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# Contextual cognitive-behavioral therapy for severely disabled chronic pain sufferers: Effectiveness and clinically significant change

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**Abstract**

Interdisciplinary pain management programs have an established record of significantly improving the functioning of persons disabled with chronic pain. There is a group of pain sufferers, however, who have difficulty accessing these programs and for whom the effectiveness of these treatments in unknown, these are patients whose mobility and self-care deficits leave them unable to meet the practical demands of many treatment environments. The purpose of this study was to examine the results of a treatment program designed to meet the needs of these highly disabled individuals ($n = 53$) in comparison to results obtained from a standard less-disabled group attending treatment at the same facility ($n = 234$). Results from the highly disabled patients showed statistically significant change after treatment in eight of nine outcome variables, including improvements in pain-related distress, disability, depression, pain-related anxiety, daytime rest, and performance during an activity tolerance test. Effect size calculations showed a number of large treatment effects, for psychosocial disability, depression, and acceptance of pain. Analysis of reliable change and clinical significance demonstrated that results were not merely statistically significant but clinically meaningful. Results appeared stable at three months following treatment. This research plays an important part in establishing an evidence base to inform service development, ensuring that chronic pain services do not exclude people on the basis of the severity of their disability.


*Keywords:* Chronic pain; Multidisciplinary treatment; Disability; Cognitive behavioral treatment; Clinical significance; Contextual cognitive-behavioural therapy

## 1. Introduction

Recent research estimates the prevalence of chronic pain in the general UK population to be as high as 46% (Elliott et al., 1999), with cases of severely disabling chronic pain estimated as between 5% and 10% (Smith, 2002). For many of these patients, traditional treatments that aim to reduce pain will be unsuccessful. In these cases participation in some form of interdisciplinary pain management treatment, where improving daily functioning is the focus, is an established option (Morley et al., 1999; McCracken and Turk, 2002). This type of treatment, however, is not equally accessible to all those suffering with pain-related disability (e.g., Dr. Foster, 2003).

In the UK, as in other countries, most interdisciplinary pain management centers are designed for the relatively independent; those with extremely limited mobility or self-care deficits are excluded from many services. Most centers are not adequately resourced with nursing staff to assist patients with transfers or mobility needs, or with basic self-care, such as bathing and dressing. Only a small number of patients have these types of needs met in inpatient facilities in the UK (Dr. Foster, 2003). Separate from these practical barriers to

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treatment access, the extreme disability demonstrated by some chronic pain sufferers may discourage treatment staff from believing that treatment will succeed, and patients may be denied access on this basis (e.g., Freeney et al., 1999). Some of the most disabled patients are likely to be refused treatment based on exclusion criteria such as inability or unwillingness to participate in treatment offered (e.g., Williams et al., 1996; Kole-Snijders et al., 1999). Considering the limited treatment options for the most highly disabled chronic pain sufferer, it is likely that there is a considerable amount of unrelieved suffering in this group.

Recent advances have led to a form of interdisciplinary treatment for chronic pain, referred to as contextual cognitive behavioral therapy (CCBT) that appears effective for patients suffering with longstanding and complex chronic pain conditions, and may be particularly suited to multi-problem cases characterized by change-resistant behavior patterns (McCracken, 2005; McCracken et al., 2005). CCBT is a natural evolution of behavioral and cognitive behavioral therapies and is based on acceptance and commitment therapy (Hayes et al., 1999) and mindfulness-based approaches (e.g., Kabat-Zinn, 1990).

Our purpose was to assess the effectiveness of CCBT for a highly disabled group of patients with chronic pain. Because these patients are rarely investigated, we sought first to examine their distinguishing features in comparison with the normative group of patients referred for pain management who are able to mobilize and care for personal needs independently. Second, we sought to analyze treatment results in domains of pain, disability, and emotional functioning, and to test results based on statistical criteria and clinical significance, based on reliable change criteria and in relation to results of the standard group of treatment completers. We predicted that treatment would be effective for the highly disabled group and would meet criteria for clinical significance across each of the outcome domains for the majority of patients.

## 2. Method

Participants in this study were 53 consecutive adult patients (64.2% women) attending a three-week hospital-based pain management course designed for people with significantly limited mobility and needing assistance with self-care (henceforth referred to as the "highly disabled" group). These patients attended treatment between March 2001 and December 2005. The mean age was 47.6 (SD = 11.6); most were married (66.0%) and the group was predominately white European (98.1%). The mean time they reported having pain was 140 months (SD = 103). None of the participants was working either full time or part-time; 77.4% were not working because of their pain and 96.2% were receiving some form of wage replacement. The group also reported limited physical functioning: mean uptime (average time spent standing or walking per day in the past week) was 2.1 h (SD = 2.8). Low back pain was the most commonly reported primary complaint (35.8%), followed by lower limbs (26.4%) and full body (20.8%), leaving 17% with other primary pain areas.

An additional 234 consecutive adult patients (61.1% women) attending a standard three-week pain management course over the same period of time as the highly disabled patients provided a clinical comparison sample (henceforth referred to as the "standard" group). These patients were treated in groups that were completely separate from the highly disabled group and accommodated outside of the hospital in standardly equipped and furnished apartments. Patients were excluded from treatment in this group if they were unable to ambulate the 100 yards to the hospital for treatment, or walk up a set of eight steps for access to the accommodation, or if they required assistance with self-care. The mean age was 46.0 (SD = 11.7); most were married (61.5%), and white European (98.7%). The mean chronicity of their pain was 138.8 months (SD = 132.2). A small fraction was working full or part-time (10.3%). They reported their daily uptime as 4.3 h (SD = 4.6). Low back pain was the most commonly reported primary complaint (38.5%), followed by full body (13.2%) and upper limbs (12.9%), leaving 35.4% reporting other primary areas of pain. Table 1 provides demographic details of the two groups.

General exclusion criteria from both groups included inability to speak and understand English, brain injury or disease that would be expected to interfere with learning, unwillingness to participate in group-based treatment, or, based on a clinical psychology assessment, other emotional or behavioral concerns expected to make the treatment environment intolerable, to suggest little chance of a successful outcome, or to hinder the progress of the group overall (e.g., uncontrolled angry behavior, stated conflicts regarding litigation, irresistible behavior disruption from depression, uncontrolled bipolar disorder or psychotic disorders).

All patients completed a number of standard measures on the first day and the final day of treatment and a smaller number of patients completed them immediately prior to a three-month follow-up visit. The forms they completed provided information about patient background variables, including ratings of usual pain in the past week, average daily uptime and daily rest due to pain. Patients also completed the following standardized measures: The Sickness Impact Profile (SIP; Bergner et al., 1981), the Beck Depression Inventory (BDI; Beck et al., 1961), the Pain Anxiety Symptoms Scale (PASS; McCracken et al., 1992) and the Chronic Pain Acceptance Questionnaire (McCracken et al., 2004).

The SIP is a 136-item measure of health-related disability. Respondents are asked to endorse only those state-

Table 1
Baseline comparisons between groups for demographic and clinical data

| Variable | Highly disabled group Mean (SD) $n = 53$ | Standard group Mean (SD) $n = 234$ | Signif ($p<$) |
|---|---|---|---|
| Age | 47.6 (11.6) | 46 (11.7) | ns |
| Years of education | 11.2 (1.8) | 12.2 (2.8) | .05 |
| Chronicity of pain (months) | 140.0 (103.0) | 138.8 (132.2) | ns |
| Out of work (months) | 95.9 (55.3) | 67.1 (65.2) | .01 |
| Usual pain intensity past week (0–10) | 7.4 (1.6) | 6.8 (1.8) | .05 |
| Pain-related distress past week (0–10) | 7.5 (2.1) | 6.6 (2.5) | .05 |
| Physical disability (SIP) | .36 (.14) | .18 (.11) | .001 |
| Psychosocial disability (SIP) | .33 (.16) | .26 (.15) | .05 |
| Depression (BDI) | 22.6 (7.9) | 19.3 (8.9) | .05 |
| Pain-related anxiety (PASS) | 97.3 (35.2) | 83.4 (31.9) | .01 |
| Acceptance of pain (CPAQ) | 47.8 (18.0) | 52.1 (17.4) | ns |
| Sit-to-stand (repetitions in 1 min) | 1.9 (2.5) | 11.1 (6.7) | .001 |
| Uptime (hours standing/walking daily) | 2.1 (2.8) | 4.3 (3.6) | .001 |
| Rest (hours resting daily due to pain) | 5.8 (5.6) | 4.9 (4.1) | ns |
| | Highly disabled group % | Standard group % | |
| Male | 35.8 | 38.9 | ns |
| Female | 64.2 | 61.1 | |
| White European ethnicity | 98.1 | 98.7 | ns |
| Married | 60.0 | 61.5 | ns |
| Work status | | | |
| Not working due to pain | 77.4 | 71.8 | ns |
| Working (full or part) | 0 | 10.3 | |
| Receiving wage replacement | 96.2 | 76.1 | .001 |
| Precipitant of pain | | | |
| Unknown | 24.5 | 48.3 | .001 |
| Following illness | 20.8 | 7.3 | |
| Accident (not work or home) | 18.9 | 12.0 | |
| Accident at work | 15.1 | 20.5 | |
| Following surgery | 13.2 | 4.7 | |
| Primary site of pain | | | |
| Lower back | 35.8 | 38.5 | .05 |
| Lower limbs | 26.4 | 11.5 | |
| Full body | 20.8 | 13.2 | |
| Cervical region | 5.7 | 12.0 | |
| Upper limbs | 3.8 | 12.9 | |

*Note*. Comparison of means done with independent groups *t*-tests and comparison of categorical variables with $\chi^2$.

ments that they are sure apply to their health status. The SIP has three domains; physical, psychosocial and other, including 12 categories of daily functioning. Categories in the physical domain are ambulation, mobility, body care and movement. The psychosocial categories are social interaction, alertness behavior and emotional behavior. The other domain includes sleep and rest, eating, home management, recreation and pastimes, work and communication. The 12 categories can be scored separately or combined to provide domain scores. Higher scores indicate greater disability; all scores range from 0 to 1. For the purposes of this research, scores for the physical and psychosocial domains and total were used. The SIP is recognized as a useful measure of functional status and meets psychometric standards of test re-test reliability, internal consistency and validity (Bergner et al., 1981).

The BDI is currently the most widely used and well-validated self-report measure of depressive symptoms. The BDI has 21 items, each scored according to a 4-point scheme, from 0 (neutral) to 3 (maximum severity). The total score, calculated by summing the individual items scores, was used in this study. Scores on the BDI range from 0 to 63 and 20 is often regarded as a cutoff for clinically significant symptoms. The psychometric properties are well established and the BDI has excellent validity and a good internal consistency (Beck et al., 1988).

The PASS is a 40-item measure of anxiety responses related to chronic pain. Patients indicate the frequency of anxiety responses on a six-point scale 0 (never) to 5 (always). The PASS includes four subscales (cognitive anxiety symptoms, escape and avoidance, fearful thinking and physiological anxiety responses), however, only the total score was used in the present study. The total score ranges from 0 to 200 with a median in clinical samples at around 93.

The PASS has demonstrated good internal consistency and validity (McCracken et al., 1992; Roelofs et al., 2004).

The CPAQ is a 20-item measure of acceptance of chronic pain. It was derived from a measure originally developed by Geiser (1992). The CPAQ has two subscales that assess activity engagement (11 items, including 'Despite the pain, I am now sticking to a certain course in my life'), and pain willingness (9 reverse-keyed items such as 'I would gladly sacrifice important things in my life to control this pain better'). These measure patients' engagement in important daily activities regardless of pain, and relative absence of attempts to control or avoid pain. The subscales and total scale of the revised CPAQ are internally consistent ($\alpha = 0.78$–$0.82$) and reliably predict patient functioning (McCracken et al., 2004). The two subscales from the CPAQ are summed to form the total score used in this study. The total score ranges from 0 to 120, with a median from our recent data at 48.

### 2.1. Treatment

All patients, both the highly disabled and the standard patients, attended treatment for three weeks. The approximate total time of exposure to treatment was 80 h. The primary difference was that the highly disabled patients were accommodated in the hospital and provided with nursing care during this process while the standard patients were not. Additionally, physical exercise sessions were modified for the highly disabled patients such that their limited mobility was accommodated with physical movements that began at a lower intensity and frequency, or required shorter ranges of movement, as needed to insure appropriate patient engagement. The main elements of treatment were functionally identical for the two groups, daily general physical exercise (average 1.75 h per day), some education, skills training sessions for activity management, and psychology sessions (average 1.75 h per day). Treatment processes incorporated principles of exposure, acceptance, cognitive de-fusion, mindfulness, and values-based methods. The primary goals of treatment were not to reduce or control pain but to increase patients' psychological flexibility for dealing with unwanted experiences and improve their engagement in activities that are important to them (see McCracken, 2005; McCracken et al., 2005).

### 2.2. Analyses

The purpose of this study was to examine both statistical and clinical significance of treatment for highly disabled pain sufferers. In this context, clinical significance entails whether change produced in treatment is likely to be meaningful to the consumers of services and can include comparison to the standard of non-clinical or normal population (Kendal et al., 1999). It is usual for normal population samples to be used as a comparison in studies, however Kazdin (1999) and Jacobson et al. (1999) suggest that clinically significant change should not be dependent on a return to normal functioning. Using comparison samples from clinical populations who are functioning well, rather than general population samples, is increasingly acceptable (Tingey et al., 1996). In light of these points, a clinical sample of 234 patients who attended a standard three-week Pain Management course was used as a normative sample for comparison. Recent analyses of patients receiving this treatment, including a subset of the current standard sample ($n = 87$), established these patients as achieving clinically significant benefit from treatment (McCracken et al., 2005). The current standard sample is an expansion of the sample featured in this earlier report.

The first stage of analyses involved comparing the hospital-based patient group with the standard residential treatment sample. $\chi^2$ and $t$-tests were calculated for relevant background and clinical variables.

The second stage of analysis involved considering the impact of treatment on hospital-based patients in statistical terms. $t$-Tests were calculated to examine pre to post changes in outcome. Next, uncontrolled pre–post effect sizes were calculated for both the highly disabled and standard patients. The method was as follows: ES $(d) = M_1 - M_2/\sigma$, where $M_1$ is the mean at time 1 (pre-treatment), $M_2$ is mean at time 2 (post-treatment), $\sigma$ is the SD at pre-treatment. Westbrook and Kirk (2005) point out that an uncontrolled effect size statistic may inflate the apparent effects of treatment compared with a conventional controlled effect size statistic, as it assumes no change without therapy. It does, however, provide a useful means for comparison between alternate treatment samples. Traditionally, effect sizes are classified as small above 0.2, medium above 0.5 and large above 0.8 (Cohen, 1988).

Clinical significance is a more conservative and potentially more persuasive method for treatment outcome studies (Kendal et al., 1999), examining change in a more practical or socially valid way. To consider how many patients showed change that was clinically meaningful, reliable change estimates and clinical significant cutoff points were calculated. Jacobson's clinical significance analysis (Jacobson and Revenstorf, 1988; Jacobson et al., 1999) was adopted. Reliable change indices were calculated using temporal stability data to test if scores change to an extent that is beyond change that could be due to measurement error. If a patient's score changes to a greater extent than the calculated criterion, then that patient can be described as reliably improved on the measure. To calculate the reliable

change index a standard error of difference ($S_{diff}$) score was calculated for the SIP total score, the BDI, PASS and CPAQ. The $S_{diff}$ creates confidence intervals for assessing measurement error. The steps for calculating the standard error of difference are as follows:

$SEM_1 = SD_1\sqrt{1 - r_{12}}$ (standard deviation from time 1 multiplied by the square root of 1 minus the test–retest coefficient)

$SEM_2 = SD_2\sqrt{1 - r_{12}}$ (standard deviation from time 2 multiplied by the square root of 1 minus the test–retest coefficient)

$$S_{diff} = \sqrt{SEM_1^2 + SEM_2^2}$$

(Square root of the sum of the squared SEMs for each testing occasion.)

The $S_{diff}$ is then multiplied by 1.64 to obtain the confidence interval .90 (cutting off 5.0% of the distribution in each tail) for possible measurement error.

The other aspect of clinical significance is to test whether a case constitutes "recovery" to within a "normal" range. There is a number of different methods to calculating this criterion; each has its benefits and disadvantages. Evans et al. (1998), suggest the following formula to derive cutoffs for the "normal" range:

$$\frac{(mean_{clin} \times SD_{norm}) + (mean_{norm} \times SD_{clin})}{SD_{norm} + SD_{clin}}$$

For these calculations post-treatment means and standard deviations from standard treatment group were used as the "norm." It should be noted that cases with pre-treatment scores that fall within the boundaries of the normative sample are excluded, as they cannot show clinically significant change by this method.

Finally, following analyses of results immediately post-treatment, we conducted some preliminary analyses of attenders to a three-month follow-up visit ($n = 29$). Due the smaller sample at follow-up these analyses were more limited, including tests of statistically significant change and examination again of percentage of patients falling within a "recovered" range.

## 3. Results

### 3.1. Characteristics of sample

Based on *t*-tests the highly disabled and standard treatment groups did not differ on age or chronicity of pain. Compared to the standard group, however, the highly disabled group reported fewer years of education, more months out of work, greater pain, and greater pain-related distress. In terms of aspects of daily functioning the highly disabled group was statistically different from the standard in the following domains: physical disability, psychosocial disability, depression, pain-related anxiety, sit-to-stand performance, and uptime. The groups did not differ on acceptance of pain or daily rest.

A more detailed examination of responses from the SIP showed that, prior to treatment, in the highly disabled group, 80.4% were unable to transfer from a chair or bed without assistance, 62.7% were unable to dress unassisted, and 60.8% required a wheelchair to mobilize, compared to 3.0%, 3.9%, and 4.3%, respectively, in the standard group.

Based on $\chi^2$ analyses the treatment groups did not differ in terms of gender, marital status, or work status. They did differ in percentage receiving wage replacement benefits, 96.2% for the highly disabled group and 76.1% for the standard group. The groups differed of primary location of pain in that the highly disabled group was relatively more likely than the standard group to have lower extremity, 30.4% versus 15.2%, or generalized pain, 23.9% versus 17.4%, and less likely to have predominantly upper extremity pain, 4.3% versus 16.9% (some patients excluded from these analyses to control for cells with expected frequencies less than five). The groups also differed on the precipitating circumstances of their pain in that precipitant was far more likely to be unknown for the standard group than the highly disabled group, 48.5% versus 24.5%, and less likely to follow and illness, 7.3% versus 20.8%, or surgery, 4.7% versus 13.2%.

### 3.2. Impact of treatment

Based on *t*-tests, the highly disabled patients showed significant improvements during treatment in most areas, as shown in Table 2. Interestingly they showed no significant reduction in pain during treatment although they did show a statistically significant reduction in their rating of how distressing they found their pain. They otherwise showed significant changes in a

Table 2
Pre- and post-treatment results for highly disabled patients

| | Mean (SD) | | *t*-Test |
|---|---|---|---|
| | Pre-program | Post-program | |
| Usual pain (0–10) | 7.4 (1.6) | 7.3 (1.8) | ns |
| Pain distress (0–10) | 7.5 (2.0) | 5.8 (2.5) | 4.0* |
| Physical disability (SIP) | .35 (.14) | .28 (.15) | 3.3* |
| Psychosocial disability (SIP) | .32 (.16) | .16 (.13) | 5.7* |
| Depression (BDI) | 22.5 (7.8) | 13.2 (7.8) | 6.7* |
| Pain anxiety (PASS) | 97.3 (35.2) | 73.5 (37.7) | 4.0* |
| Acceptance (CPAQ) | 47.8 (18) | 71.4 (18.4) | 8.6* |
| Sit-to-stand (freq/1 min) | 1.7 (2.4) | 4.0 (4.0) | 5.6* |
| Rest (h/day) | 5.7 (5.6) | 2.0 (2.4) | 5.0* |

* Significant at $p < .005$.

healthy direction for each of the seven remaining measures of functioning including physical and psychosocial disability, depression, pain-related anxiety, acceptance of pain, daily rest related to pain, and their sit-to-stand performance. A conservative Bonferoni-type correction for multiple tests would require $p < .005$ for statistical significance. Each of the eight, of the total nine tests described here, met these criteria.

### 3.3. Effect sizes

Fig. 1 shows the effect sizes for selected variables covering physical and psychosocial functioning, depression, pain-related anxiety, acceptance of pain, rest, and sit-to-stand performance for both the highly disabled group and the less disabled 'standard' group. There were a number of large effects, and in some cases the highly disabled group achieved larger effect sizes than the standard. For example, compared with the standard group the highly disabled group achieved higher effect sizes for psychosocial disability, .94 versus .77, acceptance of pain, 1.30 versus .84, and depression, 1.22 versus .84. On the other hand the standard group notably outperformed the highly disabled group in terms of treatment effects on pain, sit-to-stand performance, and physical disability. The overall average effects across nine domains for the highly disabled and standard groups were .75 and .77, respectively.

### 3.4. Reliable change

Table 3 shows the results of the reliable change analyses. Because we had no test–retest reliability statistics for the separate composite scores of the SIP we examined the total score only. Close to half (47.6%) the sample showed reliable change in the improved direction for disability. A majority of the sample showed reliable improvement for depression (61.9%), a large majority showed improvement in acceptance of pain (92.9%), while a smaller minority of patients showed reliable improvement for pain-related anxiety (32.5%), owing to the quite large standard deviations calculated for the PASS. The average percentage reliable change across the four outcome measures was 58.7%. There was a small rate of reliable change in the direction of a decline in functioning, on average 3.0%.

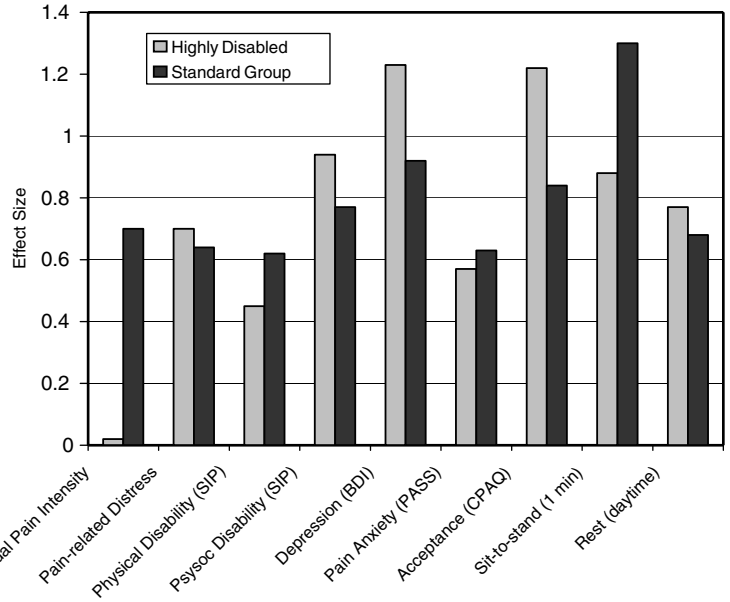


Fig. 1. Effect sizes for highly disabled and standard groups.

Table 3
Results from reliable change analyses of the highly disabled patients at 90% confidence

| Variable | Test–retest ($r$) | $S_{diff}$ | % Reliable decline | % Reliable improvement |
|---|---|---|---|---|
| Total disability (SIP) | .87 | .061 | 4.8 | 47.6 |
| Depression (BDI) | .86 | 4.2 | 4.8 | 61.9 |
| Pain anxiety (PASS) | .86 | 19.3 | 2.5 | 32.5 |
| Pain acceptance (CPAQ) | .75 | 12.9 | 0.0 | 92.9 |
| Mean | – | – | 3.0 | 58.73 |

### 3.5. Clinical significance

Again, clinical significance analyses are to examine the percentage of highly disabled patients who, during treatment, move outside the range of their original levels of functioning and into the range of functioning of the standard treatment group at post-treatment. By these criteria, the percentage of "recovered" patients ranged from 20.0% for physical disability to 44.7% for depression. The average percent recovered across the five outcome variables was 35.7%. Further calculations showed that 28 of 53 patients, or 52.8% of the original full sample, met criteria for recovery on at least one of what might be considered "primary" outcome measures, in this case physical disability, psychosocial disability, or depression (see Table 4).

### 3.6. Results at follow-up

Twenty-nine patients provided data from a three-month follow-up visit, 54.7% of the initial treatment completers. Comparisons of those who provided data from those who did not showed that they were remarkably similar. They did not differ on gender of marital status. They did not differ on age, education level, pain ratings, or duration of pain. They did not differ on daily uptime or rest, or their scores for physical or psychosocial disability, depression, pain-related anxiety, or acceptance of pain at pre-treatment or post-treatment. All these analyses were done with a significance level of $p < .05$.

Paired $t$-tests showed that seven of nine primary outcome variables remained significantly improved at follow-up compared to pre-treatment at a level of significance corrected for multiple comparisons, all $t > 2.0$, $p < .005$, including pain, pain-related distress, psychosocial disability, depression, pain-related anxiety, acceptance, and sit-to-stand performance. The exceptions included physical disability, which shifted from .34 to .29, $t = 2.1$, $p < .05$; and hours spent resting daily due to pain, which reduced from 6.2 to 2.9, $t = 2.7$, $p < .05$. Clearly there are trends here, however, they miss the threshold for significance at the corrected alpha-level. There was also some missing data for the ratings of daily rest leaving $n = 23$.

Looking at rates of "recovery," employing the same criteria as applied at post-treatment, demonstrated 18.2% for physical disability, 52.9% for psychosocial disability, 36.8% for depression, 43.8% for pain-related anxiety, and 41.2% for acceptance of pain. Once again, these percentages exclude patients who fell within the "recovered" range at pre-treatment. Fifteen of the follow-up patients met criteria for "recovery" on at least one of the primary outcomes, physical disability, psychosocial disability, or depression, which is 51.7% of the full sample of those who provided follow-up data.

## 4. Discussion

This study demonstrates that highly disabled patients with chronic pain can show significant benefits following interdisciplinary pain management treatment. These benefits include improvements in pain-related distress, physical and psychosocial disability, depression, pain-related anxiety, sit-to-stand performance, daily rest due to pain, and increased acceptance of pain. On average, effect sizes for the highly disabled group were similar in magnitude to effect sizes achieved by the larger number of less disabled patients who attend such treatment. Further analyses showed that a majority of the highly disabled patients showed reliable change, taking into account measurement instability, and about half of patients "recovered" to within a range of functioning similar to the standard group at treatment completion. These results demonstrate improvement that is both statistically significant and clinically meaningful for these patients. Follow-up analyses show that results appear durable up to three months following treatment.

There are few studies of the most highly disabled chronic pain sufferers. We know of no other similar outcome study examining results of a group-based, interdis-

Table 4
Clinically significant change for the highly disabled patients

| | Cutoff [a] | Cases in "Recovered" range at pre-treatment | Cases "Recovered" at post-treatment[b] | % "Recovered"[b] |
|---|---|---|---|---|
| Physical disability (SIP) | .21 | 9 | 11 | 25.0 |
| Psychosocial disability (SIP) | .23 | 16 | 16 | 43.2 |
| Depression (BDI) | 17.0 | 7 | 21 | 45.7 |
| Pain anxiety (PASS) | 79.0 | 14 | 10 | 25.6 |
| Pain acceptance (CPAQ) | 57.8 | 14 | 16 | 41.0 |
| Mean | – | 12.0 | 14.8 | 36.1 |

*Note*. Selecting cases that meet criteria for "recovery" on either physical disability, psychosocial disability, or depression yields 28 cases or 52.8% of the highly disabled sample.

[a] Derived from the formula by Evans et al. (1998).

[b] Excludes patients in "recovered" range at pre-treatment.

ciplinary, pain management course. Although the present results are preliminary, they support the inclusion of these patients in pain management courses and call for greater awareness of these patients' needs when planning service provision and designing treatment programs. There is just one service in the UK that is designed to meet the particular treatment needs of this group with rehabilitation and psychological therapies. Given estimates of the prevalence of highly disabled chronic pain sufferers in the UK at 1.7 million (Astin et al., 1996), this service provision is likely to be inadequate.

This study explored a number of ways to investigate statistical and clinical significance; in doing so we highlight a number of practical and theoretical challenges. From a practical standpoint, we are forced to recognize a shortage of temporal consistency and comparative data on "normal functioning" individuals for many of the measures we use in pain management contexts. The lack of these statistics, particularly in relation to chronic pain samples, limits our ability to carry out reliable change and clinical significance analyses in more domains and in a more detailed fashion. For instance, applying temporal stability data taken from a general population sample may lead to biased criteria for reliable change in comparison to those derived from the clinical sample itself. A related problem is the selection of a population used in defining "recovery" from chronic pain. We chose a novel approach: to use post-treatment data from a sample of people who are known to do well in treatment. This may be a stringent criteria given that the highly disabled group starts with a great deal lower level of functioning than the standard group, however, it is perhaps more realistic than a comparison with normal community dwelling individuals with no history of significant chronic pain and disability (Kazdin, 1999; Kendal et al., 1999). Finally, the issue of what is clinically significant change will always involve judgments of the assessor and cannot be justified outside of the values implied by those judgments. In this sense clinical significance cannot be known but only judged in relation to what the assessor holds as important or meaningful.

The treatment delivered to patients described in this study is based on what has been referred to as contextual cognitive-behavioral therapy (McCracken, 2005). Treatments that share features with this approach have been applied previously with good results to persons at risk for pain and stress-related sick leave (Dahl et al., 2004) and to a larger but less disabled group of chronic pain sufferers (McCracken et al., 2005). These studies used random assignment to the active treatment versus treatment as usual, and comparison with a waiting phase prior to treatment, respectively, to demonstrate efficacy of the specific treatment applied. As it lacked either of these forms of control, the present study was more akin to an effectiveness study, a demonstration of results from routine clinical practice. Nonetheless, the current results represent further support for an approach to chronic pain that includes less focus on pain control, coping, or reducing maladaptive thoughts and beliefs, and more focus on acceptance of experiences that cannot be usefully changed, on values, mindfulness, general psychological flexibility, and action (Hayes et al., 1999; McCracken, 2005).

There are some limitations to the methods employed in the present study. First, the sample size of severely disabled patients was small compared with those typically used for treatment outcome analyses, disallowing any sub-group analyses. Second, there was no non-treatment control group, disallowing any control over possible changes due to non-specific factors. Third, without further comparison, it is not immediately clear how this sample of highly disabled individuals from the UK compares with other similarly disabled populations in other settings and other countries.

Although we have demonstrated strong treatment effects, further study will be needed to assess the repeatability, long-term stability, and generality of these effects. Data at more distant points post-treatment will be helpful to clarify whether there are differential effects of maintenance of treatment gain for these different populations. It is reasonable, for example, to question whether those more severely disabled require more or less support to maintain treatment gains than the standard group. A second further avenue for development will be in regard to our novel attempt to measure clinical significance, and the choice of a treated normative sample as a realistic 'recovery' comparison point. This strategy, although promising, needs further research in other samples.

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