterogeneous sample would be needed to test in more detail whether differences between the pain question and the pain drawing exist. However, as Davies, Crombie, Macrae and Rogers's (1992) extensive study found in 10 different outpatient pain clinics in Scotland and northern England that the most frequently reported location was the "lower back" and the second most frequent location was "buttock and lower limb". This is similar to the present study, and showed that the present

study probably did have a representative sample of patients with chronic non-malignant pain with regard to pain location.

The study was conducted on patients mainly attending a hospital outpatient clinic. No attempt was made to include people whose pain was managed by general practitioners or people who were in-patients because of their pain. To improve the generalisability of the study's results, further studies with different samples of people with chronic non-malignant pain are needed.

Pain location was not fully examined because of the incompatibility with any inferential statistics. The multitrait multimethod matrix was not used to explore the construct validity, because the data obtained from pain location were categorical. Other methods of scoring pain location need to be investigated.

The scoring systems, especially the Margolis and adapted Margolis scoring systems, need to be improved to obtain more acceptable levels of inter-rater and test-retest reliabilities. Photocopying the pain drawing, as shown in appendix B, distorted the outline by several millimetres, therefore the plastic template did not exactly match some of the pain drawings. This made the scoring difficult and probably contributed to the low reliability results for the Margolis scoring system.

5.4 IMPLICATIONS FOR FURTHER RESEARCH

Both Toomey et al (1991) and Krause et al (1989) recommend further research in this area because little research has shown relationships between the number of sites of pain, percentage of body surface area in pain and pain location.

The present study was unable to use inferential statistics on pain location. Other scoring systems for both the pain drawing and the pain question need to be developed for the number of sites of pain to allow the possibility of using multivariate statistics which could further the contribution of these measures to pain intensity and disability.

Other factors such as coping strategies or diagnosis could be further examined in relation to the pain question and the pain drawing.

Scoring systems need to be improved to obtain reasonable levels of reliability. Photocopying the pain drawing must be avoided and other methods of printing the body outline could be explored. With greater technology, such as computers, coding and scoring the pain drawing can be improved. However, these programs are at present not widely used and are only available in very specialised units. A new computer model has been designed by North, Nigrin, Fowler, Szymanski and Piantadosi (1992). They

described a new method of collecting and analysing pain drawings which is computer controlled and patient interactive. However, this would need further assessment, using carefully designed studies.

5.5 CONCLUSION

To conclude, both the pain question and the pain drawing are useful measures in assessment procedures for people with chronic non-malignant pain. There are several aspects of pain that can be measured, such as location of pain, number of sites of pain and percentage of body surface area in pain. There are differences between the two measures. The patient answering the pain question tends to report pain usually in one location, whereas with the pain drawing, the patient reports more sites of pain and a larger percentage of pain in several different locations.

And finally, the pain question and pain drawing should not be used to measure or assess pain intensity, anxiety, depression and disability until further research explores the relationship between these variables.

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Appendix A

Definition of Pain and Notes on usage

Recommended by the IASP Subcommittee on Taxonomy
(IASP, 1979)

Pain

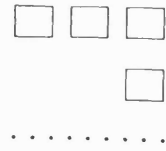
An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage.

Note: Pain is always subjective. Each individual learns the application of the word through experiences related to injury in early life. Biologists recognize that those stimuli which cause pain are liable to damage tissue. Accordingly, pain is that experience which we associate with actual or potential tissue damage. It is unquestionably a sensation in a part or parts of the body but it is also always unpleasant and therefore also an emotional experience. Experiences which resemble pain, e.g., pricking, but are not unpleasant, should not be called pain. Unpleasant abnormal experiences (dysaesthesiae) may also be pain but are not necessarily so because, subjectively, they may not have the usual sensory qualities of pain.

Many people report pain in the absence of tissue damage or any likely pathophysiological cause; usually this happens for psychological reasons. There is no way to

distinguish their experience from that due to tissue damage if we take the subjective report. If they regard their experience as pain and if they report it in the same ways as pain caused by tissue damage, it should be accepted as pain. This definition avoids tying pain to the stimulus. Activity induced in the nociceptor and nociceptive pathways by a noxious stimulus is not pain, which is always a psychological state, even though we may well appreciate that pain most often has a proximate physical cause.

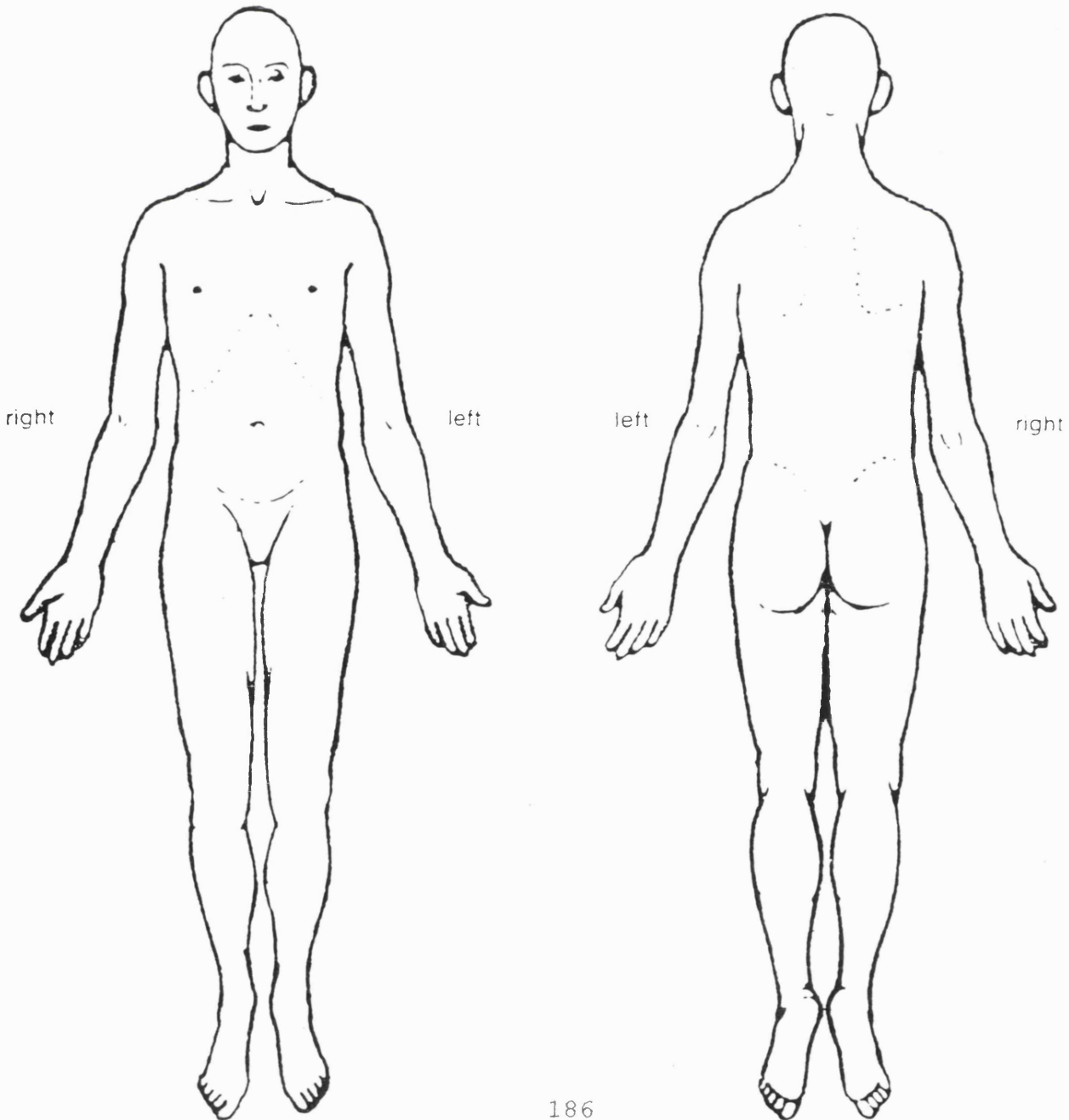
Appendix B



Pain Drawing

Pain Chart

Please **shade in**, on the body outline below, where your pain is.



Appendix C

The Hospital Anxiety and Depression Scale (HAD)

(Zigmond and Snaith, 1983)

HAD Scale

THIS QUESTIONNAIRE IS DESIGNED TO HELP US KNOW HOW YOU FEEL. PLEASE READ EACH ITEM AND PLACE A TICK IN THE BOX OPPOSITE THE REPLY WHICH COMES CLOSEST TO HOW YOU HAVE BEEN FEELING IN THE LAST WEEK. DON'T TAKE TOO LONG OVER YOUR REPLIES, YOUR IMMEDIATE REACTION TO EACH ITEM WILL PROBABLY BE MORE ACCURATE THAN A LONG THOUGHT-OUT RESPONSE.

Tick only one box in each section

I feel tense or 'wound up':

- Most of the time
- A lot of the time
- Time to time. Occasionally
- Not at all

<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>

I feel as if I am slowed down:

- Nearly all the time
- Very often
- Sometimes
- Not at all

<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>

I still enjoy the things I used to enjoy:

- Definitely as much
- Not quite so much
- Only a little
- Hardly at all

<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>

I get a sort of frightened feeling like 'butterflies' in the stomach:

- Not at all
- Occasionally
- Quite often
- Very often

<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>

I get a sort of frightened feeling as if something awful is about to happen:

- Very definitely and quite badly
- Yes, but not too badly
- A little, but it doesn't worry me
- Not at all

<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>

I have lost interest in my appearance:

- Definitely
- I don't take so much care as I should
- I may not take quite as much care
- I take just as much care as ever

<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>

I can laugh and see the funny side of things:

- As much as I always could
- Not quite so much now
- Definitely not so much now
- Not at all

<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>

I feel restless as if I have to be on the move:

- Very much indeed
- Quite a lot
- Not very much
- Not at all

<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>

Worrying thoughts go through my mind:

- A great deal of the time
- A lot of the time
- From time to time but not too often
- Only occasionally

<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>

I look forward with enjoyment to things:

- As much as ever I did
- Rather less than I used to
- Definitely less than I used to
- Hardly at all

<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>

I feel cheerful:

- Not at all
- Not often
- Sometimes
- Most of the time

<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>

I get sudden feelings of panic:

- Very often indeed
- Quite often
- Not very often
- Not at all

<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>

I can sit at ease and feel relaxed:

- Definitely
- Usually
- Not often
- Not at all

<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>

I can enjoy a good book or radio or TV programme:

- Often
- Sometimes
- Not often
- Very seldom

<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>

Do not write below this line

ate

Appendix D

Modified Sickness Impact Profile (SIP)

(Watt-Watson and Graydon, 1989)

THE FOLLOWING INSTRUCTIONS ARE FOR THE INTERVIEWER-ADMINISTERED QUESTIONNAIRE.

INSTRUCTIONS TO THE RESPONDENT

Before beginning the questionnaire, I am going to read you the instructions.

You have certain activities that you do in carrying on your life. Sometimes you do all of these activities. Other times, because of your state of pain, you don't do these activities in the usual way: you may cut some out; you may do some for shorter lengths of time; you may do some in different ways. These changes in your activities might be recent or longstanding. We are interested in learning about any changes that describe you today and are related to your state of pain.

I will be reading statements that people have told us describe them when they are not completely well. Whether or not you consider yourself sick, there may be some statements that will stand out because they describe you today and are related to your state of pain. As I read the questionnaire, think of yourself today. I will pause briefly after each statement. When you hear one that does describe you and is related to your pain please tell me and I will tick it.

Let me give you an example. I might read the statement "I am not driving my car." If this statement is related to your pain and describes you today, you should tell me. Also, if you have not been driving for some time because of your pain, and are still not driving today, you should respond to this statement.

On the other hand, if you never drive or are not driving today because your car is being repaired, the statement, "I am not driving my car" is not related to your pain and you should not respond to it. If you simply are driving less, or are driving shorter distances, and feel that the statement only partially describes you, please do not respond to it.

I am now going to begin the questionnaire. Please tell me if you want me to slow down, repeat a statement, or stop so that you can think about one. Also let me know any time you would like to review the instruction. Remember we are interested in the recent or longstanding changes in your activities that are related to your pain.

PLEASE RESPOND TO (TICK) ONLY THOSE STATEMENTS THAT YOU ARE SURE DESCRIBE YOU TODAY AND ARE RELATED TO YOUR STATE OF PAIN.

-
1. I spend much of the day lying down in order to rest _____
 2. I sit during much of the day _____
 3. I am sleeping or dozing most of the time -
day and night _____
 4. I lie down more often during the day in
order to rest _____
 5. I sit around half asleep _____
 6. I sleep less at night, for example, wake up too
early, don't fall asleep for a long while, awaken
frequently _____
 7. I sleep or nap more during the day _____

PLEASE TICK THIS BOX WHEN YOU HAVE READ ALL THE STATEMENTS ON THIS PAGE.

PLEASE DO NOT WRITE BELOW THIS LINE

Date

PLEASE RESPOND TO (TICK) ONLY THOSE STATEMENTS THAT YOU ARE SURE DESCRIBE YOU TODAY AND ARE RELATED TO YOUR STATE OF PAIN.

1. I say how bad or useless I am, for example, that I am a burden on others _____
2. I laugh or cry suddenly _____
3. I often moan and groan in pain or discomfort _____
4. I have attempted suicide _____
5. I act nervously or restlessly _____
6. I keep rubbing or holding areas of my body that hurt or are uncomfortable _____
7. I am irritable and impatient with myself, for example, talk badly about myself, swear at myself, blame myself for things that happen _____
8. I talk about the future in a hopeless way _____
9. I get sudden frights _____

PLEASE TICK THIS BOX WHEN YOU HAVE READ ALL THE STATEMENTS ON THIS PAGE.

THIS GROUP OF STATEMENTS HAS TO DO WITH ANY WORK YOU USUALLY DO IN CARING FOR YOUR HOME OR GARDEN. CONSIDERING JUST THOSE THINGS THAT YOU DO, PLEASE RESPOND TO (TICK) ONLY THOSE STATEMENTS THAT YOU ARE SURE DESCRIBE YOU TODAY AND ARE RELATED TO YOUR STATE OF PAIN.

1. I do work around the house only for short periods of time or rest often _____
2. I am doing less of the regular daily work around the house than I would usually do _____
3. I am not doing any of the regular daily work around the house that I would usually do _____
4. I am not doing any of the maintenance or repair work that I would usually do in my home or garden _____
5. I am not doing any of the shopping that I would usually do _____
6. I am not doing any of the house cleaning that I would usually do _____
7. I have difficulty doing handwork, for example, turning taps, using kitchen gadgets, sewing, carpentry _____
8. I am not doing any of the clothes washing that I would usually do _____
9. I am not doing heavy work around the house _____
10. I have given up taking care of personal or household business affairs, for example, paying bills, banking, working on a budget _____

PLEASE TICK THIS BOX WHEN YOU HAVE READ ALL THE STATEMENTS ON THIS PAGE.

PLEASE RESPOND TO (TICK) ONLY THOSE STATEMENTS THAT YOU ARE SURE DESCRIBE YOU TODAY AND ARE RELATED TO YOUR STATE OF PAIN.

1. I am going out less to visit people _____
2. I am not going out to visit people at all _____
3. I show less interest in other people's problems, for example, don't listen when they tell me about their problems, don't offer to help _____
4. I often act irritably towards those around me, for example, snap at people, give sharp answers, criticise easily _____
5. I show less affection _____
6. I am doing fewer social activities with groups of people _____
7. I am cutting down the length of visits with friends _____
8. I am avoiding social visits from others _____
9. My sexual activity is decreased _____
10. I often express concern over what might be happening to my health _____
11. I talk less with those around me _____
12. I make many demands, for example, insist that people do things for me, tell them how to do things _____
13. I stay alone much of the time _____
14. I act disagreeably to family members, for example, I act spitefully, I am stubborn _____
15. I have frequent outbursts of anger at family members, for example, strike at them, scream, throw things at them _____
16. I isolate myself as much as I can from the rest of the family _____
17. I am paying less attention to the children _____
18. I refuse contact with family members, for example, turn away from them _____
19. I am not doing the things I usually do to take care of my children or family _____

20. I am not joking with family members as I usually
do

PLEASE TICK THIS BOX WHEN YOU HAVE READ ALL THE
STATEMENTS ON THIS PAGE.

IF YOU ARE NOT WORKING AND IT IS NOT BECAUSE OF
YOUR PAIN, PLEASE SKIP THIS PAGE

IF YOU ARE RETIRED, WAS YOUR RETIREMENT RELATED
TO YOUR PAIN? YES ___ NO ___. PLEASE SKIP THIS PAGE

NOW CONSIDER THE WORK YOU DO AND RESPOND TO (TICK) ONLY THOSE
STATEMENTS THAT YOU ARE SURE DESCRIBE YOU TODAY AND ARE RELATED
TO YOUR PAIN. (IF TODAY IS A SATURDAY OR SUNDAY OR SOME OTHER DAY
THAT YOU WOULD USUALLY HAVE OFF, PLEASE RESPOND AS IF TODAY WERE
A WORKING DAY.)

-
1. I am not working at all _____
(IF YOU TICKED THIS STATEMENT, SKIP TO THE NEXT PAGE.)
 2. I am doing part of my job at home _____
 3. I am not accomplishing as much as usual at work _____
 4. I often act irritably towards my work associates,
for example, snap at them, give sharp answers,
criticise easily _____
 5. I am working shorter hours _____
 6. I am doing only light work _____
 7. I work for only short periods of time or take
frequent rests _____
 8. I am working at my usual job, but with some changes,
for example, using different tools or special aids,
trading some tasks with other workers _____
 9. I do not do my job as carefully and accurately as
usual _____

PLEASE TICK THIS BOX WHEN YOU HAVE READ ALL THE
STATEMENTS ON THIS PAGE.

THIS GROUP OF STATEMENTS HAS TO DO WITH ACTIVITIES YOU USUALLY DO IN YOUR FREE TIME. THESE ACTIVITIES ARE THINGS YOU MIGHT DO FOR RELAXATION, TO PASS THE TIME, OR FOR ENTERTAINMENT. PLEASE RESPOND TO (TICK) ONLY THOSE STATEMENTS THAT YOU ARE SURE DESCRIBE YOU TODAY AND ARE RELATED TO YOUR STATE OF PAIN.

1. I do my hobbies and recreation for shorter periods of time _____
2. I am going out for entertainment less often _____
3. I am cutting down on some of my usual inactive recreation and pastimes, for example, watching TV, playing cards, reading _____
4. I am not doing any of my usual inactive recreation and pastimes, for example, watching TV, playing cards, reading _____
5. I am doing more inactive pastime in place of my usual other activities _____
6. I am doing fewer community activities _____
7. I am cutting down on some of my usual physical recreation or activities _____
8. I am not doing any of my usual physical recreation or activities _____

PLEASE TICK THIS BOX WHEN YOU HAVE READ ALL THE STATEMENTS ON THIS PAGE.

NOW PLEASE REVIEW THE QUESTIONNAIRE TO BE CERTAIN YOU HAVE FILLED OUT ALL THE INFORMATION. LOOK OVER THE BOXES ON EACH PAGE TO MAKE SURE EACH ONE IS TICKED SHOWING THAT YOU HAVE READ ALL OF THE STATEMENTS. IF YOU FIND A BOX WITHOUT A TICK, THEN READ THE STATEMENTS ON THAT PAGE.

Appendix E

Verbal Rating Scales (VRS)

(taken from Karoly and Jensen, 1987)

- | | |
|-------------------|---|
| * No pain | * No pain at all |
| * Mild | * Some pain |
| * Moderate | * Considerable pain |
| * Severe | * Pain that could not be
more severe |
| * None | * No pain |
| * Mild | * Mild |
| * Moderate | * Moderate |
| * Severe | * Horrible |
| * Very Severe | * Excruciating |
| * Not noticeable | |
| * Just noticeable | |
| * Very weak | |
| * Weak | |
| * Mild | |
| * Moderate | |
| * Strong | |
| * Intense | |
| * Very strong | |
| * Severe | |
| * Very intense | |
| * Excruciating | |

Appendix F

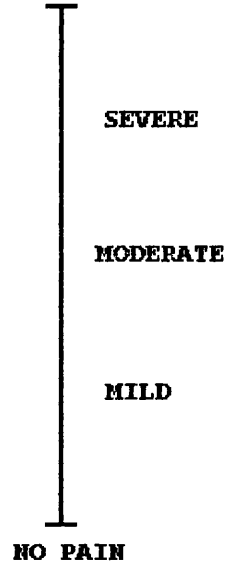
Visual Analogue Scales (VAS)

(taken from Scott and Huskisson, 1976)

PAIN AS BAD AS IT COULD BE



PAIN AS BAD AS IT COULD BE



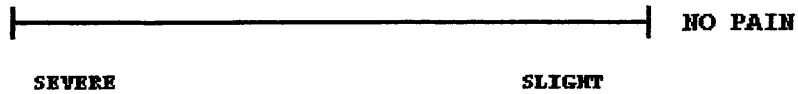
PAIN AS
BAD AS IT
COULD BE



PAIN AS
BAD AS IT
COULD BE



PAIN AS
BAD AS IT
COULD BE



Appendix G

The McGill Pain Questionnaire (MPQ)

(Mount, Melzack and MacKinnon, 1978)

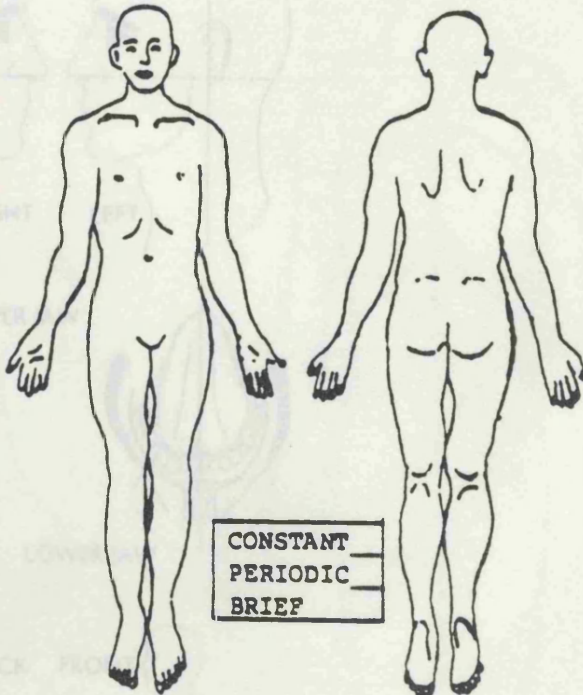
McGill - Melzack Pain Questionnaire

Patient's Name _____ Date _____ Time _____ am/pm
 Analgesic(s) _____ Dosage _____ Time Given _____ am/pm
 _____ Dosage _____ Time Given _____ am/pm

Analgesic Time Difference (hours): +4 +1 +2 +3
 PRI: S _____ A _____ E _____ M(S) _____ M(AE) _____ M(T) _____ PRI(T) _____
 (1-10) (11-15) (16) (17-19) (20) (17-20) (1-20)

FLICKERING	11	TIRING
QUIVERING		EXHAUSTING
PULSING	12	SICKENING
THROBBING		SUFFOCATING
BEATING	13	FEARFUL
POUNGING		FRIGHTFUL
JUMPING		TERRIFYING
FLASHING	14	PUNISHING
SHOOTING		GRUELLING
PRICKING		CRUEL
BORING		VICIOUS
DRILLING		KILLING
STABBING	15	WRETCHED
LANCINATING		BLINDING
SHARP	16	ANNOYING
CUTTING		TROUBLESOME
LACERATING		MISERABLE
PINCHING		INTENSE
PRESSING		UNBEARABLE
GNAWING	17	SPREADING
CRAMPING		RADIATING
CRUSHING		PENETRATING
TUGGING		PIERCING
PULLING	18	TIGHT
WRENCHING		NUMB
HOT		DRAWING
BURNING		SQUEEZING
SCALDING		TEARING
SEARING	19	COOL
TINGLING		COLD
ITCHY		FREEZING
SMARTING	20	NAGGING
STINGING		NAUSEATING
DULL		AGONIZING
SORE		DREADFUL
HURTING		TORTURING
ACHING		PPI
HEAVY	0	No pain
TENDER	1	MILD
TAUT	2	DISCOMFORTING
RASPING	3	DISTRESSING
SPLITTING	4	HORRIBLE
	5	EXCRUCIATING

PPI _____ COMMENTS: _____



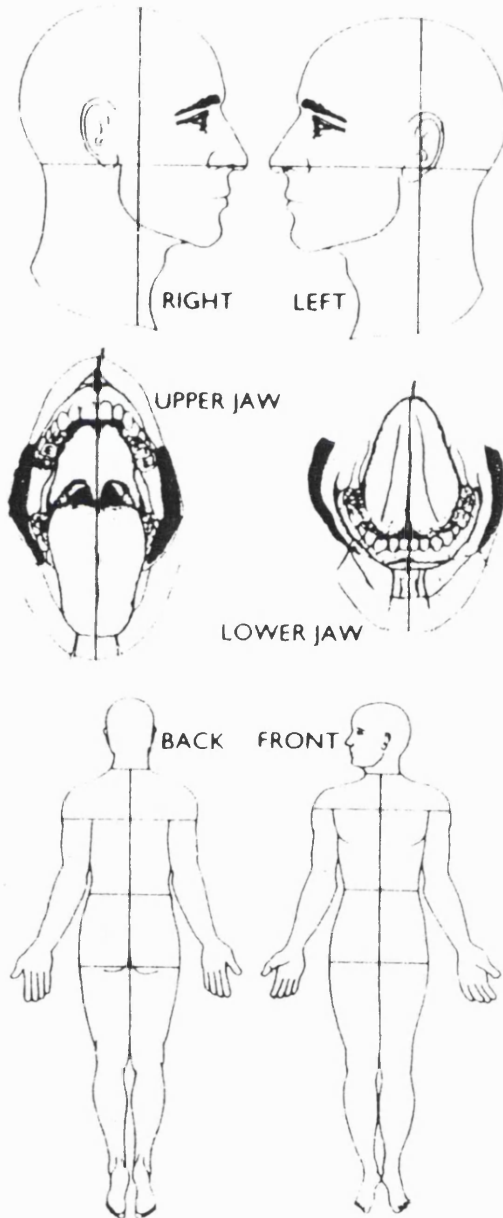
ACCOMPANYING SYMPTOMS:
 NAUSEA _____
 HEADACHE _____
 DIZZINESS _____
 DROWSINESS _____
 CONSTIPATION _____
 DIARRHEA _____
 COMMENTS: _____

SLEEP: _____
 GOOD _____
 FITFUL _____
 CAN'T SLEEP _____
 COMMENTS: _____
 ACTIVITY: _____
 GOOD _____
 SOME _____
 LITTLE _____
 NONE _____

FOOD INTAKE: _____
 GOOD _____
 SOME _____
 LITTLE _____
 NONE _____
 COMMENTS: _____
 COMMENTS: _____

Appendix H

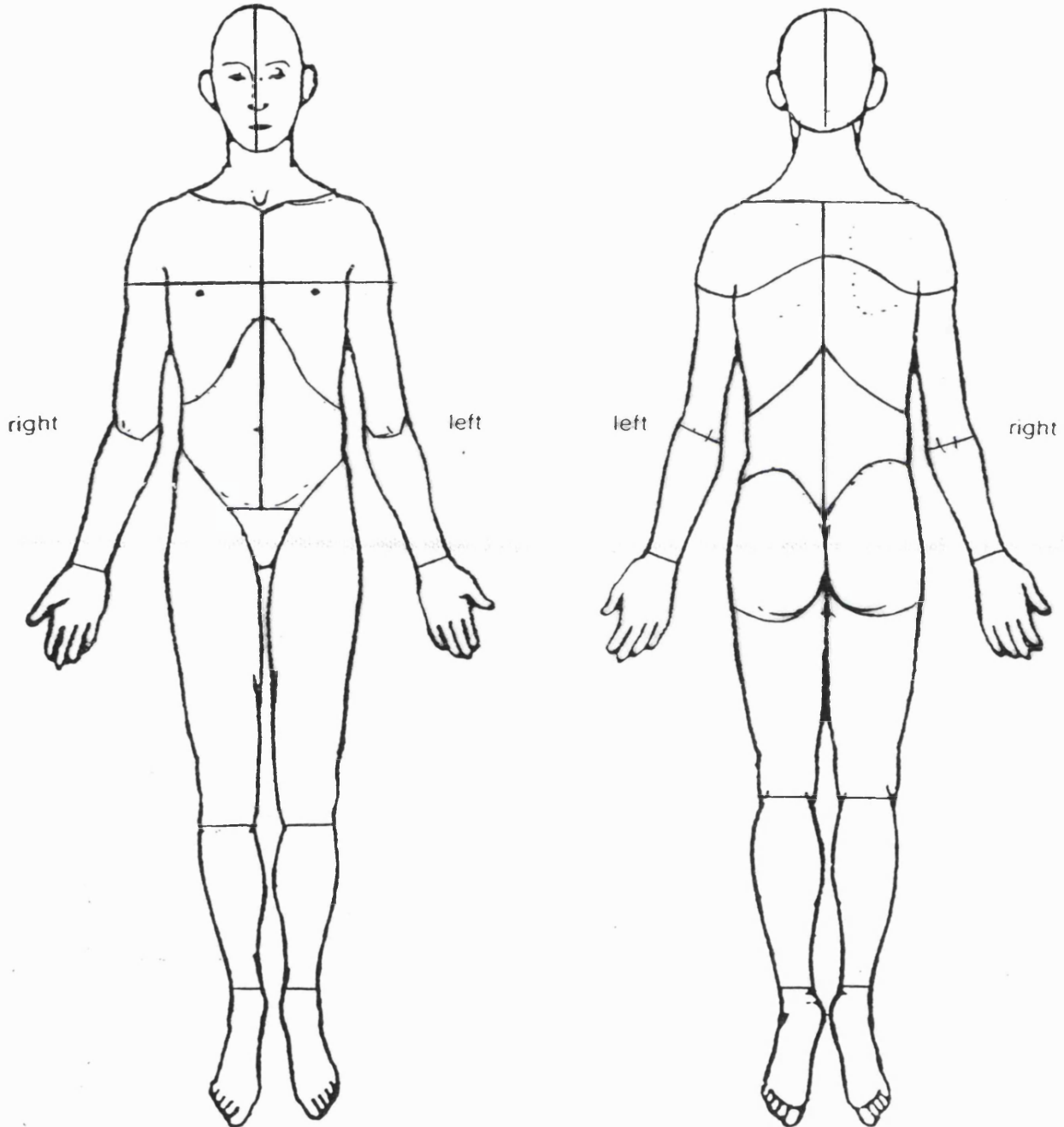
Scoring system used by Toomey et al (1983)



Appendix I

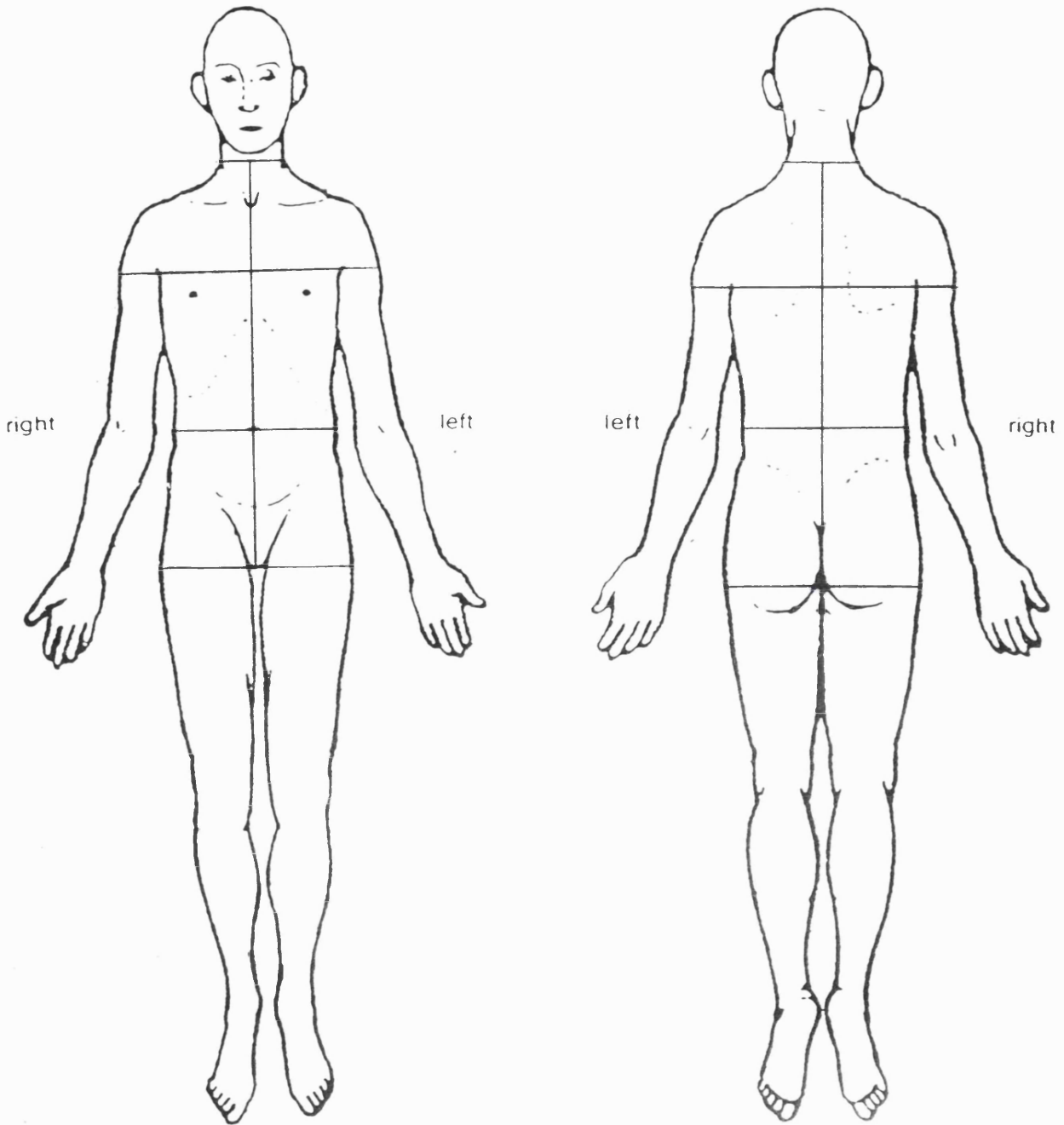
The Margolis scoring system

taken from Margolis et al (1986)



Appendix J

The adapted Toomey scoring system



Appendix K

The coding sheets

CODING FRAMEWORK FOR MPHIL

Main Study

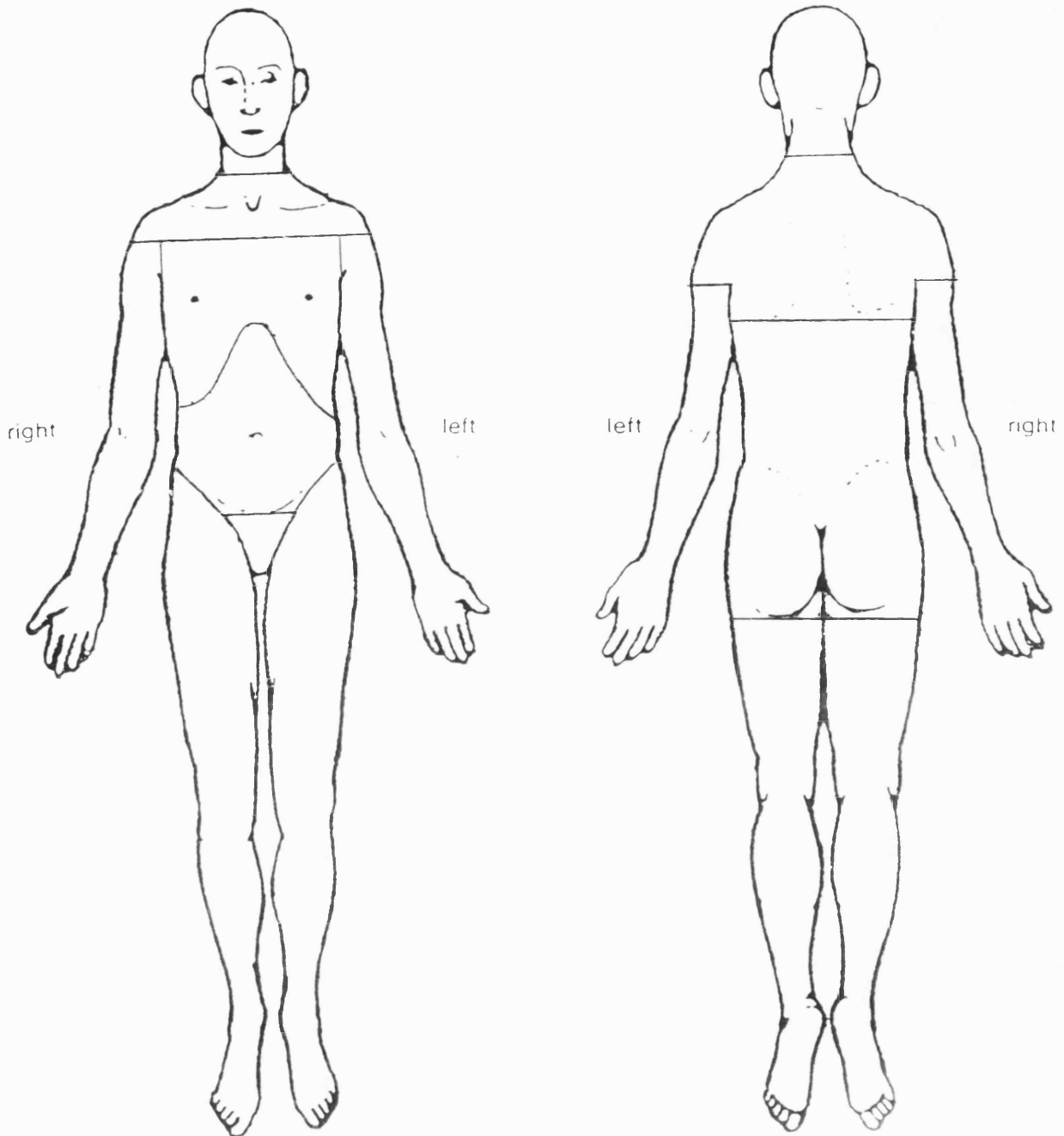
KA1)	Patient Code Number	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
KA2)	Card number	<input type="checkbox"/>	<input type="checkbox"/>	
KA3)	Ordering	<input type="checkbox"/>		
QS1)	Head	<input type="checkbox"/>		
QS2)	Neck	<input type="checkbox"/>		
QS3)	Shoulder	<input type="checkbox"/>		
QS4)	Chest/ breast	<input type="checkbox"/>		
QS5)	Arms/ hands	<input type="checkbox"/>		
QS6)	Abdomen	<input type="checkbox"/>		
QS7)	Genital/ groin	<input type="checkbox"/>		
QS8)	Back/ buttocks	<input type="checkbox"/>		
QS9)	Legs/ feet	<input type="checkbox"/>		
QS10)	Total number of sites	<input type="checkbox"/>	<input type="checkbox"/>	
QL1)	Location	<input type="checkbox"/>	<input type="checkbox"/>	
PS1)	Head	<input type="checkbox"/>		
PS2)	Neck	<input type="checkbox"/>		
PS3)	Shoulder	<input type="checkbox"/>		
PS4)	Chest/ breast	<input type="checkbox"/>		
PS5)	Arms/ hands	<input type="checkbox"/>		
PS6)	Abdomen	<input type="checkbox"/>		
PS7)	Genital/ groin	<input type="checkbox"/>		
PS8)	Lower back/ buttocks	<input type="checkbox"/>		
PS9)	Legs/ feet	<input type="checkbox"/>		
PS10)	Total number of sites	<input type="checkbox"/>	<input type="checkbox"/>	

PL1)	Location			<input type="checkbox"/>	<input type="checkbox"/>
PT1)	Site 1	<input type="checkbox"/>	PT12)	Site 12	<input type="checkbox"/>
PT2)	Site 2	<input type="checkbox"/>	PT13)	Site 13	<input type="checkbox"/>
PT3)	Site 3	<input type="checkbox"/>	PT14)	Site 14	<input type="checkbox"/>
PT4)	Site 4	<input type="checkbox"/>	PT15)	Site 15	<input type="checkbox"/>
PT5)	Site 5	<input type="checkbox"/>	PT16)	Site 16	<input type="checkbox"/>
PT6)	Site 6	<input type="checkbox"/>	PT17)	Site 17	<input type="checkbox"/>
PT7)	Site 7	<input type="checkbox"/>	PT18)	Site 18	<input type="checkbox"/>
PT8)	Site 8	<input type="checkbox"/>	PT19)	Site 19	<input type="checkbox"/>
PT9)	Site 9	<input type="checkbox"/>	PT20)	Site 20	<input type="checkbox"/>
PT10)	Site 10	<input type="checkbox"/>	PT21)	Site 21	<input type="checkbox"/>
PT11)	Site 11	<input type="checkbox"/>	PT22)	Site 22	<input type="checkbox"/>
PT23)	Total number of sites			<input type="checkbox"/>	<input type="checkbox"/>
PM1)	Site 1	<input type="checkbox"/>	PM24)	Site 24	<input type="checkbox"/>
PM2)	Site 2	<input type="checkbox"/>	PM25)	Site 25	<input type="checkbox"/>
PM3)	Site 3	<input type="checkbox"/>	PM26)	Site 26	<input type="checkbox"/>
PM4)	Site 4	<input type="checkbox"/>	PM27)	Site 27	<input type="checkbox"/>
PM5)	Site 5	<input type="checkbox"/>	PM28)	Site 28	<input type="checkbox"/>
PM6)	Site 6	<input type="checkbox"/>	PM29)	Site 29	<input type="checkbox"/>
PM7)	Site 7	<input type="checkbox"/>	PM30)	Site 30	<input type="checkbox"/>
PM8)	Site 8	<input type="checkbox"/>	PM31)	Site 31	<input type="checkbox"/>
PM9)	Site 9	<input type="checkbox"/>	PM32)	Site 32	<input type="checkbox"/>
PM10)	Site 10	<input type="checkbox"/>	PM33)	Site 33	<input type="checkbox"/>
PM11)	Site 11	<input type="checkbox"/>	PM34)	Site 34	<input type="checkbox"/>
PM12)	Site 12	<input type="checkbox"/>	PM35)	Site 35	<input type="checkbox"/>
PM13)	Site 13	<input type="checkbox"/>	PM36)	Site 36	<input type="checkbox"/>
PM14)	Site 14	<input type="checkbox"/>	PM37)	Site 37	<input type="checkbox"/>
PM15)	Site 15	<input type="checkbox"/>	PM38)	Site 38	<input type="checkbox"/>

PM16)	Site 16	<input type="checkbox"/>	PM39)	Site 39	<input type="checkbox"/>
PM17)	Site 17	<input type="checkbox"/>	PM40)	Site 40	<input type="checkbox"/>
PM18)	Site 18	<input type="checkbox"/>	PM41)	Site 41	<input type="checkbox"/>
PM19)	Site 19	<input type="checkbox"/>	PM42)	Site 42	<input type="checkbox"/>
PM20)	Site 20	<input type="checkbox"/>	PM43)	Site 43	<input type="checkbox"/>
PM21)	Site 21	<input type="checkbox"/>	PM44)	Site 44	<input type="checkbox"/>
PM22)	Site 22	<input type="checkbox"/>	PM45)	Site 45	<input type="checkbox"/>
PM23)	Site 23	<input type="checkbox"/>			
PM46)	Total number of sites				<input type="checkbox"/> <input type="checkbox"/>

Appendix L

The KF scoring system



Appendix M

The pain site check-list

- 1 - Head
- 2 - Neck
- 3 - Shoulder
- 4 - Chest/ breast
- 5 - Arms/ hands
- 6 - Abdomen
- 7 - Genital/ groin
- 8 - Back/ buttocks
- 9 - Legs/ feet

Appendix N

The pain location check-list

- 01 - Upper quadrant
- 02 - Ventral/ genital/ groin
- 03 - Back/ buttock
- 04 - Extremities
- 05 - Upper quadrant & ventral
- 06 - Upper quadrant & back
- 07 - Upper quadrant & extremities
- 08 - Ventral & back
- 09 - Ventral & extremities
- 10 - Back & extremities
- 11 - Upper quadrant & ventral & back
- 12 - U. quadrant, ventral & extremities
- 13 - U. quadrant, back & extremities
- 14 - Back, ventral & extremities
- 15 - All

Appendix O

Descriptive statistics of the outcome variables

NUMERICAL PAIN RATING SCALES:

There were several numerical pain rating. One for pain now, one for the worst pain today and another for the least pain today.

a) Pain now

The mean pain now was 47.6 with a standard deviation of 30.7. The range was from 0 to 100 which was the full range of the scale. The median and mode were 50.

b) Worst pain

The mean worst pain was 66.7 with a standard deviation of 29.7. The range was from 5 to 100. The median was 70, however the mode was 100 which reflected itself in the barchart where there was a definite strong negative skewness.

c) Least pain

The mean least pain was 34.4 with a standard deviation of 27.8. The range was from 0 to 100 again the full range of the scale. The median was close to the mean at 30, but

the mode was 0. This gave a positive skewness, but not as large as the negative one with worst pain.

THE MCGILL PAIN QUESTIONNAIRE:

The McGill Pain Questionnaire has several measures. The first is the Pain Rating Index (PRI) which is the sum of the rank values of the words chosen. The PRI score can be computed separately for the sensory, affective, evaluative and two miscellaneous subclasses. The second measure is the overall pain intensity or present pain intensity (PPI). The third measure is total number of words chosen (NWC).

a) PRI Sensory (subclasses 1-10)

The maximum number a person can score on this measure is 42. With the present sample the mean score was 17.7 with a standard deviation of 7.1. The median was 17, which reflects the mean closely. The range was from 1 to 38.

b) PRI Affective (subclasses 11-15)

The maximum number a person can score on this measure is 14. With the present sample the mean score was 4.6 with a standard deviation of 3.3. The median was 4, which is similar to the mean. The range was from 0 to 13.

c) PRI Evaluative (subclass 16)

The person can only score up to five points on this subscale. The mean was 3.1 with a standard deviation of 1.4. The median was 3. The range was from 0 to 5 the full range of the scale.

d) PRI Miscellaneous sensory (subclass 17-19)

The maximum a person can score on this scale is 12. The mean was 3.6 with a standard deviation of 2.7. The median was 3. The range was 0 to 11.

e) PRI Miscellaneous affective and evaluative (subclass 20)

The maximum score in this class is 5. The mean was 2.2 with a standard deviation of 1.5. The median was 2. The range was 0 to 5.

f) PRI Total

The maximum score for the PRI is 78. The mean score was 31 with a standard deviation of 12.2. The median was 29. The range was 7 to 68.

g) PPI

This a verbal rating scale where 0 is no pain to 5 is excruciating pain. The median was 3 or distressing pain. The mean was 3.1 with a standard deviation of 1.1. The range was 1 to 5.

h) Number of words chosen

The mean number of words chosen were 12.8 with a standard deviation of 4.2. The median was 13 and the range was 2 to 20.

THE HOSPITAL ANXIETY AND DEPRESSION SCALE:

The Hospital Anxiety and Depression Scale (HAD) has two measures the total anxiety score and the total depression score. The maximum a person can obtain on either score is 21.

a) Total anxiety score

The median was 9. The mean was 9.9 with a standard deviation of 4.5. The range was from 1 to 19. This score of 9 was higher than what is considered normal and is in the range where intervention to treat anxiety is recommended.

b) Total depression score

The median was 7. The mean was higher at 8 with a standard deviation of 4.4. The range was 0 to 20. The score of 7 was just in the range where there is no cause for concern to intervene and treat depression.

THE SICKNESS IMPACT PROFILE:

The Sickness Impact Profile Questionnaire has several scores including a total score. In this study only 6 out of the 12 subscales were used as described in the literature review.

a) SIP Sleep and Rest

The median was 22. The mean was 26.6 with a standard deviation of 22.2. The range was 0 to 88.4. This reflected a large variation in what people chose to score.

b) SIP Emotional Behaviour

The median was 27.9. The mean was 31.4 with a standard deviation 23.6. The range was 0 to 91.2.

c) SIP Home Management

The median was 22.5. The mean was 25.4 with a standard deviation 19.3. The range was 0 to 75.

d) SIP Social Interaction

The median was 18.7. The mean was 27.2 with a standard deviation 23.9. The range was 2.5 to 96.1.

e) SIP Work

The median was 9.7. The mean was 29.3 with a standard deviation 32.2. The range was 0 to 70.1.

f) SIP Recreation and Pastimes

The median was 39.3. The mean was 37.1 with a standard deviation 21.4. The range was 0 to 100.

g) SIP Total

The median was 23. The mean was 28.8 with a standard deviation 18.7. The range was 4.6 to 76.8.

As can be seen with all the SIP score there was a big range which probably reflected people being differently and widely affected by disability in this sample of people.