COPING WITH MEDICAL ADVERSITY: CHARACTERISTICS OF EFFECTIVE ADJUSTERS WITH CHRONIC PAIN

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This thesis is dedicated to my mother, Bette Saunders,
who by her example, and her unconditional love and support,
inspires in all who know her a joy of life, a dedication to others,
and the strength to handle the difficult times with grace and style.

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ABSTRACT

Studies of multidimensional clinical profiles of people with chronic pain have supported the presence of at least two empirically distinct clusters: a Low Pain (LP) cluster characterized by low levels of reported pain, depression, and disability, and a Chronic Pain Syndrome (CPS) cluster characterized by high levels of reported pain, depression and disability. Recently, two investigations have also suggested the possibility of a third grouping of profiles characterized by low levels of depression and disability despite severe pain, as well as relatively high scores on measures of denial and the pain-related use of cognitive coping strategies. However, the presence of such a cluster and its distinctive dimensions have yet to be confirmed in broader, more heterogeneous chronic pain samples.

This study investigates the reproducibility and distinctive features of this third grouping, identified in this study as Effective Adjusters (EA) in a community-based sample (n=184; 141 females, 43 males) of people with mixed sources of chronic pain. Cluster analysis of individual adjustment profiles (composed of scores from self-report measures of pain severity, depression, and subjective disability) demonstrates the presence of the previously reported LP, CPS and EA groupings (along with a fourth grouping of profiles identified as 'Undefined Adjustment'). Comparison of the EA and CPS clusters using ANOVAs (with planned comparisons) revealed no significant differences on self-report measures of pain severity, pain-related appraisals of control and benefits. However the EA cluster of cases was characterized by significantly higher frequencies of conscious cognitive coping efforts and conscious disregard of pain, significantly higher ratings of pain-related choice and responsibility appraisals, and significantly lower frequency of pain-related catastrophizing thoughts. Background variables such as age, education, pain duration, medication use and number of active personal pain management strategies failed to differentiate the two clusters.

This study provides empirical support for the validity of an EA cluster of adjustment profiles distinct from those characterized by LP and CPS adjustment profiles. The results add to evidence suggesting that among the population of chronic pain sufferers there exist distinct subgroupings of people with very different adjustment outcomes. The evidence suggests that these adjustment differences are likely related not only to overall pain severity but also to the presence of specific pain-related appraisals and conscious cognitive coping strategies. The findings support previous research which has shown a relation between adjustment outcomes and differences in pain-related catastrophizing and conscious cognitive coping efforts. At the same time, they extend previous results by suggesting that among people reporting relatively severe pain levels, pain-related appraisals of choice and responsibility rather than control and benefits are likely to be associated with adjustment differences.

TABLE OF CONTENTS

LIST OF TABLES

INTRODUCTION

Overview

Understanding how people cope with, and adjust to, the adversity of chronic medical conditions has become an important area of psychological research. Recent estimates are that thirty percent of the population in North America may be coping with a chronic medical condition (Taylor & Aspinwall, 1990). Most prominent are various forms of arthritis (affecting in total over 40 million people) including rheumatoid arthritis (over two million), hypertension (more than 30 million), heart attack or angina (close to six million), diabetes (more than 12 million), cancer (close to six million) and AIDS. These numbers are likely to increase over the next few decades with a general aging of the population.

Chronic medical conditions have a pervasive impact on people's lives, affecting not only physical functioning and activities but also more psychological dimensions such as emotional well-being, mental health, social and family life, intimate relationships and life meaning (Burish & Bradley, 1983). In turn there are growing indications that people's attitudes and psychological responses play a key role in people's experience with chronic disease (Taylor & Aspinwall, 1990) and may, in some cases, influence the physical course of their disorder (Maeland & Havek, 1987; Pettingale, Morris, Greer, & Haybittle, 1985). This evidence underscores the need for a well-documented understanding of the psychological dimensions associated with adjustment to chronic medical conditions.

Importance of Psychological Research into Chronic Pain Adjustment

Perhaps the most aversive aspect of many people's experience with chronic illness is coping with ongoing pain. Studies of people coping with chronic conditions consistently demonstrate the co-occurrence of mood disturbance with pain (Craig, 1994; Spira & Spiegel, 1992). As an example, interviews with cancer patients undergoing chemotherapy have suggested that side effects of vague, diffuse pain and fatigue are more closely associated with distress than more acute side effects of nausea or vomiting (Nerenz, Leventhal, & Love, 1982). Thus it is not surprising that effective managing of persistent pain has been found to play a critical role in

overall adjustment to chronic disease (Blanchard & Schwarz, 1988; Hawley & Wolfe, 1988; Sarcedote, 1970; Spiegel & Bloom, 1983).

However adjusting to chronic pain is by no means exclusive to chronic illness. Recent surveys suggest that as many as one in five members of the general population are coping with chronic pain (defined in the survey as continuous pain of at least one month duration or pain experienced for more than 100 days in the past year) and that one family in three has someone coping with persistent pain (Crook, Rideout, & Browne, 1984). Most common among types of pain are those of the joints (10% of the population surveyed) and back (9% of the population surveyed). Others include headaches (5%) muscle pains (5%), stomach pains (3%), menstrual pain (1%) and dental pain (Magni, Caldieron, Rigatti-Luchini, & Merskey, 1990; Sternbach, 1986). These data indicate that the experience of adjusting to persistent pain extends well beyond those with chronic illness and can be considered a chronic medical condition in its own right (IASP, 1994).

Beyond its importance as a defining feature of chronic medical conditions, people's experience with chronic pain also provides researchers an opportunity to investigate the more general question of how people handle adversity. Aversive situations are commonly associated in the psychological literature with a perceived lack or loss of control, a feature which is quite common to those experiencing elevated levels of chronic pain. Their experience provides the opportunity to examine commonly held assumptions about the role of various cognitive, behavioural, and social factors in adjusting to low control situations. The general purposes of this study are to determine if variations in adjustment can be reliably detected in a general sample of people with chronic pain, and to investigate whether differences on various psychological measures (in particular pain-related beliefs or appraisals of control, disability, personal responsibility and benefits, partner support) can, under this type of low control situation, distinguish people reporting effective adjustment from those reporting dysfunction and emotional distress.

The Validity of a Uniform Chronic Pain Personality Profile

There is now extensive evidence that people's experience with chronic pain is associated with an array of related problems, among them impairment in functioning (Fordyce, 1976), depression (Love, 1987; Turner & Romano, 1984), addiction (Sternbach, 1974), and disruption in social and family relationships (Turk & Rudy, 1990). Growing recognition of the complex nature of people's experience with chronic pain has led to revisions in the earlier conceptualization of pain as purely a physiological indicator of tissue damage. Chronic pain is now viewed as a multidimensional phenomena which incorporates affective, cognitive, behavioural and social components (so-called "non-organic" elements) as well as physical or `organic' aspects (Chapman & Bonica, 1985; Fordyce, 1976; Melzack & Wall, 1983; Pennebaker, 1982; Turk & Flor, 1984).

Early studies attempted to capture these `non-organic' elements by delineating characteristic personality profiles of people with persistent pain. These were produced by averaging together individual profiles from standard measures of personality and psychopathology such as Minnesota Multiphasic Personality Inventory (MMPI). Studies of this kind consistently depicted the typical chronic pain patient as anxious, irritable, depressed, attention seeking and preoccupied with somatic symptoms (Keller & Butcher, 1991).

However an increasing awareness of the complex and heterogeneous nature of chronic pain has led clinical researchers to question the validity of these portrayals of people with persistent pain. Clinically, the assumption of homogeneity underlying the use of mean profiles and group averages has not been consistent with experience. Fordyce (1976), for example, has warned of an `illusion of homogeneity' which may arise with labels such as `the chronic pain patient' and interfere with important advances in treatment and theory. More empirical evidence has suggested that mean profiles likely bear little resemblance to most individual score patterns and may obscure the presence of important individual differences and meaningful subgroupings (e.g., Sternbach, Wolf, Murphy, & Akeson, 1973). As an example, Naliboff, Cohen, and Yellen (1983) found the mean profile of a large sample of subjects to be a `Conversion-V' (a lower T-

score on the 2nd clinical scale (D) confined with high T-scores on first (Hs) and third (Hy) clinical scales), even though this particular pattern characterized a relatively small minority of the individual profiles.

At the same time, evidence also exists for recurring patterns of adjustment profiles in samples drawn from a wide variety of settings and pain categories (Keller & Butcher, 1991; Jamison, Rudy, Penzien, & Mosley, 1994; Turk & Rudy, 1990). This suggests the possibility of several homogeneous groupings within this very heterogeneous population. The ability to empirically identify and characterize these subgroups on behavioural, psychological and social dimensions has been recognized as important step towards integrating the many factors affecting pain and pain-related disability, and refining the effectiveness of clinical services (Jamison et al., 1994; Turk & Rudy, 1988).

Subgroupings on Standard Psychopathology Instruments

Profiles produced by standard measures such as the MMPI or Symptom Checklist 90-Revised (SCL-90-R) have been the basis for most of the research into the occurrence and distinguishing features of groupings within the chronic pain population (Keller & Butcher, 1991)

I) MMPI Profiles

One of the earliest attempts to differentiate psychological outcomes among chronic pain patients was reported by Sternbach (1974). He outlined four MMPI profiles which he found to be prevalent in his clinical practice. These profiles were primarily distinguished by differing patterns of elevated scores on the first four clinical scales (Hs, D, Hy, and Pd respectively). However, a lack of empirical validation of such profile groups and poorly defined classification procedures has limited the general utility of these findings.

Other studies have adopted a more empirical approach to investigating the presence of homogeneous groupings of chronic pain patients. In one of the earliest, Bradley, Prokop, Margolis, and Gentry (1978) studied two samples of chronic low back pain (CLBP) patients, one males (n=233), the other females (n=315), assessed by a university medical centre "because of a

lack of response to traditional medical-surgical treatments and/or a questionable physiological basis for their pain" (Bradley et al., 1978, p.255). In each sample, hierarchical clustering procedures were performed separately on the MMPI profiles of three distinct cohorts representing all the CLBP patients of that particular gender evaluated at the centre in each of three successive calendar years.

In both the male and female CLBP samples three groupings were replicated across the three cohorts. One grouping had a mean profile characterized as a `neurotic triad', with mean T-scores above 70 on the Hs, D, and Hy scales. The mean profile of a second grouping was characterized as `generally elevated' with mean T-scores above 70 on several scales including Hs, D, Hy, as well as clinical scales six (Pa), seven (Pt), and eight (Sc). The third grouping generated a mean profile with T-scores on all scales in the relatively normal range. A fourth grouping characterized by a conversion V mean profile was identified in the female sample only.

Several subsequent studies have confirmed the presence of three or four basic groupings of MMPI profiles in chronic pain patient samples (Armentrout, Moore, Parker, Hewett, & Feltz, 1982; Atkinson, Ingram, Kremer, & Sacuzzo, 1986; Bernstein & Garbin, 1983; Bradley & Van der Heide, 1984; Guck, Meilman, Skultety, & Poloni, 1988; Hart, 1984; Leavitt & Garron, 1982; McCreary, 1985; McGill, Lawlis, Selby, Mooney, & McCoy, 1983; Moore, Armentrout, Parker, & Kivlihan, 1986; Prokop, Bradley, Margolis, & Gentry, 1980; Rosen, Grubman, Bevins, & Frymoyer, 1987). However the groupings generated by these studies provided little new insight into adjustment and treatment outcome differences among chronic pain patients. In fact, other than differences in employment status and pain severity, the most robust finding of these studies has been a lack of distinction between the groupings on either short-term or long-term outcomes (McGill et al., 1983; McCreary, 1985; Moore et al., 1986; Guck et al., 1986).

Several possible explanations have been put forward, retrospectively, for the general lack of distinctive differences between the groupings. First, there is little evidence that these profiles distinguish chronic pain patients from other medical populations (Keller & Butcher, 1991). This suggests that such profiles primarily reflect the emotional distress of coping with a chronic

medical condition. In a similar vein, research also suggests that among those with chronic pain, the longer the reported duration of pain, the more elevated the MMPI clinical profile, regardless of the pre-morbid condition or eventual outcome (Tarbox & Connors, 1986; Timmermans & Sternbach, 1976). This implies that these groupings of clinical profiles may simply be complicated expressions of pain severity and duration.

A third concern is that the direct use of these profiles fails to account for the heterogeneity of items making up the clinical scales (Butcher & Tellegren, 1978). In fact, investigations into the item content of chronic pain patients' responses on the MMPI find that common elevations on standard subscales such as Scale 3 (Hy) or Scale 8 (Sc) reflect very different response patterns (McGrath & O'Malley, 1986; Moore, McFall, Kivlahan, & Capestany, 1988; Prokop, 1986). This suggests the likelihood that underlying these apparently homogeneous groupings of clinical profiles is in fact a large degree of heterogeneity which would undermine any significant differences.

ii) SCL-90-R Profiles

Other researchers have attempted to empirically identify homogeneous subgroups using the SCL-90-R (Butterworth & Deardorff, 1987; Jamison, Rock, & Parris, 1988; Schwartz & DeGood, 1983). Here again, the studies consistently find three groupings of subjects. However, the only apparently dependable feature distinguishing the three clusters is the degree of overall elevation in subscale scores. No other significant differences were found among the groups on measures related to demographics, physical pathology or chronicity. Jamison et al. (1988) acknowledge that the three groupings may well represent varying degrees of a single factor, "general emotional distress". This is consistent with studies of the psychometric properties of the SCL-90-R which suggest that it is most reliable and stable as a unitary measure of psychological distress (Cyr, McKenna-Foley, & Peacock, 1985). In fact, given that the SCL-90-R primarily measures symptomatology, these findings may also be simply a more complicated expression of pain duration and severity.

iii) MMPI-2: The Sister Kenny Project

The fundamental difficulty with all these clustering studies has been the almost exclusive use of traditional scales of personality or psychopathology which were not conceptually developed or standardized on people with chronic pain. One attempt to improve on the methodology of these earlier studies has been the Sister Kenny MMPI-2 chronic pain research project (Keller & Butcher, 1991). This project involved collecting complete MMPI-2 response sets, medical and psychiatric records, as well as detailed biographical and life events data from a sample of 502 (out of a potential sample of 590) subjects entering the Sister Kenny Institute Chronic Pain Rehabilitation Program in Minneapolis, Minnesota between March, 1985 and August, 1987. Its purpose was to examine differences in chronic pain subjects' responses on MMPI-2 versus the MMPI and to investigate how patterns of responses which might differentiate this sample of chronic pain subjects from MMPI-2 reference samples of psychiatric inpatients and the general population.

In addition to producing extensively documented samples of male (n=268) and female (n=234) chronic pain patients, the study also improved upon earlier investigations in providing scores on a variety of more homogeneous subscales (e.g., new MMPI-2 content scales) for each sample and for subgroupings produced by hierarchical cluster analysis. Unfortunately, in order to compare the results with the findings of Bradley et al. (1978), these subgroupings were only based on MMPI-2 clinical profiles, rather than a broader set of measures. In addition mean pain severity levels or other measures of physical pathology were not reported by cluster. However, the use of contemporary MMPI-2 content scales has provided some potentially useful insights into subgroup differences.

In both the male and female samples the analysis indicated that, of a variety of cluster solutions ranging from six to two, only a three-cluster solution was replicable across cohorts of subjects. Further analysis found that the mean clinical profiles of the derived clusters replicated the `normal level', `neurotic triad' and `generally elevated' groupings of profiles identified by Bradley et al. (1978). The first grouping produced an overall profile (clinical plus new content

scales) consisting of relatively normal mean T-scores on all scales. In contrast, the overall profile of the generally elevated grouping was consistent with high levels of somatic complaints and physical symptoms (elevated mean T-scores on the Hs, Hy, and health concerns (HEA) scales), high emotional distress (elevated mean T-scores on the F validity scale, the D, Pa, Pt, Sc clinical scales as well as the anxiety (ANX), depression (DEP) and low self-esteem (LSE) content scales) and high dysfunction (elevated mean T-scores on the family problems (FAM), work interference (WRK), negative treatment indicators (TRT) content scales).

Most revealing, however, were the results produced by the third cluster. The clinical profile of this cluster was consistent with the previously reported Neurotic Triad cluster (elevated mean T-scores on Hs, D and Hy clinical scales). Nevertheless, a more detailed analysis of the cluster's overall profile, in particular the newly developed content scales, appears to reflect high levels of somatic complaints and physical symptoms (elevated T-scores on the Hs and Hy clinical and HEA content scales) with moderate to low levels of emotional distress (elevated T-scores on the D clinical scale but normal range T-scores on the ANX, DEP and LSE content scales) and relatively low levels of dysfunction (normal range T-scores on the FAM, WRK, and TRT). This third group represented about 55% of the men and just under 40% of the women (Keller & Butcher, 1991). Unfortunately, although Keller and Butcher reported this data in their results they made little reference to it in their discussion.

Despite appearing to overlook the potentially important additional insights revealed by their new content scales, Keller and Butcher conclude that given the enormous amount of resources invested and data collected, the insights produced by their analysis were minimal. They noted, for example, that cluster analysis results of the complete MMPI clinical profiles were not substantially different from those produced by simply grouping together basic codetypes. Among the reasons they offered for these disappointing findings were the possibility that the data collected did not accurately reflect true patient characteristics and the inappropriateness of using a measure such as the MMPI or MMPI-2 on its own for distinguishing significant subgroupings of people with chronic pain.

iv) Other Single Instrument Studies

Other researchers have attempted to improve upon traditional psychopathology measures by grouping subjects on more specific measures of pain-related thought patterns or behaviours. For example, Smith, Aberger, Follick, and Ahern (1986) reported evidence suggesting that among CLBP subjects, reported levels of cognitive distortion on the Automatic Thoughts Questionnaire (ATQ) were reliably associated with self-reported degree of disability. However in a more recent study, Ingram, Atkinson, Slater, Sacuzzo, and Garfin (1990) found that groupings of chronic pain patients clustered by cognitive patterns associated with depression, showed no significant differences on measures of pain intensity, duration, orthopaedic diagnosis, disease severity or basic demographic variables. The only result was that those experiencing depression reported more `maladaptive' automatic thoughts.

In a different approach, Keefe, Bradley, and Crisson (1990) classified pain patients on patterns of specific `pain behaviours' involving verbal and nonverbal communications of pain and emotional distress. They were able to distinguish one grouping (representing 19% of the sample) who showed minimal pain behaviour and reported no increase in pain during standardized physical exercises. Three other groupings demonstrated moderate to high levels of pain behaviours. However scores from these groups on other comparison measures showed no significant differences.

The fundamental problem with these studies is the assumption (implicit in the use of a singular clustering measure) that variations in people's responses to chronic pain can be related to differences on one specific dimension. As such they fail to account for the complex multidimensional nature of chronic pain experience (Osterweis, Kleinman, & Mechanic, 1987; U.S. Department of Health and Human Services, 1987). In particular they fail to account for the potential influence of factors such as pain severity, functional impairment or interpersonal and family support in people's chronic pain experience. For example, although many of these studies examined differences in reported pain (intensity, chronicity etc.) and functional impairment once

the subgroups were formed, none included measures of pain severity or functioning in the actual clustering process.

Multidimensional Outcome Profile Subgroups

The difficulties in generating meaningful subgroupings of chronic pain patients on standard measures such as the MMPI or SCL-90-R have led other investigators to adopt a multidimensional outcome approach to the problem. In these investigations, measures of pain severity, functional ability and partner support, as well as psychological distress are combined into an overall assessment package (Turk & Rudy, 1987).

In a series of separate studies, Turk, Rudy and colleagues examined the multidimensional clinical profiles of three common but diverse samples of people with chronic pain: low back, headache and temporomandibular joint (TMJ). The profiles, which represented people's responses on the West Haven-Yale (WHY) Multidimensional Pain Inventory (MPI; Kerns, Turk, & Rudy, 1985) were cluster analysed using a non-hierarchical K-means procedure. Gender composition in these samples ranged from 85% males in the heterogeneous chronic pain sample to 86% females in the TMJ sample. Across samples, mean levels of pain severity, affective distress and `pain interference in life activities' were consistently the largest differences separating a `Dysfunctional' cluster of MPI profiles from that of an `Adaptive Copers' cluster of profiles. A third grouping, characterized as `Interpersonally Distressed', was primarily distinguished by low reported levels of pain-related, supportive partner responses (Rudy, Turk, Zaki, & Curtin, 1989; Turk & Rudy, 1988; 1990). These results have recently been confirmed in a study of two other large samples of chronic pain patients seeking treatment at a university pain centre and from a private practice physician (Jamison et al., 1994).

More recently, two other studies of CLBP patients, one involving men (N=96) attending an orthopaedic clinic (Klapow, Slater, Patterson, Doctor, Atkinson, & Garfin, 1993), and the other an evenly mixed sample (N=100) of male and female patients attending a hospital clinic (Strong, Ashton & Stewart, 1994), have reported cluster analyses of more individually-oriented

clinical profiles (that is, minus measures of interpersonal-partner support) with somewhat different results. In the first study, Klapow et al. used hierarchical cluster analysis of measures of pain severity (McGill Pain Questionnaire; MPQ; Melzack, 1975), functional impairment (Sickness Impact Profile; SIP; Bergner, Bobbitt, Carter, & Gibson; 1981), and depression (Beck Depression Inventory; BDI; Beck, Ward, Mendelson, Mock, & Erlbaugh, 1961) to produced multidimensional `outcome' groups. A `Chronic Pain Syndrome' cluster of outcome profiles, representing 25% of the sample, presented the most dysfunctional mean profile with ratings of pain, depression and functional impairment measures at least twice those exhibited by a `Good Control of Pain' cluster (representing 50% of the sample).

In the second study (Strong et al., 1994), iterative partitioning of subject responses on an multidimensional assessment battery (including self report measures of pain intensity, subjective disability, depression, coping strategies, attitudes towards pain and illness behaviour) produced distinctive subject clusters. Substantial differences in pain intensity and pain-related disability once again distinguished the profile of a subject cluster identified as `Depressed and Disabled' (23% of the sample) from the profile of subjects making up an `In Control' grouping (48% of the sample). Thus the results of both studies were similar to those of Rudy, Turk and colleagues in identifying the presence of Low Pain (LP) and Chronic Pain Syndrome (CPS) clusters of profiles within their samples.

i) Identification of a Severe Pain/Low Dysfunction Grouping

However, the most significant result of these two studies was the presence of a third cluster of subject profiles representing 25 and 29% of the study samples respectively. In each study, this 'Active Copers' or 'Positive Adapters to Pain' cluster of profiles produced the highest reported pain severity but relatively low mean ratings of functional impairment and depression (comparable to those reported by the LP clusters). This adjustment profile contrasted with the profile produced by an Interpersonally Distressed (ID) cluster consisting of pain severity, activity disruption and affective distress levels intermediate in value between the CPS and LP clusters.

This suggests that this third cluster of adjustment profiles in these two studies may be quite different from that examined by Turk, Rudy and colleagues under their ID grouping.

Nevertheless, all these studies collectively echoed the findings of Keller and Butcher (1991) in suggesting the presence of additional clusters (beyond LP and CPS) which could be distinguished by moderate to low levels of dysfunction and emotional distress. Other results from these studies appeared to rule out major differences in basic patient characteristics such as age, pain duration, medical diagnosis, physical impairment or (in mixed samples) gender composition as explanations for cluster differences. These findings suggest that although reported pain severity is an important dimension separating dysfunctional and adaptive coping profiles, it alone is unlikely to provide a complete explanation for differences in adjustment patterns among people with chronic pain.

The evidence that cluster membership may be primarily associated with differences on subjective psychosocial dimensions rather than objective measures of organic impairment seems at first glance surprising. However it is consistent with evidence from recent studies that have found little or no association between objective measures of organic impairment and disability status or pain severity (Gallagher, Rauh, Haugh, Milhous, Callas, Langelier, McClellan and Frymoyer, 1989; Naliboff, Cohen, Swanson, Bonebakker, & McArthur, 1985; Reesor, 1988).

ii) Summary.

In summary these findings have clearly illustrated the advantages of a multidimensional approach over a single standard measure such as the MMPI in generating potentially meaningful groupings of chronic pain adjustment profiles. The results of Turk, Rudy and colleagues have been very effective in demonstrating that even among groupings ostensibly separated by levels of reported pain severity, the inclusion of other dimensions offers greater insight into their distinguishing characteristics. In this regard, the findings of Klapow et al. (1993) and Strong et al. (1994) have gone one step further in suggesting the presence of a homogeneous grouping of

chronic pain patients whose self-reported psychological distress and functional impairment appears to markedly contrast with their reported level of pain severity.

Confirmation of the presence of such a grouping in other samples of people with chronic pain would be significant to clinical research and treatment. Prior to these studies, analysis of clinical profiles had suggested that lower levels of depression and functional disability were limited to those reporting low levels of reported pain severity (that is, those with clinical profiles fitting the LP grouping). Profiles grouped under CPS and ID clusters which generated moderate and high levels of pain severity, also produced elevated levels of affective distress and subjective disability. The presence of an EA cluster, whose adjustment profiles produced moderate levels of depression and subjective disability despite very elevated levels of reported pain severity, would suggest the importance of dimensions other than pain severity in adjustment. It would also offer the means for investigating common factors associated with such adjustment .

Further investigation is now required to determine reproducibility of an EA cluster of adjustment profiles in more heterogeneous samples of people with chronic pain. The results to date are based on only two studies which draw their samples exclusively from CLBP patients attending chronic pain clinics. One of these studies (Klapow et al., 1993), although well designed, sampled only male CLBP subjects drawn from a single clinic and failed to report any test of cluster significance other than differences produced by the original clustering variables. The results of the other study (Strong et al., 1994), although potentially more applicable by virtue of a mixed gender sample, were nevertheless undermine by several limitations. The sample used in the study was small and drawn from a single clinic. The study also employed numerous clustering variables without a clear rationale for their inclusion, making interpretation of the clusters difficult. Additionally, the use of such a large number of variables in the clustering procedure limited the ability to test the meaningfulness of the derived clusters on external variables (measures not used in clustering). The study also lacked any evidence of replicability or stability of the cluster solution across different procedures. Finally, neither of these studies assessed the significance of their identified clusters on any measure of interpersonal/partner

support, leaving untested the question of whether differences on this dimension provided the most parsimonious explanation for the presence of two clusters with higher pain severity.

If the presence of an EA cluster of adjustment profiles can be confirmed, differences on measures of partner support is only one of several important psychosocial variables which may be important in distinguishing this cluster from the CPS cluster. For example, the results of Strong et al. (1994) suggest that differences on other measures of appraisals and cognitive coping strategies may also be important. In their sample of CLBP patients, Strong et al. (1994) found that their 'Active Copers' cluster produced the highest mean scores on a denial of other life problems scale and the reported use of two pain-related coping strategies, reinterpreting pain sensations and diverting attention. In addition, this grouping produced the lowest mean scores on scales of affective inhibition and pain-related irritability, as well as moderate scores on pain-related control appraisals.

However, other than these limited results, there is, as yet, no research which has examined differences in psychosocial variables among these groupings. Nevertheless, there is a larger body of research into the association of adjustment outcomes with specific appraisals and coping strategies in samples of chronic pain patients which can be of general use in variable selection. The next section reviews basic theory and research findings associated with this area of research.

Appraisals and Coping Strategies in Adjustment to Chronic Pain

Researchers studying people's responses to aversive situations such as chronic medical conditions commonly adopt a stress and coping framework (Jensen & Karoly, 1991; Jensen, Turner, Romano & Karoly, 1991; Taylor & Aspinwall, 1990). This framework emphasizes relations among appraisal measures, coping strategies and adjustment outcomes. It postulates that in demanding situations, people's responses in the form of mental judgements about the situation (appraisals), and purposeful actions to reduce the negative effects of the situation

(coping strategies) ultimately determine their psychological health and overall well-being (adjustment).

I) Pain-related Appraisals

A number of studies have examined the relations among appraisals, coping strategies and adjustment to chronic pain, with mixed results. In a recent review of these studies, Jensen et al. (1991) concluded that there is, at best, inconsistent support for a relation between self-reported adjustment indicators and coping strategy factors (i.e., composite measures of coping strategy items produced by factor analysis). A notable exception to this conclusion identified these reviewers, was the relatively consistent support for an association between adjustment indicators and one factor composed of ratings of pain-related control and catastrophizing.

These two constructs, commonly assessed by subscales on the Coping Strategies Questionnaire (CSQ; Rosenstiel & Keefe, 1983), have at times been confused with coping strategies. However, examination of their item composition clearly shows them to be more appropriately grouped under appraisals (Jensen et al., 1991). For example the subscale `Catastrophizing' refers to endorsement of negative self statements such as `It is terrible and will never get better' or `I feel I can't stand it any more', items more generally associated with irrational beliefs or expectancies rather than use of coping strategies. Similarly, the `Ability to Control and Decrease Pain' is composed of two evaluation items, `how much control do you feel you have over your pain' and `how much are you able to decrease pain'. Each of these refer more to appraisals than coping strategies.

Scores on measures of catastrophizing appraisals have consistently shown the strongest relation with adjustment indicators (Jensen et al., 1991). Self-reported frequency of catastrophizing has been found to be associated with reported pain severity (Phillips, 1989), to mediate the relation between arthritis pain severity and depression (Smith, Peck, Milano, & Ward, 1988), and to be positively associated with reported pain intensity, physical disability and depression over a 6 month longitudinal study (Keefe et al., 1989). In their study of the relation of

specific CSQ subscales to adjustment scores, Jensen et al. (1992) found that catastrophizing subscale scores, rather than pain-related control ratings, were directly associated with psychosocial and psychological adjustment scores. These results support the use of catastrophizing appraisals in assessing the validity and distinctiveness of derived clusters of adjustment profiles.

Ratings of pain control have generally been found to be associated with self-reported pain intensity, psychological dysfunction and physical disability (Gil, Abrams, Phillips, & Keefe, 1989; Keefe, Brown, Walston, & Caldwell, 1989; Keefe, Caldwell, Queen, Gil, Martinez, Crisson, Ogden, & Nunley, 1987; Keefe & Williams, 1990; Spinhoven, Ter Kuile, Linssen, & Gazendam, 1989). Pain control has also been found in one study to predict long-term self-reported disability (Keefe, Caldwenn, Williams, Gil, Mitchell, Robertson, Martinez, Nunley, Beckham, & Helms, 1990). Ratings on similar measures assessing perceived control over pain have also shown an association with self-reported adjustment (Affleck, Tennen, Pfeiffer, & Fifield, 1987; Strong, Ashton, Cramond, & Chant, 1990; Strong et al., 1994).

Although most studies have found a relation between perceptions of pain-related control and adjustment indicators, the association appears to be only weak to moderate. For example, in a recent analysis of a CLBP patient sample (Strong et al., 1994), scores on a 10-item measure of pain-related control were only moderately related to measures of immediate pain severity (r = -.24), disability (r = -.31) and depression (r = -.35). Recent evidence suggests that one explanation for this relatively weak association is that the relation of adjustment indicators and pain-related control is likely to be substantially influenced by reported pain severity levels (Jensen & Karoly, 1991; Jensen, Turner, Romano, & Lawler, 1994; Tennen, Affleck, Urrows, Higgins, & Mendola, 1992).

For example, in their hierarchical multiple regression analysis of responses from a heterogeneous sample of chronic pain patients (N=118), Jensen and Karoly (1991) found that controlling for pain severity, subjects' pain-related control appraisal accounted for an additional 11% of the variance on an index of psychological functioning. A similar analysis for activity

levels revealed no direct association. However the analysis did show a significant interaction effect (pain severity X pain-related control appraisal). Further examination of the nature of this effect indicated that for subjects with low levels of pain, the association of pain-related control to activity levels was `strong', whereas at high levels of pain this association was `weak'. A subsequent study of a heterogeneous sample of 241 male and female chronic pain patients has produced similar findings (Jensen et al., 1994).

Tennen et al. (1992) reported results consistent with these findings in a sample of 54 rheumatoid arthritis (RA) patients. They examined the relation of pain-related appraisals to mean scores on daily reported mood and activity limitations collected over a one month period. The results of a multiple regression analysis showed that controlling for pain and dispositional optimism, scores on a 5-item pain-related control measure were not directly associated with either mean reported daily mood ratings (assessed using an abbreviated version of the Profile of Mood States-Bipolar (POMS-B; Lorr & McNair, 1982)) or pain-related activity limitations. However, the analysis did reveal that the interaction of pain severity with pain-related control was significantly associated with mean daily mood ratings, although not with pain-related limits on activity. Further investigation found increases in pain-related control to be positively associated with better mood ratings only for subjects reporting relatively lower levels of pain. Among those reporting higher pain, increases in pain-related control were negatively associated with mean scores of positive daily mood.

In summary, evidence suggests that the association of pain-related control and adjustment indicators is likely to depend upon reported pain severity. Among those with less severe chronic pain (in terms of intensity and possibly duration), better adjustment outcomes appear to be associated with higher pain-related control appraisal. However for people reporting more severe chronic pain, the evidence suggests that higher pain-related control appraisal may be associated with poorer adjustment. These findings suggest that pain-related control ratings can be a potentially useful variable for testing the validity and distinctiveness of derived adjustment profile clusters. In support of this proposition, Strong et al. (1994) found that on a measure of

pain-related control appraisal, profiles grouped under an EA cluster (in their terms, `Active Copers') produced a mean score lower than that of a LP cluster but significantly higher than the mean value of a CPS cluster.

The evidence that the relation between pain-related control appraisals and adjustment is influenced by reported pain severity echoes the broader literature concerning the benefits of control beliefs in highly stressful situations (Bandura, 1986; Brickman & Karuza, 1987; Cohen & Lazarus, 1979; Folkman, 1984; Janis & Rodin, 1979; Nerenz & Leventhal, 1983; Reid, 1981; Rodin, 1986; Taylor, 1983; Thompson, 1981; Wortman & Silver, 1980). Control appraisals, that is, people's judgement that they can significantly influence outcomes are thought to be beneficial because they make situations appear more predictable. It is thought that, in turn, this is likely to increase the probability of people taking actions which objectively increase their influence (control) over the situation. However, as Folkman has pointed out, control appraisals are adaptive to the extent that there is a "comfortable match between an objective and subjective estimate of controllability " (Folkman, 1984, p.848). In circumstances where people are continually presented with evidence which conflicts with their appraisal of control (e.g., those reporting high pain-related control appraisals who continue to experience severe chronic pain), it is more likely that they will report greater psychological dysfunction and functional impairment.

Nevertheless, the evidence suggests that even when faced with such uncontrollable circumstances some people report effective adjustment (Affleck, Tennen, Croog, & Levine, 1987; Taylor, Lichtman & Wood, 1984; Weisman & Worden, 1976), Tennen et al., 1992). A common finding is that these subjects tend to associate personally important benefits with their efforts to manage their medical condition. For example, Weisman and Worden (1976) found that cancer patients who reported finding something beneficial in their illness showed the least distress due to their disease. Taylor, Lichtman and Wood (1984) noted that among a sample of 78 breast cancer patients, accounts of positive personal changes occurring as a result of coping with cancer were significantly associated with adjustment measures. These accounts frequently included the perception that their illness was part of some larger purpose in their life such as

finding a new sense of self, discovering a new aspect of themselves or re-ordering their life priorities.

Affleck et al. (1987) interviewed and followed a sample of 287 heart attack patients over an eight year period. They determined that, independent of sociodemographic characteristics and physicians' initial prognosis, those who had cited benefits from their misfortune after their attack had lower levels of morbidity and were less likely to have suffered an additional heart attack by the end of the study. Again the specific benefits cited involved elements of greater life significance such as learning to enjoy life more, discovering the value of a healthy lifestyle and finding a new life philosophy.

Finally, in a sample of RA patients, Tennen et al. (1992) also examined the relation of benefits appraisal to daily ratings of pain severity, mood and pain-related activity limitations. The benefits measure included items such as "my pain has helped me find new faith" and "my pain has helped me realize what is important in my life". Using multiple regression analysis and controlling for pain severity and optimism, they found that although pain-related benefits appraisal was not directly associated with adjustment, the interaction of benefits appraisal with pain severity was significantly associated with the number of days of pain-related activity limitations but not mean daily mood ratings. Further examination suggested that for subjects with moderate and severe pain, greater endorsement of pain-related benefits was predictive of less pain-related impairment of activities. In contrast, among subjects reporting lower levels of pain, higher benefits ratings were unrelated to activity limitations (Tennen et al., 1992).

Several theoretical frameworks have now incorporated the construing of benefits as important process in people's adjustment to aversive (i.e., relatively uncontrollable) circumstances such as chronic medical conditions (Affleck, Tennen & Rowe, 1991; Janoff-Bulman & Schwartzberg, 1991; Folkman, 1984; Rothbaum, Weisz & Snyder, 1982; Taylor, 1983; Thompson, 1985; Thompson & Janigan, 1988). As expressed by the terms `interpretative control' (Rothbaum et al., 1982), `cognitive control' (Thompson, 1981) or `cognitive adaptation' (Taylor, 1983), most of these frameworks interpret benefits appraisal as a secondary control

process. The basic premise is that under aversive (low control) conditions, people will distort their view of the situation in a manner which enhances their perception of control; or if that is not easily achieved, will attempt to offset the situation's negative features (low control) with perceived gains. This is seen as reducing the aversive effects on people's emotional state (secondary control), leading to less psychological dysfunction and functional impairment (Folkman, 1984; Taylor, 1983; Thompson & Janigan, 1988).

An alternative perspective views benefits appraisal not as the result of `favourable illusions' which reduce the aversive impact of relatively uncontrollable events on people's internal state, but rather as the product of a continuing series of action choices people make in maintain their activities despite the negative consequences (Brickman & Karuza, 1987). According to this framework, people facing aversive circumstances, who view themselves as having a choice over their actions, and who, in making this choice accept responsibility (either explicitly or implicitly) for the potential negative consequences (in this case, the resulting pain, discomfort and effort) that may ensue, incrementally infuse this behaviour with a sense of intrinsic meaning and value.

The value or benefits which people experience over a series of consistent choices (such as maintaining daily activities in spite of the pain and effort they entail) is thought to foster a sense of commitment to these actions. This in turn, contributes to a person's overall experience of life purpose and meaning, generally recognized as an important factor in maintaining psychological well-being. In aversive situations, such as coping with persistent pain, people who see themselves as choosing to maintain their activities while acknowledging the pain and effort involved are more likely to appraise this experience as having greater benefits. The associated sense of commitment to these activities will then translate in the longer term into less functional impairment and depression, although not necessarily lower short-term emotional distress (Brickman & Karuza, 1987).

Regardless of which perspective one adopts, there is general agreement that people's experience of choice and responsibility are two other important elements in effective adjustment

under aversive conditions (Brickman & Coates, 1987; Bulman & Wortman, 1977; Langer & Brown, 1992; Langer & Rodin, 1976; Thompson, 1981; Yalom, 1980). Studies show, for example, that people who report an internal locus of control, and would therefore be expected to take more responsibility for the consequences of their choices (Strickland, 1978), appear less likely to become seriously distressed or ill following negative events than those reporting an external locus of control (Johnson & Sarason, 1978; Lefcourt & Davidson-Katz, 1991; Sandler & Lakey, 1982; Wise & Rosenthal, 1982).

Similar results have been found in the limited number of studies investigating these constructs in people with chronic pain. Skevington (1983) examined the relation of locus of control orientation to adjustment in a sample of people with CLBP. As predicted, the more people attributed events to chance occurrences rather than internal control, the more likely they were to report depression and pain distress. Similarly, Laborde and Powers (1985) found that among osteoarthritis patients, an external locus of control orientation towards their health status was associated with lower reported life satisfaction. More recently, Rudy et al. (1988), using a path analytic research design, were able to provide empirical support for the hypothesis that a composite measure composed of people's beliefs about their ability to solve problems and to have control over their life in the previous week, plus their general locus of control orientation, mediated the relation between pain severity and reported depression.

However, until the recent introduction of the Personal Responsibility Questionnaire (PRQ; Saunders, Reesor & Gallant, 1993) there was no instrument which could directly assess people's attributions of choice and responsibility related to a chronic medical condition. Other measures such as the responsibility subscale of the Implicit Models of Illness Questionnaire (IMIQ; Turk, Rudy & Salovey, 1986) or the Cancer Locus of Control scale (CLOC; Watson, Greer, Pruyn & Van Den Borne, 1990) emphasize beliefs about causal responsibility. The PRQ, on the other hand, is designed to assess people's acceptance and avoidance of responsibility for how they conduct themselves and how they experience their health or medical situation in the present. Previous findings from a sample of cancer and AIDS patients, had indicated that as

predicted, scores on the PRQ were not associated with scores from either the IMIQ-Personal Responsibility or the CLOC-Cause subscales. However the PRQ scores were moderately correlated with both general affective state and condition-related distress, as well as locus of control beliefs related to the course of the illness (Saunders, Reesor & Gallant, 1994).

In summary, the association of pain-related benefits, personal responsibility and catastrophizing appraisals with adjustment indicators suggests, that if an EA cluster of adjustment profiles can be reproduced in the proposed study sample, it may be distinguished from a CPS cluster by differences on these variables. On the other hand, evidence that the association of pain-related controls with adjustment outcomes is minimal for those reporting high pain severity suggests that differences in pain-related control appraisals may be less likely to distinguish EA and CPS clusters of adjustment profiles.

Similarly, given that a LP cluster of adjustment profiles produced the lowest scores on measures of pain severity and depression, it can also be hypothesized that differences on appraisals of pain-related control, personal responsibility, and catastrophizing are likely to distinguish a LP grouping from EA and CPS clusters. However the evidence that pain-related benefits are associated with adjustment only for higher levels of reported pain severity suggests that differences on this measure may be unlikely to distinguish the LP cluster from the other two clusters.

ii) Pain-related Coping Strategies

Although there is little support for a consistent relation between adjustment indicators and composite coping factors (Jensen et al., 1991), there is more evidence for potentially significant associations between adjustment and individual coping strategy subscales (Jensen & Karoly, 1991; Keefe & Williams, 1990). Using multiple regression analysis, Jensen, Turner and Romano (1992) compared the specific coping scales of the Coping Strategies Questionnaire (CSQ) with coping factors derived from CSQ item responses as predictors of adjustment indicators. They found that specific CSQ subscales (in particular Coping self-statements, Reinterpreting pain sensations and Catastrophizing) were superior to the composite factors in

predicting adjustment (as measured by the BDI, and the physical and psychosocial scales of the Sickness Impact Profile). Results such as these suggest the utility of employing specific coping strategy measures (in particular coping self-statements and reinterpreting pain) in clustering studies rather than composite factor scores.

These findings and those of Strong et al. (1994) referred to earlier, suggest that reported differences on the CSQ subscales assessing pain-related use of coping self-statements, ignoring pain, diverting attention and reinterpreting pain are likely to distinguish a CPS cluster of adjustment profiles from EA and LP clusters. Thus these measures of coping strategy use have been included along with assessment of appraisal, adjustment and background variables in the package developed for this study.

Study Purpose

The purpose of this research study is to investigate the validity of an EA cluster of adjustment profiles within a broad sample of people with chronic pain, and to test whether this cluster differs from CPS and LP clusters on measures of specific appraisals and coping strategies shown in previous research to be associated with adjustment outcomes.

Research Objectives

The study has two principal objectives. The first is to test the reproducibility and construct validity of an EA grouping of adjustment profiles in a heterogeneous sample of adult males and females with chronic pain. The second is to determine whether an EA grouping of adjustment profiles differs from a CPS grouping on measures of pain-related control, benefits, personal responsibility, catastrophizing and partner support appraisals, as well as reported use of various coping strategies.

Research Hypotheses

First, given the overall evidence that ratings of pain-related control are directly related to reported pain level, and that the association of pain-related control with adjustment is minimal for those reporting high pain severity, it is hypothesized that:

> i) the mean rating of pain-related control appraisals from an EA cluster will not be significantly different from those produced by a CPS cluster; and the mean pain-related control rating of an LP cluster will be significantly higher than that produced by EA and CPS clusters;

Second, based on evidence that pain-related benefits appraisal may be related to adjustment for those reporting higher pain but not for those reporting lower pain, it is hypothesized that

> ii) mean ratings of pain-related benefits from an EA cluster will be significantly higher than those produced by CPS and LP clusters;

Third, from general evidence that low levels of reported pain are associated with higher appraisals of choice and responsibility, and that these appraisals appear to mediate the relation of pain severity and adjustment, it is hypothesized that:

iii) mean ratings of pain-related appraisals of choice and responsibility from an EA cluster will be significantly higher than those produced by a CPS cluster; whereas those from an LP cluster will be significantly higher than both EA and CPS clusters;

Fourth, based on evidence for a direct relation between ratings of catastrophizing and adjustment scores, it is hypothesized that:

iv) an EA cluster will produce significantly lower mean ratings of pain-related catastrophizing appraisals compared with a CPS cluster; a LP cluster will produce significantly lower mean scores on catastrophizing appraisals than both EA and CPS clusters;

Fifth, given the evidence that an EA cluster profile appears to be distinct from an Interpersonally Distressed (ID) cluster profile, it is hypothesized that:

v) an EA cluster will produce levels of pain-related partner response appraisals which are not significantly different from those produced by CPS and LP clusters;

Sixth, based on evidence that measures of the pain-related use of coping self-statements, ignoring pain, diverting attention and reinterpreting pain sensations are associated with adjustment outcomes and may distinguish a CPS cluster from EA and LP clusters, it is hypothesized that:

vi) a CPS cluster will show significantly lower mean use ratings for coping self-statements, ignoring pain, diverting attention and reinterpreting pain sensations compared with EA and LP clusters.

METHODOLOGY

Subjects and Procedures

In an effort to study as broad and heterogeneous a sample of people with chronic pain as possible, approaches were made to professionals, staff and other contact people from a large variety of settings and networks. These included community support groups, rehabilitation programs for people with motor vehicle accident or work-related injuries, chiropractic and massage therapy clinics, psychologists' private practices, and a hospital pain clinic. Potential participants were informed of the study via presentations to community-based support groups, and via an information sheet circulated to patients by physiotherapists, occupational therapists, massage therapists, chiropractors, psychologists and nurses.

The study was described as a research effort designed to increase understanding of the experience of people living with chronic pain (appendix A). Those interested in participating were asked to provide their name and phone number for follow-up contact by the researcher. Follow-up contact involved a more detailed explanation of the nature and extent of people's participation in the project, and if they agreed, an interview time was determined. In total, less than 5% (n=7) of the 195 people contacted declined to participate.

The interviews, which were all conducted by the researcher, generally lasted from an hour to an hour and a half. In each interview, potential participants were asked to read a project information sheet (appendix B) and address any questions or concerns they had regarding their participation to the researcher. Those that decided not to participate after reading the sheet (n=3) were thanked for their time. Those that agreed to participate were asked to sign two copies of the project consent form (appendix C), one of which they were given to keep along with the project information sheet.

Once participants had signed the consent form, an informal pain history-background interview was conducted based on the Basic Pain History-Background Information form (see appendix E for the complete set of measures). At this point participants were given the choice of either completing the questionnaire with the researcher or finishing it independently (after receiving a brief explanation of its contents). In most cases (n=152) participants chose to

complete the questionnaire independently and return it several days later. One person failed to complete and return the questionnaire (due to a death in the family shortly after the interview). Three returned questionnaires were sufficiently incomplete that they could not be used in the analysis.

In total, 184 people with chronic pain provided questionnaires, 181 of which were used in the analysis. Slightly less than half of this sample were responses from people who had been contacted through fibromyalgia and chronic pain support groups (n=90). The rest of the sample included clients of chiropractic clinics (n=36), rehabilitation programs (n=27), private practice psychologists offices (n=10), a hospital pain clinic (n=9), and a massage therapist (n=5), as well as a small number of self-referrals (n=7).

Those that participated in the study were required to be 18 years of age or older, with self-reported experience of persistent pain of a relatively continuous nature for a period of at least 6 months. Generally all participants were able to read and answer written questions in English, although some individuals (n=6) required assistance from the researcher in understanding individual items, particularly the descriptors used in the McGill Pain Questionnaire (MPQ; Melzack, 1975). Exclusion criteria for participation were those who were about to undergo or had recently (within the previous three months) undergone surgery.

Instruments

i) Basic Pain History-Background Information Form:

A set of background information items formed the basis of an informal semi-structured interview concerning participants' history, including age, sex, language(s), education level, marital status and household income; the origin, location and duration of their pain; therapists/specialists they had consulted; whether or not people were working, receiving disability benefits, or participating in a formal rehabilitation program; what medications as well other techniques they were using on a regular basis to manage their pain; and the extent to which pain had interfered with their activities over the previous week. Part of the material obtained was

subsequently used to classify participants' pain patterns using the International Association for the Study of Chronic Pain (IASP, 1994) classification scheme.

ii) Pain Severity:

Pain severity was measured using the Short Form MPQ (SF-MPQ; Melzack, 1987). The SF-MPQ consists of 15 representative words selected from the sensory and affective categories of the standard MPQ. Respondents were asked to rate each word as a descriptor of their pain on a 4 point severity scale (0=none to 3=severe). Total score on the standard MPQ, known as the Pain Rating Index (PRI) is a widely used clinical and research measure of pain severity with good internal consistency ($\alpha = 0.84$; Turk, Salovey & Rudy, 1985) and reliability (test-retest $r = 0.75$ to $r = 0.85$) in quite different samples of people coping with pain (Graham, Bond, Gerkovich, & Cook, 1980; Love, Loeboeuf & Crisp, 1989; Syrjala & Chapman, 1984). As a measure of pain severity, the validity of the PRI has been demonstrated in laboratory studies (Klepac, Dowling, & Hauge, 1981), with clinical samples (Turk et al., 1985), and in field studies (Melzack & Perry, 1975; Rybstein-Blinchik, 1979; Van Buren & Kleinknecht, 1979).

The SF-MPQ was specifically developed for use in research that requires more information than is provided by simple intensity rating scales (Melzack & Katz, 1992). The SF-MPQ total score from patients experiencing post-surgical, labour and chronic musculoskeletal pain has been reported to correlate highly with the PRI (r values ≥ 0.77), especially among those with chronic pain ($r = 0.93$; Melzack, 1987). SF-MPQ scores have been shown to be very responsive to analgesic effects and transcutaneous electrical nerve stimulation (TENS) therapy for chronic pain patients attending hospital clinics and rehabilitation settings (Katz & Vadnais, 1990; Melzack, 1987). At the same time, limited research (Grönblad, Lukinmaa & Konttinen, 1990) has suggested that over a four to five week period the SF-MPQ may demonstrate superior test-retest stability compared with a variety of other pain measures (Visual analogue scales,

numerical rating scales, pain drawing). In this sample the SF-MPQ items showed good internal consistency (α =0.82).

iii) Depression:

In keeping with other cluster analytic studies of adjustment to chronic pain (Klapow et al., 1993; Rudy et al., 1988; Strong et al., 1994), depression or psychological distress was measured using the Beck Depression Inventory (BDI; Beck et al., 1961), a commonly used self-report instrument assessing cognitive/affective and somatic symptoms of depression. Respondents were asked to indicate which of the four statements best described the way they had been "feeling the past week, including today" for each of 21 items. The overall BDI has demonstrated high internal consistency in both psychiatric (mean value α = 0.86) and non-psychiatric patient samples (mean value α = 0.81). Stability estimates over periods of one to four weeks range from r = 0.60 to 0.63 in samples of undergraduates to r = 0.80 to 0.85 in samples of depressed older adults (Beck, Steer, & Garbin, 1988). In studies of depression among chronic pain patients (using DSM-III criteria as true diagnosis), the BDI has demonstrated superior sensitivity (0.83 to 1.0) and specificity (0.82 to 0.98) compared with other commonly used self-report measures such as MMPI-D scale and the Zung Depression Scale (Love, 1987; Turner & Romano, 1984).

Concerns have been expressed that the use of the full 21-item BDI may provide a misleading assessment of the nature and degree of affective disturbance among people with chronic pain due to endorsement of somatic and activity items more related to pain than depression (Burkhardt, O'Reilly, Wiens, Clark, Campbell & Bennett, 1994; Novy, Nelson, Berry & Averill, 1995; Williams & Richardson, 1993). Two recent studies of BDI factor structure derived from the responses of people with chronic pain (Nvoy et al., 1995; DeGagné & Korol, 1995) have suggested the incremental validity of assessing depression in this population by combining responses on the set of cognitive/affective items (the first 14 items of the BDI, except

for item 11 concerning irritability). Based on these findings the cognitive/affective subscale (BDI-CA) score was determined and used as the measure of affective distress in cluster analysis. Both the BDI and the BDI-CA demonstrated high internal consistency in this particular sample ($\alpha = 0.91$ and $\alpha = 0.93$ respectively).

iv) Subjective Disability:

The Pain Disability Index (PDI; Tait, Chibnail, & Krause, 1990) was used as a global measure of subjective disability. The PDI asks respondents to indicate on an 11-point rating scale the level of disability they typically experience in seven areas of activity (e.g., family/home responsibilities, recreation, social activity etc.). Recent analyses of the scale's psychometric properties have suggested that the PDI has good internal consistency ($\alpha = 0.86$) although its reliability is uncertain. Evidence from a small sample of people with chronic pain has suggested the PDI may demonstrate superior stability relative to other measures of pain (Grönblad et al., 1990). In this sample the PDI demonstrated excellent internal consistency ($\alpha = 0.89$).

The validity of the PDI has been suggested by the fact that PDI scores have been most closely associated with measures of disability (the frequency with which people report stopping activity or staying in bed due to pain), work status (working vs. non-working) and symptoms, and less related to measures of psychological distress (Tait et al., 1990). The PDI has also been able to differentiate known groups of pain patients with different levels of disability (Pollard, 1983; Tait, Pollard, Margolis, Duckro, & Krause, 1987). Recent use of the PDI as a measure of functional status within a multidimensional assessment battery has produced significant cluster differences in mean PDI scores between groupings of subjects labelled 'depressed and disabled' and labelled 'active copers with denial', despite the fact that both groups reported virtually identical mean values of reported pain intensity (Strong et al., 1994).

v) Supplemental Pain Assessment:

A pain drawing and a set of four 11-point pain rating scales were included to provide supplemental pain assessment for use in the external validation tests conducted on the derived clusters. The pain drawing (Margolis, Tait & Krause, 1986) is a commonly used tool in chronic pain assessment in which people are asked to mark on an outline of the human body those body areas where they experience pain. In this study these drawings were then scored for the presence or absence of pain in each of 45 body areas, with weights being assigned to each area based on the percentage of overall body surface they covered (Margolis et al., 1986). The result is an overall weighted score reflecting the total percentage of body surface indicated to be painful. This was used as a supplemental indicator of overall pain experienced.

In addition, participants were asked to provide four separate ratings of their pain (current, average, worst and least) on an 11-point scale (0=no pain to 10=pain as bad as you can imagine). This set of four 11-point rating scales has been found to be a reliable and sensitive measure of reported pain intensity compared with other commonly used instruments (Jensen, Turner & Romano, 1994).

vi) Supplemental Mood Ratings Checklist

An abbreviated version of the Profile of Mood States-Bipolar (POMS-B; Lorr & McNair, 1982) was also included to provide supplemental positive and negative mood ratings for use in the external validation tests conducted on the derived clusters. This version consists of eighteen adjectives, nine assessing negative mood states of depression, anxiety and hostility, and nine assessing positive mood states of elation, composure and agreeableness. Respondents are asked to rate the extent to which each word describes how they been feeling over the previous few days on a 4-point scale (0=not at all to 3=quite a bit).

In a previous study of rheumatoid arthritis patients (Tennen et al., 1992), both sets of items showed good internal consistency (positive mood items $\alpha = 0.96$; negative mood items $\alpha = 0.86$). In that study scores on the two sets of items were highly correlated (r=-0.67) and

combined to produce a single mood scale with good internal consistency ($\alpha = 0.78$). However, in the present sample, the sets of positive and negative mood items also showed good internal consistencies ($\alpha = 0.85$ and $\alpha = 0.89$ respectively) but were only moderately correlated ($r = 0.43$). For this reason separate negative and positive mood rating scores were employed in the external validation tests.

vii) Pain-related Control Appraisals:

Several self-report measures were used to assess participants' pain-related appraisals. The control subscale of the Survey of Pain Attitudes (SOPA Control; Jensen, Karoly, & Huger, 1987) assessed a set of specific pain-related control appraisals, while the `Ability to Control & Decrease Pain' subscale of the Coping Strategies Questionnaire (CSQ) provided a more general appraisal of control over pain. The latter consists of two effectiveness items, `control over pain' and `ability to decrease pain', rated by respondents on a 7-point rating scale (0=no, 3=some, 6=complete). The former contains 10 pain-related control statements (e.g., "the amount of pain I feel is out of my control", "I know for sure I can manage my pain") which respondents rated on a 5-point scale (0=very untrue for me, 3=neither true nor untrue, 5=very true for me). The SOPA Control subscale has demonstrated acceptable internal consistency ($\alpha = 0.71$) and test-retest stability ($r = 0.68$ over two week period; Jensen & Karoly, 1991). In this sample it demonstrated good internal consistency ($\alpha = 0.82$). As evidence of their validity, scores on each of these measures have been found to be inversely related to pain intensity and significantly related to psychological dysfunction and activity ratings (Gill et al., 1989; Jensen & Karoly, 1991; Keefe & Williams, 1990; Spinhoven et al., 1989).

viii) Pain-related Benefits Appraisal

The Benefits Construed Scale (BCS; Tennen et al., 1992) is a 5-item measure designed to assess people's appraisal of benefits they have gained as a result of coping with their chronic

pain. Items include statements such as "my pain has made me a stronger person" and " my pain has made life more precious to me"). Respondents rate each item on a 5-point rating scale (0=very untrue for me, 3=neither true nor untrue, 5=very true for me). The scale has shown good internal consistency ($\alpha = 0.83$ in the previous study; $\alpha = 0.80$ in this study). No information is yet available regarding stability. Tennen et al. (1992) have provided preliminary evidence suggesting the distinctiveness of response patterns on the BCS relative to responses on a similarly worded control appraisal scale.

ix) Pain-related Personal Responsibility:

The Personal Responsibility Questionnaire (Saunders, Reesor & Gallant, 1993) is a recently developed research tool for assessing people's beliefs regarding their choice and responsibility over various aspects of coping with a chronic illness or condition. Respondents rate each of the 19 items on a 5-point scale (1=strongly disagree, 3=neither agree nor disagree, 5=strongly agree). The PRQ is composed of two subscales, a 10-item Responsibility Acceptance (PRQ-Accept) scale (e.g., "I know its up to me to find the best medical care I can") and a 9-item Responsibility Avoidance (PRQ-Avoid) scale (e.g., " I have little say over whether I have time for myself"). In an earlier study involving a sample of 105 cancer and AIDS patients, both the full scale and the two subscales have demonstrated good internal consistency (Cronbach alphas of 0.78 (PRQ), 0.76 (PRQ-Accept), and 0.73 (PRQ-Avoid)). In the sample used in the present study, the internal consistencies were higher (Cronbach alphas of 0.89, 0.82, 0.84 respectively).

With respect to validity, scale development work has suggested that the PRQ has good face validity and that responses to it appear to be unaffected by social desirability influences (Saunders, Reesor & Gallant, 1993). Scores on the full scale and the two subscales have shown predicted relationships with psychological distress measures. More significantly, as predicted, scores on the PRQ scales have shown no correlation with causal responsibility for illness beliefs (measured by the Implicit Models of Illness Questionnaire) or locus of control beliefs about illness cause (Cancer Locus of Control-Cause subscale), but have shown moderate correlations

with locus of control beliefs about the course of illness (Cancer Locus of Control-Course subscale).

x) Perceived Partner Support:

Part II of the Multidimensional Pain Inventory (MPI; Kerns, Turk, & Rudy, 1985) was used as a measure of perceived partner support when they were in pain. The MPI-part II is composed of three subscales created by exploratory factor analysis of a larger original pool of 21 items: Punishing Responses (PR; 4 items); Solicitous Responses (SR; 6 items); Distracting Responses (DR; 4 items). In previous samples these scales have demonstrated acceptable to good internal consistency (Cronbach alphas ranging from 0.74 to 0.89) and stability (*r's* ranging from 0.62 to 0.89). Internal consistency values in this sample were similar to previous findings, with the SR and PR scales demonstrating the highest values (Cronbach alphas of 0.84(PR), 0.85(SR), 0.74(DR)).

xi) Coping Strategies:

Finally respondents completed the Coping Strategies Questionnaire (CSQ; Rosenstiel & Keefe, 1983). The CSQ is a 42-item measure commonly employed in pain research to assess people's use and perceived effectiveness of pain-related appraisals and coping strategies. As developed, the CSQ was designed to measure 6 different cognitive strategies (diverting attention (DA), reinterpreting pain sensations (RI), ignoring pain sensations (IGN), coping self-statements (COPE), praying or hoping (PRAY) and catastrophizing (CAT)) and one behavioural strategy (BEH). Each subscale consists of six statements which respondents rate on a 7 point scale (0=never, 3=sometimes, 6=always). The subscales have generally demonstrated acceptable to good internal consistency (Cronbach alphas of 0.67 to 0.89; Gross, 1986; Keefe et al., 1987; Spinhoven et al., 1989). In this sample the CSQ subscales showed a similar range of internal consistency (Cronbach alphas ranging from 0.72 (BEH) and 0.76 (COPE) to 0.84 (CAT, RI)).

Data Analysis

Investigation of the subjects' responses combined two basic procedures: cluster analysis of subjects' three-dimensional adjustment profiles (the combination of scores on the measures of pain severity (SF-MPQ), depression (BDI-CA) and subjective disability (PDI)) followed by tests of the statistical significance of intercluster differences on a variety of self-report measures of pain-related behaviours, symptoms, perceptions and cognitive strategies using one way analysis of variance (ANOVA).

Cluster analysis is a generic name for a wide variety of procedures which can be used to form groups or `clusters' of entities with similar characteristics. This study combined two procedures, hierarchical agglomeration, in which N cases are progressively combined over N-1 steps to eventually form a single cluster, followed by iterative partitioning, in which cases are successively assigned and re-assigned to a set number of clusters according to the 'closeness' of each case to the clusters' centroids.

Prior to the analysis, the overall distributions of subjects' scores on the three clustering variables were screened to determine suitability for cluster analysis. Theoretical considerations and empirical evidence suggest that normally distributed variables are inconsistent with the presence of multiple subgroupings within a population (Aldenderfer & Blashfield, 1984). The pre-requisite for cluster analysis was non-normal distributions on at least two of the three clustering measures (SF-MPQ, BDI-CA and PDI) forming the multidimensional adjustment profile. In this sample the BDI-CA scores were positively skewed; PDI scores were bimodal; and SF-MPQ scores were normally distributed. These distributions suggested the possible presence of multiple subgroupings.

Examination of correlations between the three variables indicated they were not sufficiently correlated to suggest significant levels of shared variance (r values of 0.39 to 0.45), an argument against the possibility that any of the variables were unduly weighted in the analysis. Screening also revealed a small number of univariate outliers (n=2) only on the BDI-CA. However the Z-scores of these subjects were only marginally above cutoff z value of 3.0 and

both cases were included in the sample for analysis. Total scores on each of the three variables were converted into standardized scores to control for scaling differences.

Cluster analysis was performed using the SPSS CLUSTER program (SPSS, 1990). CLUSTER is an algorithm within SPSS which generates a hierarchical agglomeration of cases according to their similarity or dissimilarity on one or more variables. Procedurally, it uses one of several possible methods to successively combine items (e.g. cases, clusters) into fewer and fewer groupings based on a selected similarity or `distance' measure. The number of clusters begins with the number of items (or cases) and successively diminishes to a single cluster combining all the cases.

In this study, Ward's method for combining clusters and cases was chosen, with squared Euclidean distances (i.e. the sum of the squared differences on each clustering variable) used as the distance measure. Ward's method is a commonly employed procedure which considers all possible combinations of clusters and combines clusters based on minimizing the increase in the overall sum of squared within-cluster distances. It is preferred because of its demonstrated efficiency in recovering cluster structure particularly under conditions of cluster overlap and where total coverage is required (Aldenderfer & Blashfield, 1984).

In the cluster analysis literature, there is a common recognition that no single standard or statistical test exists for determining the optimal number of clusters. As a result, a variety of procedures were utilized in determining the most appropriate cluster solution (Aldenderfer & Blashfield, 1984; Milligan & Cooper, 1985). The primary procedure involved inspecting changes in cluster co-efficients (a measure of the amount of within-cluster variance) associated with each successive agglomeration. As suggested by Morris, Blashfield & Satz (1981) large jumps or discontinuities in the change in co-efficients indicates that more homogeneous clusters were combined in that step to produce a heterogeneous cluster with high within-cluster variance. This particular approach is most useful when combined with Ward's method of clustering which clusters on the basis of minimizing the overall sum of squared within-cluster distances.

However, inspecting cluster co-efficients for the largest changes was one of several different considerations used to select the most appropriate cluster solution. Another important factor was the results of previous studies with similar samples (e.g., Klapow et al., 1993; Strong et al., 1994; Turk & Rudy, 1988). A third element in determining an optimal cluster solution involved generating a plot of the clusters created during the final six levels of the hierarchical solution (i.e. 6-cluster solution down to a single cluster solution), and then examining the apparent homogeneity of the clusters at particular distance or similarity values (Aldenderfer & Blashfield, 1984). As a complement to these more heuristic methods, a variance ratio criterion or pseudo-F statistic[1] (Calinski & Harabasz, 1974) was also assessed for each solution from five to two clusters. A fifth consideration related to how well the sample was partitioned at each solution level. Finally, particular attention was given to the clinical and research utility of the clusters based on the objectives of the present study.

Once the groupings were determined, their discriminability on measures of specific appraisals and coping strategy use frequency were assessed by testing for the statistical significance of intercluster differences with univariate analysis of variance (ANOVA).

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[1] *The variance ratio criterion is computed as [trace B/k-1]/[trace W/n-k], where B and W represent the between and within cluster sum of squares and cross product matrices, n and k the number of cases and clusters respectively*

RESULTS

Background Sample Information

The sample consisted of 43 males and 141 females, who were primarily middle-aged (mean age: 46.0 years, SD=10.2, range 22-82 years), English-speaking (first language: 72% English, 20% French, 8% other languages), born in Canada (85% of the sample), and who had experienced long-standing chronic pain (mean duration: 98 months, SD=90, range 6-492 months). Overall the sample was relatively well-educated (92% reported an educational level of high school graduation or higher), of upper-middle income (annual household income: 42% over $45000; 31% $25-45000; 27% below $25000), and likely to be in a primary relationship (married or living common-law, 63%; single, separated or divorced, 33%; widowed, 4%). A majority of the sample was unemployed (58%), with the remainder split among full-time employed (10%), part-time employed (10%), self-employed (4%), retraining (14%) and student (4%).

Interview data indicated that slightly more than half the sample (52%) suffered diffuse pain, with the remainder reporting localized pain in the lower back and legs (27%); the head, neck and shoulder area (15%); and the mid to upper back (5%). Slightly less than 20% of study participants indicated having undergone pain-related surgery, (one-third them within the past two years, and another one-third within the past five years). More than 90% of respondents reported taking pain-related medication, with the majority (73%) reporting regular consumption of two or more types. More than half of those taking medications (52%) were taking either SSRI or Tricyclic anti-depressants; the majority of them (88%) in combination with other types of medications (predominantly analgesics, anti-inflammatories, weak narcotics and/or anti-convulsants).

Major event categories associated with onset of pain were injuries suffered while working (44%), motor vehicle accidents (28%), illness (10%), and long term physical conditions (18%). A majority of participants reported receiving compensation in the form of long term disability (46%), short term disability (9%) or early retirement pension (5%). More than one-third of the sample (35%) reported receiving no compensation, while the remainder (5%) indicated they were on social assistance. Slightly more than one-fifth (22%) were participating in a formal rehabilitation program involving at least two days per week attendance.

Cluster Analysis Findings

Results from the cluster analysis suggested that four, three and two cluster solutions had merit in terms of producing distinct homogeneous groupings. Inspection of the cluster coefficients indicated that the largest changes occurred in the transitions from two clusters to one, from three clusters to two, and from a four clusters to three. Although the two-cluster solution produced the largest value of cluster coefficient change and variance ratio criterion statistic, inspection of strength-of-association values for the two cluster solution indicated that it produced the smallest effect sizes for all three clustering variables (R^2 values of 0.31(SF-MPQ), 0.36 (BDI-CA), and 0.43 (PDI)). In addition, as has been noted in previous studies (Klapow et al., 1993; Strong et al., 1994; Turk & Rudy, 1988) its clinical interpretability was very limited .

As a result, previous investigations of people with chronic pain have focused on a three-cluster solution. In this sample, a three cluster solution produced groupings of case profiles with good separation (see Table 1 for mean standardized scores), as well as large values of cluster coefficient change and variance ratio criterion statistic. Strength-of-association values (shown at the bottom of Table 1) associated with this three cluster partitioning produce substantially larger effect sizes than the two cluster solution for two of the three variables (R^2 values of 0.52 (SF-MPQ), 0.59 (BDI-CA) and 0.49 (PDI). However, in this sample a three-cluster solution split the cases in a ratio of 34:102:45, generating two well separated clusters, LP and CPS, plus the presence of an extra large and undistinguished middle grouping. Moreover, in terms of interpretability, differences in mean values on the adjustment variables could be completely attributed to high-medium-low pain severity levels. Considering the objectives of the study, these results were considered of limited research value.

On the other hand the apparent presence of a viable four-cluster solution offered the possibility of further division of the large undifferentiated middle grouping into smaller, more distinctive clusters. Next to the two and three-cluster solutions, the four-cluster solution was associated with the highest variance ratio criterion, and the largest change in cluster coefficients (comparable to the three-cluster solution). More importantly, the change in cluster coefficients

associated with the transition from a four-cluster to a three-cluster solution represented the greatest jump or discontinuity of all the transitions except for the ultimate combining of two clusters into one. Consistent with these findings, inspection of agglomeration plots identified four distinct groupings of cases.

Examination of the four-cluster solution (see Table 2 for mean standardized scores) indicated that it offered superior partitioning of the sample into groupings with greater interpretability and research value. Whereas the three-cluster solution included an extra large middle group (representing almost 60% of the sample) sandwiched between two well defined extremes, the four-cluster solution effectively partitioned the middle grouping into two smaller groupings on the basis of differences in pain severity and subjective disability. In this solution the cases were split 30:63:53:35. More importantly from the point of view of interpretability and research objectives, the largest of these groups displayed the adjustment profile of high pain, low depression and subjective disability postulated to characterize an EA grouping. A fourth, Undefined Adjustment (UA) grouping produced an adjustment profile of low pain, intermediate depression and disability. Strength-of-association values for each variable (shown at the bottom of Table 2) indicate that in the four cluster solution the effect sizes for all three variables are similar. Thus differences on all three variables contribute equally to the cluster separation.

Stability of the Selected Cluster Solution

Further evidence suggesting the applicability of the four cluster solution to this sample came from examining the stability and replicability of the generated clusters under the application of additional clustering methods. Cluster stability is a particularly important issue in hierarchical agglomeration procedures because they entail, in effect, only one pass through the data and a poor early partitioning of the sample is not modified at a later stage in the process. Thus stability of the clusters' case composition is an important test because stable groupings are more likely to represent 'natural' groupings in the data.

To evaluate the stability of this hierarchically constructed solution and to sharpen cluster assignment of cases, a K-means iterative partitioning procedure was employed using SPSS QUICK CLUSTER program (SPSS, 1990). In this program, the number of clusters is specified, and initial centroid values for each cluster can also be entered. The procedure itself involved iteratively assigning and re-assigning cases to clusters until all cases were grouped with the cluster of most similar centroid values. In this procedure, starting centroid values for the clusters were drawn from the four clusters produced by the hierarchical agglomeration. Computer simulation studies indicate that a large number of case reassignments (more than 15%) is likely to be associated with an instability of the clusters. The fact that only 5% of the cases were reassigned to clusters with more similar centroids indicates the stability of the original cluster solution in classifying cases from this sample.

Second, the solution was tested for its replicability across two additional and quite different clustering methods. One method used another hierarchical agglomeration procedure, Complete Linkage, in which new cases are grouped with clusters based on their similarity to all existing members of the cluster. The other method employed a modified K-means iterative partitioning procedure (SAS FASTCLUS (SAS, 1988)) without specifying initial values for the four cluster centroids.

The results from both these methods were highly consistent with those generated by Ward's method. The pattern of changes in cluster coefficients produced by the complete linkage algorithm was congruent with that generated by Ward's method procedure, providing additional support for the presence of distinct homogeneous groupings. In addition both methods generated cluster profiles and centroid values very similar to those produced by Ward's method. These results supported the consistency of the cluster pattern across different methodologies. Together, the results from the cluster stability and replicability tests suggest that the groupings are likely to be meaningful rather than simply procedural artifacts.

Table 1. *Three Cluster Solution:*
Mean Standardized Scores on Adjustment Variables

Cluster	Cluster centroids[1]		
	SF-MPQ[2]	BDI-CA[2]	PDI[2]
Cluster 1 (n=34)	0.99	1.45	0.99
Cluster 2 (n=102)	0.23	-0.23	0.18
Cluster 3 (n=45)	-1.16	-0.74	-1.24
[4] R^2	0.52	0.59	0.47

Table 2. *Four Cluster Solution:*
Mean Standardized Scores on Adjustment Variables

Clusters	Cluster centroids[1]		
	SF-MPQ[2]	BDI-CA[2]	PDI[2]
Cluster 1 (CPS[3]) [n=30]	0.78	1.68	0.95
Cluster 2 (EA[3]) [n=63]	0.75	-0.16	0.25
Cluster 4 (UA[3]) [n=53]	-0.62	-0.34	0.11
Cluster 3 (LP[3]) [n=35]	-1.07	-0.66	-1.45
[4] η^2	0.63	0.60	0.58

[1] standardized values (n=181) [2] SF-MPQ = Short Form McGill Pain Questionnaire
BDI-CA = Beck Depression Inventory Cognitive/ Affective subscale
PDI = Pain Disability Inventory

[3] CPS = Chronic Pain Syndrome, EA = Effective Adjusters,
UA = Undefined Adjustment, LP = Low Pain

[4] R^2 , η^2 = estimates of strength-of-association values

External Validation Tests of the Derived Clusters

Ultimately, the best validation method of a cluster analysis solution is to test for the presence of significant differences among the derived clusters on 'external' variables, that is relevant variables not used in the clustering procedure (Aldenderfer & Blashfield, 1984). The power of this type of validation is that it provides a direct test of the meaningfulness of the derived groupings on a broader collection of criteria or variables, while at the same time offering the opportunity for further interpretation of the clusters' clinical utility.

In this study, validation of the derived clusters involved computing Chi square and ANOVAs for cluster comparisons on measures of pain history, demographic and psychological variables not used to generate the solution. Significance for these tests was set at $p < .01$ and for each continuous variable comparison, Tukey's HSD test was used to control the type I error rate at 0.05 for post-hoc analyses.

Results from these comparisons (presented in Table 5) suggested that the derived clusters were unlikely to have been a random result or an artifact of the methodology. The overall distribution of cases were 19% LP cluster, 17% CPS cluster, 34% EA cluster, and 30% UA grouping (see Table 2 for specific n values). However, among those who reported being employed full-time or part-time (n=44), 41% were from the LP cluster, while only 2% came from the CPS cluster. The remainder of those employed were split evenly between the EA cluster (30%) and UA grouping (27%). Slightly more than half (18 of 35) of the LP cluster reported being employed compared with only 1 in 30 of the CPS cluster. Slightly less than one-quarter of those in the EA cluster and the UA grouping reported employment. Consistent with these results, only 20% of those in the LP cluster reported receiving disability benefits, compared with a majority of those in the CPS (70%), EA (63%) and UA (56%) clusters. These differences suggest the meaningfulness of the derived clusters.

Other validation test results (see Table 5) also support the meaningfulness of the derived clusters. On an 11-point rating of pain 'at its worst' and on an overall pain drawing score, the LP cluster and UA grouping were significantly different from those of the CPS and EA clusters. No

significant differences were found between the mean values of either the former or latter pair of clusters. However, on ratings of pain `at its least', pain `on average' and current pain relief achieved, the EA cluster was significantly different from the CPS cluster at one end and the LP cluster at the other. The LP cluster was significantly different from the EA and CPS clusters in reporting higher control over pain ratings, fewer pain-medications, fewer professionals consulted, and greater use of massage and chiropractic treatment for pain management.

Validation on measures of self-reported mood and pain interference in the previous week's activities also suggested the significance of the derived clusters. On the POMS-B mood rating checklist, mean negative and positive mood scores of the CPS cluster were significantly different from the EA, UA and LP clusters. Differences in mean mood scores of the EA, UA and LP clusters were non-significant for positive mood. Mean negative mood scores of the UA and LP clusters were significantly different than the EA grouping. Comparison of mean ratings of pain's interference in the previous week's activities revealed that the CPS cluster was significantly greater than the other three groupings, with the LP cluster significantly lower than both the EA cluster and UA grouping, whose mean ratings were not significantly different.

The presence of significant differences on these external variables is evidence that the derived groupings were neither random nor an artifact of the methodology. In addition, the patterns of significant differences among the LP, EA and CPS clusters on work status, pain ratings, relief from pain, control over pain, negative and positive mood, and pain interference with activities provided an indication of the potential clinical significance of these derived clusters.

At the same time the ambiguous pattern of scores produced by the UA cluster suggested that the clinical relevance of this grouping would require more in-depth exploration than could be conducted within the design of this study. This consideration, combined with the fact that the original objectives of this investigation were to assess the potential distinctiveness of an EA profile grouping relatively to LP and CPS profile groupings, led to a focus in further analyses on comparisons among these three clusters.

Table 3. *Cluster Validation on External Variables*

External Variable[1]	Cluster assignment[2]				*P*
	CPS (n=30)	EA (n=63)	LP (n=35)	UA (n=53)	
Mean age	44.3	46.3	48.7	44.3	n.s.
Months with pain	106.1[a,b]	84.5[a]	144.2[b]	77.2[a]	<.001
Married(%)	60.1	66.7	71.4	56.6	n.s.
Disability pension (%)	76.7[b]	63.5[b]	20.0[a]	56.0[b]	<.001
Employed(%)	3.3[a]	20.6[b]	51.4[c]	22.6[b]	<.001
%FM(IASP code 933)	58.1	63.3	49.1	52.1	n.s.
%CLB(IASPcode 533)	31.0	25.9	35.3	25.0	n.s.
Pain Drawing Score	57.4[b]	50.5[b]	30.7[a]	38.0[a]	<.0001
Pain at worst rating	9.5[b]	9.2[b]	8.0[a]	8.5[a]	<.0001
Pain at least rating	4.7[c]	3.6[b]	2.0[a]	2.9[b]	<.0001
Pain on average rating	7.2[c]	5.9[b]	4.4[a]	5.4[b]	<.0001
Pain relief	19.8[a]	35.3[b]	55.3[c]	49.9[c]	<.0001
Pain medications	2.9[b]	2.5[b]	1.5[a]	2.2[a,b]	<.01
Control/decrease pain (0-12 rating)	4.3[a]	5.0[a,b]	6.6[b]	5.7[b]	<.0001
Professionals seen	6.5[c]	5.9[b,c]	3.7[a]	4.9[b]	<.001
Active strategies	1.6	1.7	2.0	1.7	n.s.
Passive strategies	1.6	1.4	1.4	1.6	n.s.
Positive mood	10.0[a]	13.6[b]	14.6[b]	13.1[b]	<.01
Negative mood	18.3[c]	12.2[b]	6.3[a]	8.6[a]	<.0001
Pain interference in past week's activities	41.0[c]	32.4[b]	14.3[a]	28.9[b]	<.0001

[1] FM = Fibromyalgia, CLB = Chronic Low Back,
[2] CPS = Chronic Pain Syndrome, EA = Effective Adjusters,
LP = Low Pain UA = Undefined Adjustment
[a,b,c] Between group differences (mean or percentage scores with same letter are not significantly different)

Further validation tests using variables related to demographics and basic pain history indicated that these variables were unlikely to provide an explanation for the differences in case membership among the LP, CPS and EA clusters . Comparison of cluster clinical profiles from the groupings produced no significant differences on basic demographic characteristics, including age, education, relationship status or household income. Similar non-significant differences were found in comparing cluster case composition on IASP pain categories and original source of pain (i.e., motor vehicle accident, work injury, illness, long term condition), as well as the mean reported number of regularly used active or passive pain self-management strategies. With regards to pain duration, a significant difference was found, with the LP cluster reporting a longer mean period with pain than the EA and UA groupings. However the mean duration of the CPS cluster did not differ significantly from the mean duration of the other three groupings.

In summary validation test results on external variables provided evidence for the meaningfulness and potential clinical significance of the derived clusters. At the same time examination of basic demographic and pain history variables indicated that these variables are unlikely to offer an explanation for the case composition of the clusters.

These results supported the replicability of three distinct clusters (EA, CPS and LP) of adjustment profiles within this broad sample of people with mixed sources of chronic pain. Comparisons of the three clusters on external variables suggested that whereas the EA and CPS clusters reported similarly high levels of overall pain severity (much greater than the mean rating of the LP cluster), the EA cluster showed significantly lower scores than the CPS cluster on a variety of adjustment indicators related to emotional distress and dysfunction. The findings were consistent with the study's original hypothesis in suggesting the replicability of a substantially sized EA cluster of adjustment profiles within a heterogeneous sample of chronic pain sufferers.

Further Validation and Interpretation

of the Adjustment Profile Clusters

To address this study's second objective and pinpoint differences between the EA, CPS and LP clusters, further validation tests were conducted of specific hypothesized differences between the groupings on measures of appraisals and coping strategies. In addition to significance tests using ANOVAs with Tukey's HSD test for post-hoc analyses, a priori contrasts were also conducted comparing the CPS and EA clusters. Given that only one planned comparison was specified, significance was set at $p < .05$. The results of these comparisons are presented in Table 6.

i) Pain-related control appraisals:

To test the first hypothesis, comparison of the clusters' clinical profiles on a set of specific pain-related control appraisals (SOPA Control subscale) revealed a significant overall difference. Post-hoc analysis found that LP cluster's score was significantly different from those of other two clusters, but that the difference in EA and CPS scores was non-significant. Planned comparison of the EA and CPS cluster scores showed this difference to be marginally significant ($t(93) = 2.29$, $p < .05$), but the difference between the two cluster's scores on the CSQ's more general control over pain appraisal to be non-significant ($t(93) = 1.51$, $p > .05$). These results were consistent with the hypothesis that the LP cluster of clinical profiles would produce greater pain-related control appraisals than the EA and CPS clusters, but that ratings of these two clusters would be comparable.

ii) Pain-related benefits appraisal:

Comparison tests failed to support the first element of the study's second hypothesis, namely, that an EA cluster of clinical profiles would produce a significantly higher pain-related benefits appraisal score than a CPS cluster. Overall comparison of the benefits appraisal scores produced by the three clusters showed no significant differences. Planned comparison of the EA and CPS clusters did reveal that the higher rating produced by the EA cluster was significantly

different from the CPS rating ($t(93) = 2.37$, $p<.02$). Thus comparisons on measures of pain-related benefits and pain-related control appraisals fail to definitively support either construct as a possible source of differences in the adjustment profiles of the two clusters.

iii) Pain-related personal responsibility appraisals:

In contrast to these results, tests of the next part of the study's second hypothesis, that an EA cluster would produce significantly higher ratings on a pain-related personal responsibility appraisals measure (PRQ) than a CPS cluster were supported. Overall comparison of the ratings produced by the three clusters revealed a significant difference. Post-hoc comparisons found that EA cluster score was significantly different from the LP cluster score at one end and the CPS cluster score at the other. PRQ scores were then separated into PRQ-Accept and PRQ-Avoid scores. Planned comparisons of the EA and CPS clusters on each of these subscales indicated that differences in PRQ scores could be primarily attributed to differences on the PRQ-Avoid subscale ($t(93) = 5.65$, $p < .0001$). These results suggest that appraisals of pain-related responsibility may be a source of differences in the adjustment profiles of the two clusters.

iv) Pain-related catastrophizing appraisals:

Similar results were found in comparing the clinical profiles of the clusters on the measure of catastrophizing appraisals (CSQ-CAT). An overall comparison test showed a significant difference in CSQ-CAT scores among the three clusters. Post-hoc comparisons indicated that the EA score was significantly different from the CPS cluster on one side and the LP cluster on the other. Planned comparison of the EA and CPS cluster scores substantiated the significance of the difference in their scores. These findings suggest that differences in the extent to which people entertain catastrophizing appraisals may also be a source of differences in adjustment profiles between the CPS and EA clusters of clinical profiles.

Table 4. *Cluster Interpretation on External Variables*

Variable[2]	Cluster assignment[1]				*P*
	CPS (n=30)	EA (n=63)	LP (n=35)	UA (n=53)	
Control appraisal	14.9[a]	18.8[a,b]	21.9[b]	19.3[a,b]	<.01
Benefits appraisal	10.9[m]	13.4[n]	13.5	12.1	<.05
Personal responsibility					
- Full scale	66.6[a]	75.4[b]	82.9[c]	75.8[b]	<.0001
- Acceptance	37.0[a]	39.7[a]	42.8[b]	39.5[a]	<.001
- Avoidance	24.7[c]	18.3[b]	13.9[a]	17.6[b]	<.0001
Catastrophizing	22.2[c]	14.0[b]	6.3[a]	11.2[b]	<.0001
Partner response appraisals					
- Punishing	9.8	8.3	5.4	6.7	n.s.
- Solicitous	25.3[m]	19.8[n]	20.9	20.9	n.s.
- Distracting	12.9[m]	9.8[n]	10.1	8.7	n.s.
Coping self-statements	16.6[a]	20.2[b,c]	22.7[c]	18.7[a,b,c]	<.001
Ignoring pain	9.4[a]	13.1[b,c]	15.7[c]	11.3[b,c]	<.01
Reinterpreting pain	8.0	8.4	6.9	6.7	n.s.
Diverting Attention	15.4	17.4	14.9	15.1	n.s.

[a,b,c] Between-group differences Tukey's HSD (scores with same letter not significantly different)
[m,n] Between group differences Planned Comparison (scores with same letter not significantly different)
[1] CPS = Chronic Pain Syndrome, EA = Effective Adjusters, LP = Low Pain.
[2] Pain severity=**SF-MPQ**; Depression=**BDI-CA**; Subjective disability=**PDI**;
Control appraisal=**SOPA-Ctrl**; Benefits appraisal=**BCS**;
Personal responsibility full scale, acceptance, avoidance=**PRQ, PRQ-Accept, PRQ-Avoid**;
Catastrophizing=**CSQ-CAT**; Coping self-statements=**CSQ-COPE**; Ignoring pain = **CSQ-IGN**;
Reinterpreting pain = **CSQ-RI**; Diverting attention = **CSQ-DA**

v) Pain-related partner response appraisals:

Comparison tests on measures of pain-related partner response appraisals revealed no significant differences among the three clusters on measures of punishing, solicitous and distracting response frequencies. Although planned comparison of the EA and CPS clusters showed significant differences in mean frequency ratings of solicitous responses ($t(93) = 2.30$, $p < .05$) and distracting responses ($t(93) = 2.23$, $p < .05$), neither clusters' frequency ratings were significantly different from those produced by the LP cluster. These findings are consistent with the hypothesis that the EA, CPS and LP clusters produce comparable ratings of partner support responses. This suggests that differences in the case membership of the EA, CPS and LP clusters are unlikely to be explained by differences in partner response appraisals..

vi) Pain-related cognitive coping strategies:

The final hypothesis postulated that an EA cluster of clinical profiles would generate higher mean use ratings of coping self-statements, reinterpreting pain, diverting attention and ignoring pain sensations than produced by a CPS cluster. The results provided mixed support for this hypothesis. Overall comparisons revealed a significant difference across the three clusters on measures of coping self-statements and ignoring pain sensations (CSQ-COPE and CSQ-IGN subscales) but no difference on reinterpreting pain or diverting attention (CSQ-RI and CSQ-DA subscales). Post-hoc analysis determined that the CPS cluster score on both the CSQ-COPE and CSQ-IGN measures was significantly lower than those of the EA and LP clusters. Differences in the ratings between these two clusters were not significant. Planned comparison of the EA and CPS cluster scores also found the differences in ratings between these two clusters to be significant for both CSQ-COPE ($t(93) = 2.62$, $p < .01$) and CSQ-IGN ($t(93) = 2.31$, $p < .05$). These findings are consistent with part of the original hypothesis, suggesting that differences in reported frequency of coping self-statements and ignoring pain sensations may also be a source of differences in adjustment profiles between the EA and CPS clusters.

DISCUSSION

This study contributes to the current literature concerning people coping with chronic pain in four important respects. First the study conceptualizes and demonstrates the presence of an Effective Adjusters (EA) grouping within a heterogeneous chronic pain sample. The emphasis on identifying groups of people who effectively adjust to chronic pain is consistent with a more adaptive model of functioning. In this respect the study introduces a new dimension to clustering studies of chronic pain sufferers which generally produce more pathology-oriented groupings.

Second it highlights the utility of more diversified samples drawn from clinical and non-clinical sources for future studies. Previous clustering studies and much of the existing chronic pain literature use samples of people recruited from pain clinics or tertiary care facilities. This may be an important factor in the more pathology-oriented outcomes from these studies. However, given population survey estimates (Sternbach, 1986) that overall only 3% of those with chronic pain see a pain specialist, while 80% of those with severe, disabling pain seek treatment, it suggests that most of the literature may be based on a small segment of the chronic pain population. An important concern with these studies is how applicable their results may be to the broader chronic pain population.

In contrast, the purpose of this study from the outset was to directly test for the presence of an EA grouping within the broader chronic pain population. The two previous clustering studies suggesting similar groupings (i.e. Klapow et al., 1993; Strong et al., 1994) were based on homogeneous pain samples of about 100 subjects drawn from individual clinical sites. Holzman et al. (1985) demonstrated that it is very difficult to generalize findings from the sample of one tertiary treatment centre to other settings. In contrast, the sample in this study was drawn from a variety of sources, mostly non-clinical, with the result that only 20% of the participants were involved in a chronic pain treatment program. As such this study has a greater chance of producing outcomes which are more robust for the broader chronic pain population.

An important empirical advantage of this relatively large, more diversified sample was the presence of a proportionately large middle grouping of adjustment profiles. The more restricted clinical samples of the two earlier studies produced proportionately larger Low Pain

(LP) and Chronic Pain Syndrome (CPS) groupings and a relatively small middle grouping. This combined with small overall sample sizes, necessarily limited their analysis to consideration of 3-cluster solutions because these offered a combination of good cluster extraction properties (good cluster separation, high reproducibility) and interpretability. On the other hand, the larger, more diversified sample of this study generated a proportionately large middle grouping of profiles compared to the LP and CPS cluster which allowed for a more robust empirical investigation of a four-cluster solution. It was only under this four-cluster solution that it became possible to empirically generate a homogeneous cluster characterized by the hypothesized EA adjustment profile (i.e., high pain, low depression and disability).

Third, the study suggests that differences in perceived partner support are unlikely to underlie the presence of an EA grouping. The two earlier studies could only speculate on the importance of interpersonal distress and perceived partner support to their derived clusters. However, this study was able to test this possibility directly by including the three partner response scales (Punishing, Solicitous and Distracting) as external variables. Differences in these scales' scores have been used in previous studies (Jamison et al., 1994; Rudy et al., 1989; Turk & Rudy, 1988; 1990) to distinguish a grouping of Interpersonally Distressed (ID) profiles in several large chronic pain samples. In this study, the lack of significant differences between cluster mean ratings suggests that these variables are unlikely to explain cluster assignments. This is particularly significant because several other studies (Jamison et al., 1994; Turk & Rudy, 1988), including a recent follow-up of the earliest report of an EA grouping (Klapow et al., 1995), have suggested interpersonal/partner support as the important distinguishing feature of their third grouping of adjustment profiles. It is possible that the ID grouping may reflect another grouping which is distinct from clusters generated by this study and more prevalent within clinical samples.

Fourth, the study assesses a number of possible factors which might distinguish an EA grouping from those assigned to the CPS and LP clusters. For example, although the EA and CPS clusters produced similar mean ratings of pain severity, the two groupings differ quite

dramatically on a number of adjustment indicators, best exemplified by work status, where in the CPS group, only 1 in 24 of those not involved in a rehabilitation program report engaging in retraining or employment compared with 20 out of 51 in the EA group. However, somewhat contrary to expectations, this distinction in work status is not associated, at least in this sample, with differences in reported pain-related activities. The two clusters produce remarkably similar mean rating scores for regular use of active and passive pain management strategies, as well as the number of professionals consulted about their pain, the number of different medications used, and the percentage using massage and chiropractic treatment for pain management. Yet consistent with differences in work status, the two clusters generate quite different mean ratings of recent pain relief achieved by their pain management activities. These findings suggest that relative to a CPS group, an EA group appears to perceive greater benefits from engagement in similar pain-related activities.

A greater perception of benefit may be associated with how such activities are actually practised and/or how people interpret their pain-related significance. The literature concerned with stress, coping and adjustment suggests that in either case people's cognitions are likely to be critical associated elements. The evidence is that people's appraisals and coping strategies are likely to be associated with how they engage in pain management activities, and with their interpretation of the pain-related significance of these activities. However, the results of this study raise questions about commonly-held assumptions concerning the association adjustment to specific appraisals and cognitive coping strategies.

Most notable in this regard is the lack of support for significant differences between the EA and CPS groups on measures of pain-related benefits and control appraisals. In previous studies each of these dimensions has demonstrated some association with adjustment indicators when pain severity is taken into account (Jensen & Karoly, 1991; Jensen et al., 1991; Tennen et al., 1992). On the surface, the lack of definitive findings in this study is surprising because these two groupings appear to offer one of the most likely opportunities for these differences to appear: clear disparity in adjustment profiles despite comparable scores on pain severity.

However, closer examination of the literature indicates that, at least for pain-related control appraisals, these results may be more consistent with previous findings than first appears. Early studies of the relation between control appraisals and adjustment indicators (see Jensen et al., 1991 for a review) did not control for reported pain severity. The findings from more recent studies (Jensen & Karoly, 1991; Jensen et al., 1994) which do account for pain severity suggest that the relation of control appraisals and adjustment indicators is non-existent for those reporting more severe pain.

On the other hand, the results from this study with respect to benefits appraisals run counter to a number of recent studies of people coping with medical conditions, in particular those involving RA (rheumatoid arthritis) chronic pain sufferers (Affleck, Pfeiffer, Tennen and Fifield, 1988; Tennen et al., 1992). This discrepancy in results may be related to at least two aspects which clinically often distinguish RA sufferers from the more general population of people with chronic pain. One is that RA pain tends to be more episodic and unpredictable than the chronic pain experienced by most of the severe pain sufferers in this sample. The other aspect, likely more critical, is that RA pain is related to a more certain and accepted diagnosis.

As a result, those with more severe RA pain may be more likely to perceive their condition as real but out of their control, so that appraising benefits to their situation may be critical to continuing their activities. On the other hand for more severe general chronic pain sufferers, the continuous but somewhat fluctuating presence of the pain and the lack of a certain and accepted diagnosis may mean that questions of controllability and the exact physical nature of the pain remain unresolved. In this circumstance, appraisals of positive aspects of the experience may be less associated with adjustment than regular use of specific cognitive coping strategies and awareness of personal choice, each of which can be associated with minimal negative thoughts (Jensen & Karoly, 1991; Jensen, Turner & Romano, 1992; Keefe & Williams, 1990; Laborde and Powers, 1985; Rudy et al., 1988; Saunders, Reesor & Gallant, 1994; Skevington, 1983)

Consistent with these speculations, the results suggest that EA and CPS clusters may produce quite different reported ratings of pain-related appraisals of choice/responsibility and catastrophizing, as well as the use of two pain-related, conscious cognitive coping strategies: coping self-statements and ignoring pain sensations. The finding that an EA cluster of clinical profiles may be distinguished by self-reported appraisals of pain-related catastrophizing rather than pain-related control is quite consistent with the results of previous studies which have found scores on catastrophizing rather control appraisals to have strong, direct and predictive associations with psychosocial and psychological adjustment scores among people with chronic pain (Jensen et al., 1991; Jensen and Karoly, 1992; Jensen, Turner & Romano, 1992; Keefe et al., 1989).

Similarly the finding that an EA cluster may be distinguished from a CPS cluster on two measures of conscious cognitive coping strategies, mental self-encouragement and the disregarding of pain is also consistent with previous results . Studies of coping strategies and adjustment outcomes in samples of chronic pain patients generally support a direct relation between use frequency ratings of coping self-statements and measures of psychological functioning (Jensen et al., 1991; Jensen & Karoly, 1991; Jensen, Turner & Romano, 1992; Keefe et al., 1987). Less consistent support has been found for a relation between use frequency ratings of conscious efforts to ignore pain and adjustment outcomes particularly among those with more severe pain (Jensen et al., 1991; Jensen, Turner & Romano, 1992; Jensen & Karoly, 1991). However, this result is consistent with the finding by Strong et al. (1994) that a distinguishing feature of an Active Copers cluster may be a relatively high score on a measure of active denial of life problems.

On the other hand the lack of difference in ratings produced by the EA and CPS clusters on the Reinterpreting pain and Diverting attention scales is somewhat surprising given previous findings. For example, Strong et al. (1994) found that higher scores on measures of reinterpreting pain and diverting attention were prominent in distinguishing an Active Copers cluster from LP and CPS clusters. In addition, there is some evidence, albeit inconsistent, within

the chronic pain literature to support the relation of these two measures with adjustment outcomes (Jensen et al., 1991). Sampling differences may be one explanation for the inconsistency in these findings. In clinical samples, better short term outcomes may be associated with cognitive coping efforts to downplay pain by diverting one's attention or relabelling the sensation. However they are unlikely to be associated with better long term outcomes because they interfere with the ability to accept and address the impact of persistent pain. On the other hand, greater use of coping self-statements and deliberate ignoring of pain may have greater long term potential on functioning because they require conscious acknowledgement of pain's presence. Regular use of these strategies is also likely to be associated with less frequent catastrophizing thoughts which also may contribute to better long term adjustment outcomes.

The somewhat surprising prominence of pain-related personal responsibility appraisals in distinguishing the EA and CPS clusters is consistent with this explanation. Although scores on this measure had previously shown predictable associations with emotional adjustment in people with a diagnosis of life-threatening illness (Saunders, Reesor & Gallant, 1994), this is the first time this instrument has been used in a sample of people with chronic pain. Of particular note is the striking difference in the two clusters' mean ratings of responsibility avoidance (PRQ-Avoid). In fact, differences in mean ratings from PRQ-Avoid exceeded all other differences except those produced by the CSQ catastrophizing scale. These results suggest those with an EA profile generally report lower responsibility avoidance ratings than those with a CPS profile. This is consistent with other studies which find an association between an internal locus of control orientation and adjustment measures such as depression and life satisfaction (Laborde and Powers, 1985; Rudy et al., 1988; Skevington, 1983). However, rather than extrapolating from scores on a general locus of control measure, these are the first findings based on a measure of specific pain-related appraisals of choice and responsibility.

The striking differences between the EA and CPS clusters on measures of responsibility avoidance and catastrophizing is consistent with the moderately strong correlation between the

two measures (r = 0.53) for the complete sample. It suggests an important association between the reported frequency of negative thoughts and the reported acknowledgement of choice and responsibility in living with the adversity of chronic pain. Frequency of catastrophizing appraisals is highly correlated with reports of emotional distress, depression, a sense of helplessness and greater physical dysfunction (Sullivan & D'Eon, 1990). Thus an association between catastrophizing and responsibility avoidance is also consistent with the wider literature on coping with aversive situations, in which those who report an internal locus of control appear less likely to become seriously distressed or ill, following negative events (Johnson & Sarason, 1978; Lefcourt & Davidson-Katz, 1991; Sandler and Lakey, 1982; Wise & Rosenthal, 1982).

Consistent with the differences in mean ratings between the two groupings in the reported use of coping self-statements, scores on this scale is moderately correlated with both catastrophizing and responsibility avoidance (r = -0.35, -0.40 respectively). On the other hand use of ignoring pain statements shows little overall correlation with either measure, although it is strongly correlated with reported use of coping self-statements (r= 0.65). Together these results suggest better adjustment outcomes associated with lower frequency of catastrophizing thoughts, higher frequency of coping self-statements and less appraisal of responsibility avoidance. There is no evidence from this study as concerning causal relations among these variables.

However the results do suggest that for people with high levels of chronic pain, appraisals of pain-related control and a focus on the positive aspects or benefits of coping with chronic pain are unlikely to be associated with better long term outcomes. As noted earlier, this runs counter to commonly held assumptions that distress is inevitably associated with a perceived loss of control and that helping chronic pain sufferers find controllable aspects of their situation is associated with better outcomes. It is also inconsistent with the postulate that encouraging people with chronic pain to concentrate on the positive aspects or benefits of their situation will be associated with better long term outcomes.

From these considerations it can be speculated that the effectiveness of chronic pain management programs may be more related to addressing appraisals of choice and responsibility,

catastrophizing thoughts and use of coping self-statements than to perceptions of pain-related control or benefits. As yet there is no evidence as to a casual relation among these constructs and it is likely that they mutually interact with each other. This may suggest that effective treatment approaches can begin with personal beliefs (e.g. about responsibility and choice), or learning to use coping self-statements, or identifying and interrupting negative thought patterns. Attention to all three dimensions may produce the most effective treatment.

The evidence of homogeneous groupings which are not distinguished solely by reported pain severity indicates the importance of multi-dimensional assessment batteries in ensuring that treatments are refined to fit the specific needs of clients. The fact that in this broader sample only about 15 to 20% were classified as CPS, the group to which most pain management programs are targeted, highlights the need for greater refinement in treatment protocol or screening methods. Along these lines it is worth noting that the clinical profiles from about a third of the sample (those in the UA grouping), showed considerable distress relative to their low levels of reported pain. This suggests that a significant minority of people with chronic pain may be experiencing considerable levels of distress despite appearing to adjust well (on the basis of reported pain severity).

In terms of research, these results suggest that, as noted in previous studies (Chapman, Sola & Bonica, 1979; Holzman, Rudy, Gerber, Turk, Sanders, Zimmerman and Kerns, 1985), samples drawn from a single clinic or facility are unlikely to be sufficiently representative of the general population of chronic pain sufferers to generalize their findings. This limitation is especially important for research which attempts to identify homogeneous subgroupings. In particular, as demonstrated in this study, a subgrouping such as the EA cluster is likely to be substantially under represented in a clinical sample, leading to less than optimal clustering solutions, particularly in samples of less than 150 subjects. Given that cluster analysis involves relatively simple procedures supported by a very limited body of statistical reasoning, there is the extra need to ensure that findings are based on relatively large samples drawn from clinical and community-based sources.

In a similar vein, the results also demonstrate the fundamental importance of selecting as clustering variables, a limited set of measures based on an explicit rationale for their relationship to the concept of similarity being studied (in this case chronic pain adjustment). Other studies (e.g., Strong et al., 1994) have adopted an approach based on a multitude of variables. Researchers, with experience in cluster analysis, warn that an emphasis on analysing as many variables as possible in hope that the 'real' structure will emerge with enough data is dangerous in cluster analysis because of the heuristic nature of the technique and the many unsolved problems that plague its application (Aldenderfer & Blashfield, 1984). The results of this study suggest that the combination of pain severity, depression and subjective disability measures was sufficient to provide meaningful clusters of clinical profiles in a heterogeneous sample of people with chronic pain.

From a research perspective, the confirmation of a substantial-sized EA cluster within this broad, community-based sample (along with CPS and LP clusters), offers a new vehicle for investigating variables which may underlie differences in adjustment to chronic pain. As noted earlier, chronic pain is a defining feature of many people's experience with chronic medical conditions. These in turn represent an important example of people's adjustment to adversity, a fundamental area of psychological research. Further exploration of variables which can distinguish EA and CPS adjustment profiles in people with chronic pain are likely to have great significance for this research area.

At the same time, it is important to keep in mind a number of important caveats and limitations to these findings. The most fundamental is that all the data used in this study are based on a single assessment of a self-report questionnaire. As accurate indications of respondents' situations, self-report measures are generally viewed with a good deal of scepticism. Even apparently factual information related to issues such as type of pain medications in current use, employment status, use of pain management strategies can be of questionable accuracy.

To minimize this effect, demographic and pain history information was obtained from 95% of the study sample via semi-structured interview, usually done in the participant's home.

Areas of inquiry, such as current use of pain medications, pain management strategies, employment status, participation in retraining and rehabilitation programs, and professionals seen, were as much as possible verified by requests for more specific information. In the case of pain medications, for example, this generally involved recording information from medication containers and confirming use with the respondent.

The other very important limitation of this study was the lack of verification of the clustering solution on an independent sample. Verification on an independent sample is considered the best evidence in support of the validity of an obtained cluster solution. Given the potential difficulties associated with generalizing findings from one chronic pain sample this is an essential future step towards validating the presence of an Effective Adjusters grouping within the larger chronic pain population. On the other hand, given the findings of an EA grouping in two earlier studies, this result is still quite significant.

With regards to psychological measures, although they were all self-report, every effort was made to utilize instruments with well-documented psychometric properties in chronic pain samples, particularly those whose ratings were used to produce the adjustment profiles. Exceptions to this criteria were measures of constructs in which no suitable alternative could be found, such as many of the pain-related appraisals.

The use of a single self-report questionnaire also limited the extent of the external validation that could be undertaken regarding the significance and clinical utility of the adjustment profile clusters. In comparison to other studies which have utilized follow-up indicators such as treatment outcome and return to work, this is an important limitation.

These results suggest the need for further research, particularly of a longitudinal nature, to examine the relations among appraisals of personal responsibility and catastrophizing, conscious cognitive coping strategies such as coping self-statements and ignoring pain, and adjustment outcomes in people whose adjustment profiles fall within an EA pattern. They also suggest the need for follow-up research which can investigate the surprising lack of difference on ratings on pain-related beliefs and control appraisals between the EA and CPS clusters. This result may

truly reflect subjects' experience or it may result from the use of less than optimal measures of these constructs.

Nevertheless this study lends support to the validity of empirically derived EA, CPS and LP groupings of chronic pain clinical profiles. In particular it suggests the presence of an EA cluster of adjustment profiles which is different from an ID grouping of clinical profiles produced in previous studies. Comparisons of the clinical profiles of EA and CPS clusters suggest that the two groupings are unlikely to be distinguishable on indicators of pain-related activities, but are likely to produce quite different ratings on several cognitive factors, in particular pain-related appraisals of catastrophizing and choice/responsibility, as well as the use frequency of coping self-statements and disregarding of pain. These results suggest that appraisals of choice and responsibility related to living with pain are a potentially important dimension to address in developing effective chronic pain management programs.

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APPENDICES

Appendix A: **PAIN EXPERIENCE RESEARCH PROJECT - DESCRIPTION**

Appendix B: **PAIN EXPERIENCE RESEARCH PROJECT - INFORMATION SHEET**

Appendix C: **PAIN EXPERIENCE RESEARCH PROJECT - CONSENT FORM**

Appendix D: **PAIN EXPERIENCE RESEARCH PROJECT - ETHICS APPROVAL**

Appendix E: **PAIN EXPERIENCE RESEARCH PROJECT - MEASURES**

1. Basic Pain History - Background Information
2. Short Form McGill Pain Inventory (SF-MPQ)
3. Pain Disability Index (PDI)
4. Supplemental Pain Assessment: Rating scales / Drawing
5. Survey of Pain Attitudes (SOPA) - Control subscale
6. Benefits Construed Scale (BCS)
7. Personal Responsibility Questionnaire (PRQ)
8. Multidimensional Pain Inventory (MPI)-Part II

APPENDIX A

PAIN EXPERIENCE RESEARCH PROJECT

In an effort to increase understanding of the experience of living with chronic pain, we would like to interview people who have experienced pain which has persisted for longer than six months. The interview which takes about an hour, consists of a brief pain history and a questionnaire about your current experience with pain and its impact on your activities, thoughts and emotional state. All your responses will be recorded on coded sheets and used for research purposes only. If you are interested in participating in this project or would like more information, please write your name and phone number below and we will contact you to discuss the project and if you agree, arrange an interview time. Thank you for your time.

Doug Saunders, M.Sc., Dr. Ken Reesor
Reesor, Pigeon & Assocs.
230-0250

Yes I am interested in being contacted concerning this project.

NAME (please print) _____ PHONE _____

APPENDIX B

PAIN EXPERIENCE RESEARCH PROJECT

INFORMATION SHEET

Whenever a research project is undertaken by a member of the University of Ottawa, written consent of the participants is required. As researchers in this project, we are interested in learning more about people's experience of living with chronic pain. We believe that this information will be helpful in furthering an understanding of people's experience with chronic pain.

If you agree to participate in this project, you will be asked to sign two copies of a consent form, briefly answer a few questions regarding your pain and medical history, and fill out a questionnaire about your current experience with pain, and its impact on your activities, thoughts and emotional state. Altogether this will involve about an hour of your time.

All the information you provide will be kept confidential and used for research only. Your responses will be recorded on coded sheets. Your name and any other identifying information will not appear on the questionnaire. This information will be known only to the researchers strictly for the purposes of the research. Your responses will be grouped together with responses of other participants for statistical analysis. In reporting the results of this research, your individual responses will not identified in any way without your specific written consent.

We would appreciate your help and cooperation but you are under no obligation to take part in this project. You may choose to withdraw from the project at any point without question and without affecting in any way the services you are presently receiving or may require in the future.

Thank you for your time. We would be pleased to answer any questions you have concerning this research.

Doug Saunders, M.Sc., Dr. Ken Reesor
Reesor, Pigeon & Assocs.
230-0250

APPENDIX C

PAIN EXPERIENCE RESEARCH PROJECT

CONSENT FORM

Douglas Saunders
University of Ottawa,
Ottawa, Ont.
K1N 6N5

I, _____ have read the attached information sheet and discussed any questions I have with the researchers.

I give my informed voluntary consent to participate.

SIGNATURE: _____ DATE: _____

WITNESS: _____ _____

APPENDIX D

UNIVERSITÉ D'OTTAWA
UNIVERSITY OF OTTAWA

ÉCOLE DE PSYCHOLOGIE
SCHOOL OF PSYCHOLOGY

February 28, 1995

Mr. Douglas Saunders
c/o Dr. Ken Reesor
Reesor & Associates
Killeany Place, Suite 220
460 O'Connor Street
Ottawa, Ontario
K1S 5H3

Dear Mr. Saunders:

RE: Ph.D. Research Project: Discovering benefits in medical adversity: The limits of perceived control in coping with chronic pain

Thank you for sending us the requested modifications on the above mentioned research project.

I am pleased to inform you that your project has now received the full approval of the Human Research Ethics Committee of the School of Psychology (under category I.A.). Such approval is valid for one year.

We wish you the best in your project.

Sincerely,

Claude Lamontagne, Ph.D.
Chair of the Ethics Committee

PLJR/jc

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APPENDIX E

MEASURE 1: BACKGROUND- PAIN HISTORY

PAIN EXPERIENCE RESEARCH PROJECT

1. BIRTH DATE dy mth yr / / **2. SEX** M_ F_

3. LANGUAGE USED (please circle)

First Language: English French Other _____

Second Language: English French Other _____

4. BORN IN CANADA? (please circle) Yes No

If No at what age did you come to Canada? _____

5. EDUCATION LEVEL (circle highest grade completed)

Grade 1 2 3 4 5 6 7

8 9 10 11 12 13

College/University: Years 1 2 3 4

Post-Graduate/Professional: Degree ____ or Years __

6. MARITAL/RELATIONSHIP STATUS (check the best response)

__ single __ separated/divorced

__ married or common law __ widowed

7. HOUSEHOLD INCOME STATUS (check the best response)

__ under 15,000 per year __ 15 - 25,000 per year

__ 25 - 35,000 per year __ 35 - 45,000 per year

__ over 45,000 per year

PAIN EXPERIENCE RESEARCH PROJECT

PAIN MEDICAL HISTORY (contd.)

8. RECEIVING DISABILITY BENEFITS? YES___ NO___

9. ABOUT WHEN DID THE PAIN PROBLEM BEGIN? _____

(year) (month)

10. LOCATION OF THE PAIN PROBLEM:

_____

_____

_____

11. CAUSE OF CHRONIC PAIN:

motor vehicle accident (date) _____

illness (please indicate) _____

injury (briefly describe what happened)_____

_____

_____

12. IF YOU KNOW OR HAVE BEEN GIVEN A DIAGNOSIS OF THE PROBLEM, PLEASE INDICATE:

_____

_____

13. HAVE YOU HAD SURGERY TO ADDRESS THE PAIN PROBLEM?

YES ___ NO ___ If yes, approximate date _____

PAIN EXPERIENCE RESEARCH PROJECT

PAIN MEDICAL HISTORY (contd.)

14. PLEASE CHECK THOSE OF THE FOLLOWING YOU HAVE SEEN REGARDING YOUR PAIN PROBLEM:

Anaesthesiologist ___
Physiatrist ___
Rheumatologist ___
Neurologist ___
Nurse ___
Massage Therapist ___
Psychiatrist ____
Psychologist ____
Occupational Therapist ____
Orthopaedic Specialist ____
Rehabilitation Consultant ____
Exercise Therapist ____
Other _____

15. WHAT TREATMENTS OR MEDICATIONS ARE YOU RECEIVING FOR YOUR PAIN? _____

_____

_____

16. IN THE LAST 24 HOURS, HOW MUCH RELIEF HAVE PAIN TREATMENTS OR MEDICATIONS PROVIDED? PLEASE CIRCLE THE ONE PERCENTAGE THAT SHOWS HOW MUCH RELIEF YOU HAVE RECEIVED.

0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
No Relief										Complete Relief

17.

NAME OF MEDICATION	**AMOUNT OF MEDICATION**		
	number of tablets taken at a time	milligrams per tablet	how often?

PAIN EXPERIENCE RESEARCH PROJECT

PAIN MEDICAL HISTORY (contd.)

18. CURRENTLY PARTICIPATING IN A REHAB PROGRAM? YES ___ NO ___

LOCATION: _____

FREQUENCY:

more than twice/week ____ twice/week _____ once/week _____

once/month _____ less than once/month _____

19. ARE YOU INVOLVED IN A COURT CASE FOR COMPENSATION?

YES__ NO__

MEASURE 2: SF-MPQ

PAIN EXPERIENCE RESEARCH PROJECT

PLEASE DESCRIBE YOUR PAIN BY CHECKING ONE OF THE FOUR RATINGS FOR EACH OF THE FOLLOWING WORDS:

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

MEASURE 4: PAIN DISABILITY INDEX

PAIN EXPERIENCE RESEARCH PROJECT

THE RATING SCALES BELOW ARE DESIGNED TO MEASURE THE DEGREE TO WHICH YOUR PAIN PREVENTS YOU FROM DOING WHAT YOU WOULD NORMALLY DO OR FROM DOING IT AS WELL AS YOU NORMALLY WOULD.

FOR EACH OF THE LIFE ACTIVITIES BELOW, PLEASE CIRCLE THE NUMBER WHICH DESCRIBES THE LEVEL OF DISABILITY YOU TYPICALLY EXPERIENCE, NOT JUST WHEN THE PAIN IS AT ITS WORST.

A SCORE OF `0' MEANS NO DISABILITY AT ALL AND A SCORE OF `10' MEANS THAT ALL OF THE ACTIVITIES IN WHICH YOU WOULD NORMALLY BE INVOLVED HAVE BEEN TOTALLY DISRUPTED OR PREVENTED BY YOUR PAIN

1. Family/Home Responsibilities. This refers to activities related to the home or family. It includes chores and duties performed around the house (eg, yard work, house work) and errands or favours done for other family members (driving children to school, accompanying family members to appointments).

0	1	2	3	4	5	6	7	8	9	10
no disability										total disability

2. Recreation. This includes hobbies, sports, and other similar leisure time activities.

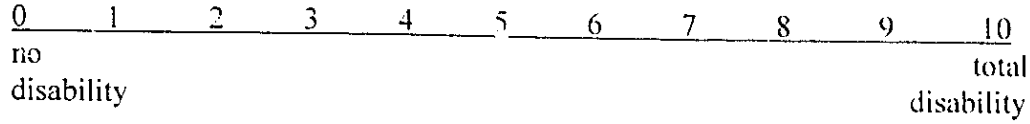
0	1	2	3	4	5	6	7	8	9	10
no disability										total disability

3. Social Activity. This refers to activities which involve participation with friends and acquaintances other than family members. It includes parties, sports events, theatre, concerts, eating out and other social functions.

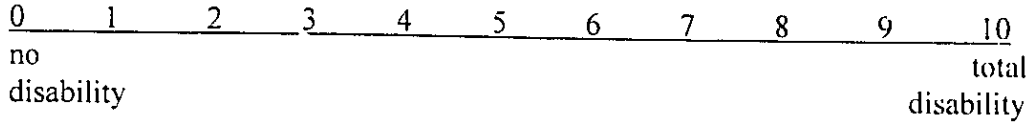
0	1	2	3	4	5	6	7	8	9	10
no disability										total disability

PDI (contd.)

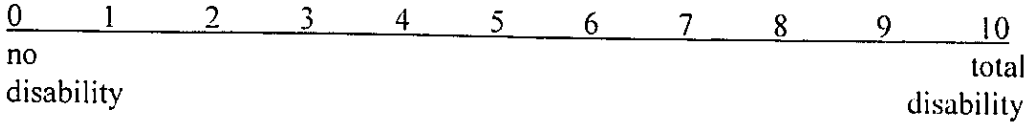
4. Occupation. This refers to activities that are part of or directly related to one's job. This includes nonpaying work as well, such as that of housewife or volunteer worker.



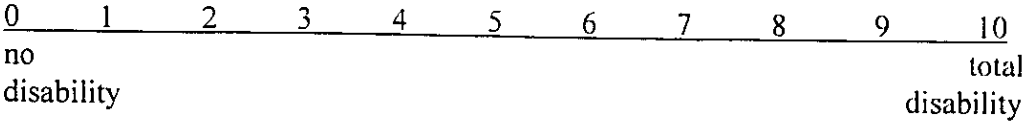
5. Sexual Behaviour. This refers to the frequency and quality of one's sex life.



6. Self Care. This includes activities which involve personal maintenance and independent daily living (eg, taking a shower, driving, getting dressed, etc.)



7. Life-Support Activity. This refers to basic life-supporting behaviours such as eating, sleeping, and breathing.



MEASURE 5: SUPPLEMENTAL PAIN ASSESSMENT RATING

PAIN EXPERIENCE RESEARCH PROJECT

PLEASE RATE YOUR PAIN BY CIRCLING THE NUMBER THAT BESTS DESCRIBES YOUR PAIN WHEN IT IS AT ITS **Worst**

0	1	2	3	4	5	6	7	8	9	10
No pain										Pain as bad as you can imagine

PLEASE RATE YOUR PAIN BY CIRCLING THE NUMBER THAT BESTS DESCRIBES YOUR PAIN WHEN IT IS **Least**

0	1	2	3	4	5	6	7	8	9	10
No pain										Pain as bad as you can imagine

PLEASE RATE YOUR PAIN BY CIRCLING THE NUMBER THAT BESTS DESCRIBES YOUR PAIN ON THE **Average**

0	1	2	3	4	5	6	7	8	9	10
No pain										Pain as bad as you can imagine

PLEASE RATE YOUR PAIN BY CIRCLING THE NUMBER THAT BESTS DESCRIBES YOUR PAIN **At the Moment**

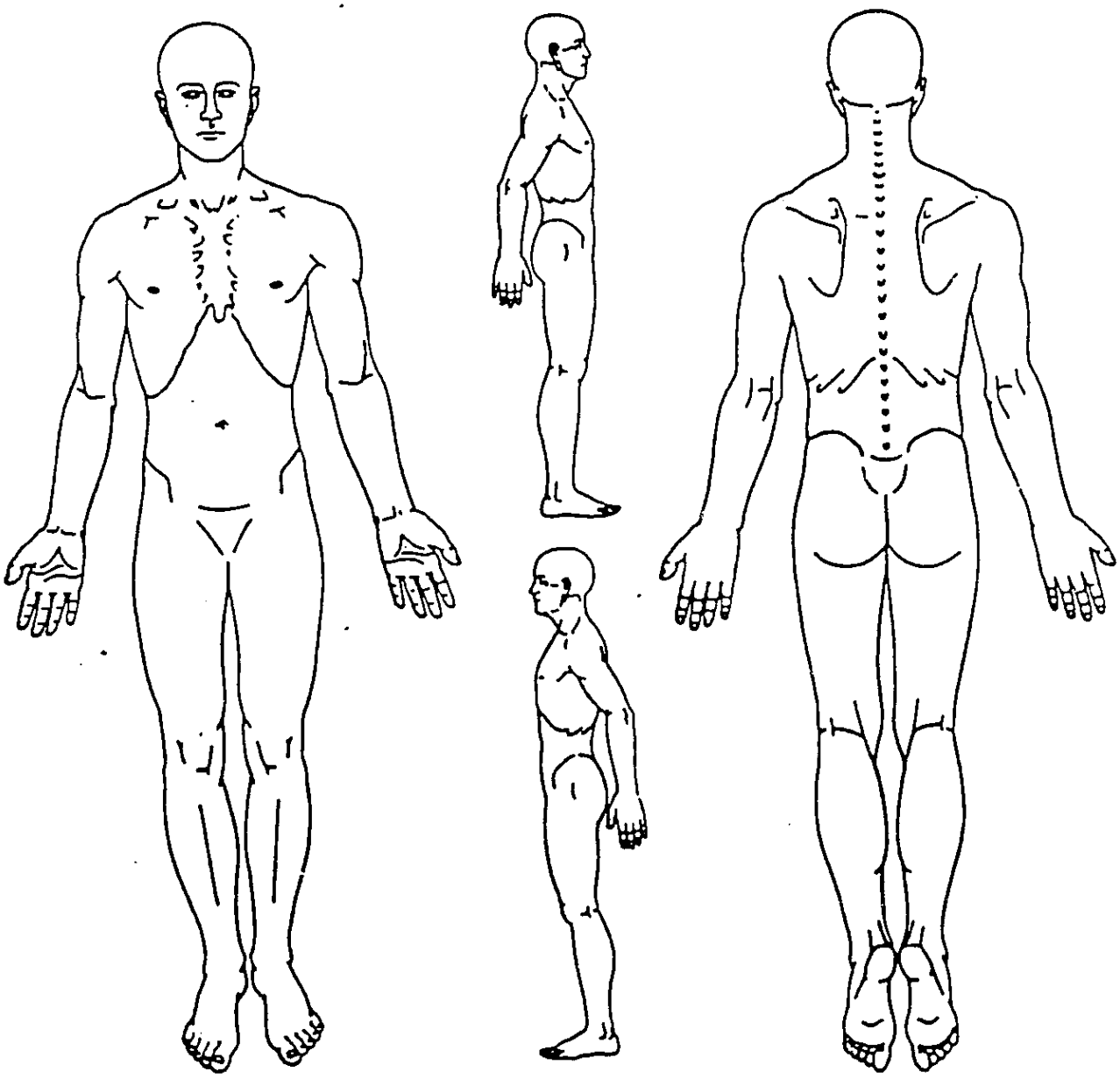
0	1	2	3	4	5	6	7	8	9	10
No pain										Pain as bad as you can imagine

Patient Signature: _____ Date: __/__/_

RANSFORD PAIN DRAWING

Mark the areas on this body where you feel the described sensations.
Use the appropriate symbols.
Mark areas of radiation.
Include all affected areas.

Numbness	Pins & Needles	Burning	Aching	Stabbing
- - - - -	00000	xxxxx	•••••	/////
- - - - -	00000	xxxxx	•••••	/////
- - - - -	00000	xxxxx	•••••	/////



PAIN EXPERIENCE RESEARCH PROJECT

IPS

	YES	/	NO
1. Do you ever get pain at the tip of your tailbone	___		___
2. Does your whole leg ever become painful?	___		___
3. Does your whole leg ever go numb?	___		___
4. Does your whole leg ever give way?	___		___
5. In the past year have you ever had any spells of time with very little pain?	___		___
6. Have you ever had a reaction to treatment for your pain or had treatment that you could not tolerate?	___		___
7. Have you ever had an emergency admission to hospital for your pain?	___		___

MEASURE 6: SUPPLEMENTAL MOOD RATINGS CHECKLIST

PAIN EXPERIENCE RESEARCH PROJECT

CIRCLE THE NUMBER NEXT TO EACH OF THE FOLLOWING WORDS THAT BEST DESCRIBES HOW YOU HAVE BEEN FEELING **OVER THE PAST FEW DAYS**.

	not at all	a little	moderately	quite a bit
Composed	0	1	2	3
Angry	0	1	2	3
Tense	0	1	2	3
Sad	0	1	2	3
Playful	0	1	2	3
Nervous	0	1	2	3
Dejected	0	1	2	3
Kindly	0	1	2	3
Peaceful	0	1	2	3
Jittery	0	1	2	3
Serene	0	1	2	3
Joyful	0	1	2	3
Mad	0	1	2	3
Jolly	0	1	2	3
Gloomy	0	1	2	3
Friendly	0	1	2	3
Good-natured	0	1	2	3
Furious	0	1	2	3

MEASURE 7: SURVEY OF PAIN ATTITUDES - CONTROL SUBSCALE:

PAIN EXPERIENCE RESEARCH PROJECT

Instructions: Please indicate how much you agree with the following statements about your pain problem using the following scale:

0 very untrue for me	1 somewhat untrue	2 neither true nor untrue	3 somewhat true	4 very true for me

1. There are many times when I can influence the amount of pain I feel	0	1	2	3	4
2. The amount of pain I feel is completely out of my control	0	1	2	3	4
3. There is little that I or anyone else can do to ease the pain I feel	0	1	2	3	4
4. Just by concentrating or relaxing I can 'take the edge' off my pain	0	1	2	3	4
5. I am unable to control a significant amount of my pain	0	1	2	3	4
6. I believe that I can control how much pain I feel by changing my thoughts	0	1	2	3	4
7. I have learned to control my pain.	0	1	2	3	4
8. I know for sure I can learn to manage my pain.	0	1	2	3	4
9. I am not in control of my pain.	0	1	2	3	4
10. I have noticed that if I can change my emotions I can influence my pain.	0	1	2	3	4

MEASURE 8: BENEFITS CONSTRUED SCALE:

PAIN EXPERIENCE RESEARCH PROJECT

Instructions: Please indicate how much you agree with the following statements about your pain problem using the following scale:

0	1	2	3	4
very untrue for me	somewhat untrue	neither true nor untrue	somewhat true	very true for me

1. My pain has helped me to find new faith	0	1	2	3	4
2. I have learned a great deal from my pain.	0	1	2	3	4
3. Dealing with my pain has made me a stronger person.	0	1	2	3	4
4. My pain has made my life more precious to me.	0	1	2	3	4
5. My pain has helped me realize what's important in my life	0	1	2	3	4

MEASURE 9: PERSONAL RESPONSIBILITY QUESTIONNAIRE

Please circle the number that best describes HOW STRONGLY YOU AGREE OR DISAGREE with the following statements about LIVING WITH YOUR PAIN.

1	2	3	4	5
strongly disagree	disagree	neither agree or disagree	agree	strongly agree

I really have no choice over whether the medical care I receive is the best possible.

1 2 3 4 5

I believe that it's really up to me how my family and friends can best help me

1 2 3 4 5

I have no choice except to let the doctor make all the treatment decisions.

1 2 3 4 5

Its up to me whether or not I change my habits

1 2 3 4 5

I believe that it's my choice how REHAB consultants and staff can help me.

1 2 3 4 5

It's no longer possible to enjoy life.

1 2 3 4 5

I am actively keeping my body as healthy as possible

1 2 3 4 5

I have little say over whether I spend my time on my own or in the company of others.

1 2 3 4 5

I am discovering positive things for myself.

1 2 3 4 5

MEASURE 10: MULTIDIMENSIONAL PAIN INVENTORY (MPI) -PART II:

PAIN EXPERIENCE RESEARCH PROJECT

In this section we are interested in knowing how your spouse (or significant other) responds to you when he or she knows that you are in pain. On the scale listed below each question **circle the number** to indicate **how often** your spouse (or significant other) responds to you in that particular way when you are in pain. Please answer all of the questions.

1. Ignores me.

0	1	2	3	4	5	6
never						very often

2. Asks me what he/she can do to help

0	1	2	3	4	5	6
never						very often

3. Reads to me

0	1	2	3	4	5	6
never						very often

4. Gets irritated with me

0	1	2	3	4	5	6
never						very often

5. Takes over jobs or duties

0	1	2	3	4	5	6
never						very often

6. Talks to me about something else to take my mind off the pain

0	1	2	3	4	5	6
never						very often

MPI PT II (contd.)

7. Gets frustrated with me

0	1	2	3	4	5	6
never						very often

8. Tries to get me to rest

0	1	2	3	4	5	6
never						very often

9. Tries to involve me in some activity

0	1	2	3	4	5	6
never						very often

10. Gets angry with me

0	1	2	3	4	5	6
never						very often

11. Gets me my pain medication

0	1	2	3	4	5	6
never						very often

12. Encourages me to work on a hobby

0	1	2	3	4	5	6
never						very often

13. Gets me something to eat or drink

0	1	2	3	4	5	6
never						very often

14. Turns on the T.V. to take my mind off the pain

0	1	2	3	4	5	6
never						very often