Six month post-treatment deterioration in acceptance (CPAQ-8) and cognitions following multidisciplinary pain treatment

John Baranoff, Stephanie J. Hanrahan, Dilip Kapur, Jason P. Connor

Abstract Pain acceptance contributes significantly to the effectiveness of pain treatment outcomes. Nevertheless, little research has been conducted to examine whether a decrease in acceptance contributes to a deterioration in post treatment functioning. The aim of this study was to assess the role of pain acceptance in relation to process and outcome variables in the six-months following the conclusion of a pain program. Adults with chronic pain (N = 120) completed assessments at the completion of a 3-week multidisciplinary treatment program and 6-months post-treatment. Process measures included the Chronic Pain Acceptance Questionnaire-8 (CPAQ-8); the catastrophizing scale of the Pain Response Self-Statement Scale; the coping cognitions scale of the Pain Response Self-Statement Scale; and the Tampa Scale of Kinesiophobia. Outcome measures included the Roland Morris Disability Questionnaire; the depression scale of the Depression Anxiety and Stress Scale; and two measures of physical functioning. Deterioration in acceptance of pain was significantly associated with deterioration in depression and disability, even when catastrophizing cognitions and kinesiophobia were accounted for. Decrease in acceptance was the strongest predictor of reliable deterioration in depression and disability. Results indicated the CPAQ-8 has utility as a measure for monitoring patient functioning post-treatment.

J. Baranoff (&) · S. J. Hanrahan

School of Psychology, The University of Queensland, Brisbane, QLD 4072, Australia
e-mail: johnbaranoff@gmail.com

S. J. Hanrahan

School of Human Movement Studies, The University of Queensland, Brisbane, QLD, Australia

D. Kapur

Pain Management Unit, Flinders Medical Centre, Adelaide, SA, Australia

J. P. Connor

Discipline of Psychiatry, The University of Queensland, Brisbane, QLD, Australia

Centre for Youth Substance Abuse Research, The University of Queensland, Brisbane, QLD, Australia
Introduction

Cognitive behavioral treatment for chronic pain improves depression and reduces disability (e.g., Morley et al., 1999; Eccleston et al., 2009; Williams et al., 2012). A number of recent studies have focused on change mechanisms related to these key pain treatment outcomes (e.g., Samwell et al., 2009a, b; Turner et al., 2007; Vowles et al., 2007; Vowles et al., 2011). The aim has been to identify and then target the cognitive and behavioral mechanisms through psychological treatment to maximize treatment gains. Nevertheless, there has been little investigation of process variables (i.e., the underlying mechanisms of change) that contribute to deterioration in disability and depression after treatment completion. Identifying key post-treatment variables is important in light of findings that indicate adherence to cognitive behavioral therapy (CBT) techniques mastered during treatment (such as activity pacing and relaxation) account for only a small amount of variance in the maintenance of treatment gains (Curran et al., 2009; Nicholas, 2009). Curran et al. (2009) found that adherence to CBT techniques accounted for 3% of the variance in changes in outcomes from the end of treatment to 1-month follow up. By contrast, process variables have shown robust associations with deterioration in mood and function after completion of treatment.

Jensen et al. (2007) evaluated changes in coping, cognitive pain variables, disability, and depression from the end of treatment to 12-month follow-up. Changes in coping and cognitions were associated with changes in pain intensity, disability, and depression. From a traditional CBT perspective, cognitions are considered of primary importance as the mechanism of change in emotional disorders and function (Beck et al., 1979). Coping cognitions, therefore, have theoretical relevance as a hypothesized mechanism of change in CBT; they have also received research support as being relevant to chronic pain adjustment (Flor et al., 1993). As part of the fear-avoidance model of chronic pain, catastrophizing and kinesiophobia, have received a large volume of empirical support as variables linked to changes in depression and disability (Nicholas et al., 2012; Vlaeyen & Linton, 2012). Catastrophizing refers to cognitive content characterized by magnification and rumination about feared outcomes (Sullivan et al., 2001). Kinesiophobia also incorporates negative expectations about future outcomes (Sullivan et al., 2001). Kinesiophobia also incorporates negative expectations about future outcomes, but specifically relates to fear of movement (Kori et al., 1990).

The role of deterioration in pain acceptance has not been evaluated relative to deterioration in outcome variables during the post-treatment period, and in particular whether it offers an additional novel contribution above that of established process variables (i.e., catastrophizing, kinesiophobia, coping cognitions). Acceptance from a behavioral perspective is an action as opposed to a cognition or emotion (Hayes et al., 2012). Pain acceptance is the behaviour of pursuing meaningful activities without avoiding pain, even when the activity brings the individual into contact with pain (McCracken et al., 2004). Acceptance of pain has been associated with improved depression and disability in cross-sectional studies (McCracken et al., 2004). Baranoff et al. (2013) previously identified that acceptance of chronic pain is an important process variable in traditional CBT, even though traditional CBT does not specifically target acceptance. Pain acceptance may also have utility as an indicator of deterioration in depression and disability following completion of a pain program. If a deterioration in acceptance is associated with functional outcomes, it will have implications for the type of monitoring undertaken after treatment and for the response to decline in function.
In the present study, we evaluated 6-month changes after completion of a group-based chronic pain treatment that was described in Baranoff et al. (2013). Process variables (catastrophizing, kinesiophobia; Vlaeyen & Linton, 2012), and coping cognitions that have been established in the chronic pain literature (e.g., Jensen et al., 2007 and Flor et al., 1993) were considered alongside pain acceptance. The primary aim was to examine deterioration in pain acceptance and other process variables in relation to deterioration in depression and disability after completion of multidisciplinary treatment. We hypothesised that deterioration in acceptance would show a significant association with post-treatment deterioration in disability and depression, even after accounting for process variables previously associated with post treatment outcomes. A secondary focus of the study was to evaluate the utility of the recently validated 8-item short form of the Chronic Pain Acceptance Questionnaire (CPAQ-8; Baranoff et al., 2012; Fish et al., 2010) as a post-treatment monitoring tool.

Method

Participants

Participants in this study were 120 adults (55 % female) with chronic pain who completed end of program assessment and 6-month follow-up assessment, following a 3 week, intensive, outpatient, multidisciplinary CBT-based pain management program. A total of 417 patients who attended the pain unit were assessed by psychologist and pain physician for suitability for group treatment. One hundred and ninety-seven patients commenced the program, with 187 retained by treatment completion. The reasons given for withdrawal from the program were family related (n = 3); interpersonal problems in the group (n = 2); increase in pain (n = 1); physical illness (n = 3); and mental health problems (n = 1). The 197 patients included the 186 who commenced treatment in the study described in Baranoff et al. (2013) in addition to 11 patients who were subsequently admitted to the group treatment program. Details of inclusion/exclusion criteria for the group program are described in Baranoff et al. (2013). In summary, to be included in the program, patients were required to be over the age of 18; have had chronic pain for over 3 months; had not responded to medical or surgical treatment; and had approval from their insurer for the payment of treatment costs. Exclusion criteria included patients who were seeking surgery, the presence of a psychotic disorder and patients assessed to be at risk of self-harm. Patients who had been prescribed medication were required to be on a stable dose prior to admission to the program. One hundred and twenty patients were available for the 6-month post-treatment follow-up. The mean age at end of the program for the 120 patients in this study was 43.1 years (SD = 9.7).

A total of 34 % of the participants had not completed high school and 40 % had undertaken some form of training after completing high school. A total of 53 % of the participants were unemployed. The remainder of patients were in a work-trial or working (full-time or part-time). Mean duration of chronic pain was 2 years 9 months (SD = 2 years 10 months) and mean number of months since last participating in any type of work was 3 months (SD = 4 months). The mean self-reported usual pain
intensity over the past week was 6 (where 0 was no pain and 10 was worst possible pain; SD = 1.7). A total of 51.4% of patients were identified as having pain originating from degenerative, mechanical origin; 31.6% were classified as having pain of traumatic or surgical origin; 7.5% of patients had pain of genetic origin; and 0.9% had pain of primary psychological origin. The most common primary region of pain was lower back, lumbar spine, sacrum, and coccyx (40.2%). Other regions where pain was located were upper shoulder and limbs (15.0%); cervical spine (10.3%); full body (9.3%); head, face and mouth (8.4%); and lower limbs (5.6%). The most commonly identified primary body system associated with the pain was the musculoskeletal system and connective tissue (82.2%). Other systems associated with pain included nervous system (peripheral and central; 9.3%); more than one system (1.9%); and other (0.9%).

Measures

Process measures

Acceptance of pain The Chronic Pain Acceptance Questionnaire (CPAQ-8; Fish et al., 2010), which consists of 8 items, was administered as part of the assessment battery. The CPAQ-8 has two subscales: activity engagement (e.g., “I am getting on with the business of living no matter what my pain level is”) and pain willingness (e.g., “I avoid putting myself in situations where my pain might increase”). Questions are rated on a scale from 0 (never true) to 6 (always true). The internal consistency has been reported as 0.77–0.89 (Fish et al., 2010). Cronbach’s alpha for the present study was 0.85. The validity of the CPAQ-8 has been demonstrated in cross-sectional studies; it shows correlations with a number of measures of patient-functioning (Baranoff et al., 2012; Fish et al., 2010) and predicts depression and disability, after accounting for catastrophizing and kinesiophobia Baranoff et al. (2012). Rodero et al. (2010) reported test re-test reliability of the CPAQ to be r = 0.83.

Pain catastrophizing Pain catastrophizing was measured using the 9-item pain catastrophizing scale of the Pain Response Self-Statement Scale (Flor et al., 1993). The questionnaire includes items such as “I cannot stand this pain any longer”. Items are rated on a 6-point scale ranging from 0 to 5; higher scores indicating more frequent catastrophizing when experiencing pain. The internal reliability of the catastrophizing scale is high (0.92 in Flor et al., 1993). Cronbach’s alpha was 0.85 in the present study. The test–retest reliability of the catastrophizing scale was 0.77 (Flor et al., 1993).

Kinesiophobia The Tampa Scale of Kinesiophobia is a 17 item-scale that measures fear of (re)injury by physical activity (Kori et al., 1990; Vlaeyen et al., 1995). Items include, “I can’t do all the things that normal people do because it’s too easy for me to get injured” and are rated on a 4-point scale ranging from 1 (strongly disagree) to 4 (strongly agree) with higher scores indicating higher fear of (re)injury. The reliability and validity of the Tampa Scale of Kinesiophobia has been established in a chronic-pain population (Vlaeyen et al., 1995). Cronbach’s alpha for the Tampa Scale of Kinesiophobia in Vlaeyen et al.’s (1995) chronic pain population was 0.77. It was 0.85 in the present
study. The test–retest reliability of the Tampa Scale of Kinesiophobia has been reported to be 0.75 (Swinkels Meewisse et al., 2003).

Pain coping Pain coping was measured using the nine items of the Pain Response Self-Statement Scale that relate to pain coping (Flor et al., 1993). The questionnaire lists typical coping-related thoughts of people in pain (e.g., “if I stay calm and relaxed, things will get better”). Items are rated on a 6-point scale ranging from 0 to 5 with higher scores indicating more frequent use of coping-related statements when experiencing pain. Cronbach’s alpha for the coping subscale of the Pain Response Self-Statement Scale is 0.88 (Flor et al., 1993). Cronbach’s alpha for the coping subscale of the Pain Response Self-Statement Scale in the present study was 0.72. The test–retest reliability of the coping subscale is 0.84 (Flor et al., 1993).

Outcome measures

Pain intensity Pain intensity was measured on a Numerical Rating Scale. The scale ranged from 0 (no pain) to 10 (worst possible pain). Ratings were given for the average daily pain in the last week. The Numerical Rating Scale has been shown to be a valid and sensitive measure when used to assess change in pain intensity (Ferreira-Valente et al., 2011). Grotle et al. (2003) reported test–retest reliability of pain-intensity as measured by the Numerical Rating Scale to be 0.83.

Depression The depression scale of the Depression Anxiety and Stress Scale 21 contains seven items (Lovibond & Lovibond, 1995). The depression scale does not include somatic symptoms and is therefore useful in chronic-pain populations because it avoids confounding the measurement of depression with somatic symptoms that may relate to the pain problem. Items include “I was unable to become enthusiastic about anything” and “I felt I wasn’t worth much as a person”. The internal consistency of the depression scale of the Depression Anxiety Stress Scale 21 has been shown to be good in a non-clinical sample (a = 0.91; Lovibond & Lovibond, 1995) and in a chronic pain sample (a = 0.95; Nicholas et al., 2008). Cronbach’s alpha in the present study was 0.92 for the depression subscale. Brown et al. (1997) reported test–retest reliability of the Depression Anxiety Stress Scale 21 depression subscale to be 0.71.

Functional disability The Roland-Morris Disability Questionnaire is a 24 item-scale that measures functional disability (Roland & Morris, 1983). The items relate to a range of daily activities that patients may perceive are limited by pain. A modified version of the Roland-Morris Disability Questionnaire was used in this study, with references to pain in general being substituted for references to a specific injury site (e.g., “Because of my back, I lie down to rest more often”), to be suitable for use with all pain locations. The reliability and validity of the modified measure has been established in a chronic-pain population with an internal reliability of 0.92 (Asghari & Nicholas, 2001). Cronbach’s alpha for the modified Roland-Morris Disability Questionnaire in the present study was 0.83. Asghari (2011) reported test–retest reliability of the modified Roland-Morris Disability Questionnaire to be 0.90.
Physical measures

The timed-walked was conducted over 5-minutes. The walk was conducted in an empty corridor with permanent marks placed 20 meters apart. The timed-walk has been shown to have good inter-rater reliability in a chronic-pain population; it has also demonstrated sensitivity to change in functioning during treatment (Harding et al., 1994). The test–retest reliability of the measure is 0.94 (Harding et al., 1994).

The sit-to-stand task was conducted in a chair without armrests. Patients were not permitted to use their arms to assist them (Harding et al., 1994). Patients were instructed to perform as many sit-to-stand actions as they could in 1 min and were given a reminder at 30 s. The sit-to-stand test has been shown to have good inter-rater reliability in a chronic-pain population and to be sensitive to change in function during treatment (Harding et al., 1994). The test–retest reliability of the measure is 0.84 (Harding et al., 1994).

Procedure

The group treatment program is described in Baranoff et al. (2013). In summary, the study was conducted in a public hospital outpatient pain-clinic. Treatment consisted of a manualized CBT based on Nicholas et al. (2007). The treatment team was multidisciplinary; sessions were conducted with a physiotherapist, psychologist, pain physician and nurse. The activity component of the program consisted of graded exposure invivo to activities that the patient avoided and graded activity as usual. The rationale for the exposure component of the program was based on the fearavoidance model (Vlaeyen & Linton, 2012). The psychological component of the course was based on traditional CBT; it consisted of cognitive restructuring, relaxation training, goal setting, and education regarding chronic pain. Questionnaires were completed at the end of the program. Follow-up questionnaires were mailed out to participants just prior to 6 months after completion of the program. Participants were invited to attend the clinic in person at 6month follow-up to return completed questionnaires and so that physical measures could be administered. Ethical clearance was obtained from both a hospital and university ethics review committee. Patients provided written consent.

Data analytic strategy

T-tests were performed to assess changes from pre-treatment to end of treatment and from end of treatment to 6-month follow-up. Effect sizes were then calculated using the formula described by Dunlap et al. (1996). This formula accounts for the correlation between pre and posttreatment scores.

Next, residualized change scores were calculated and linear regressions conducted to assess the relationship between changes in process measures and changes in outcome measures. Four process measures (changes in pain acceptance, kinesiophobia, coping cognitions, and catastrophizing
cognitions) were entered into regression models as a block; separate regressions were conducted using change in depression and then change in disability as the criterion. Regressions were conducted with the focal process variable, acceptance, measured using the CPAQ-8.

Reliable change index (Jacobson & Truax, 1991) scores were calculated for all process and outcome variables. An alpha of 0.05 (corresponding to the 95% confidence interval) was used to determine the criterion to assess the reliability of individual level change. This type of analysis is in accordance with suggestions made by Wise (2004) and Morley (2011).

The patient was considered to have experienced reliable change on a measure if their score changed by an amount greater than the calculated criterion. The Reliable Change Index was determined by first calculating a standard error of difference that was then used to calculate confidence intervals to assess measurement error. For each outcome measure, comparisons were made between an individual’s change score and the criterion score for reliable change, resulting in the identification of three groups based on the direction of therapeutic change (patients who showed deterioration, those who stayed the same, and those who showed improvement). Next, logistic regressions were conducted using demographic and end of treatment variables as predictors of reliable deterioration in disability, depression and of reliable deterioration in depression and/or disability. The dependent variables used in the logistic regressions were dichotomous variables. Finally, residualized change scores of process variables (from end of treatment to 6-months) were entered as predictors to evaluate the relationship between process variables and reliable change in disability, depression, and in depression and/or disability.

Results

Preliminary analyses

The data revealed no univariate or multivariate outliers, and no multicolinearity. Examination of residuals scatterplots showed that the data met assumptions for normality, linearity, and homoscedacity. At post-treatment, there were no statistically significant differences on key variables (age, gender, pain-intensity, duration of pain, time since last worked, depression, anxiety, disability, acceptance, and catastrophizing) between patients who completed the 6-month follow-up questionnaire and individuals who did not complete the 6-month follow-up questionnaire; For pre-treatment scores, all ts(195) \ 1.13, all ps \ .26, expect for sit-stand which showed a statistically significant difference at pre-treatment between the group that completed the 6-month questionnaire and those that did not, t(195) = 2.47, p \ .05. For post-treatment, all ts(185) \ 1.97, all ps \ .05. The 120 cases and 4 independent variables yielded a cases-to-IV ratio of 30:1, which is above the minimum requirement for regression.

End of treatment/6-month follow-up changes
Table 1 shows the means and standard deviations of measures at pre-treatment, end of treatment and 6-month follow-up for the 120 patients. Changes between end of treatment and 6-month follow-up were statistically significant for all variables except pain intensity and timed walk; all other $t$s(119) [ 1.98, all other ps $B .05$. Table 1 (right half) shows the effect sizes for all measures from pretreatment to end of treatment and from end of treatment to 6-month follow-up. From pre-treatment to end of treatment, the average effect size was 0.72 (range 0.58–0.97) for process variables and 0.46 (range 0.11–0.78) for outcome variables. From end of treatment to 6-month follow up, the average effect size was -0.31 (range -0.19 to -0.50) for process variables and -0.18 (range -0.1 to -0.37) for outcome variables.

Table 1 Means (SD) of process variables and outcome variables at pre-treatment, post-treatment and 6-month Follow-up

Table 2 Correlations between changes in process and outcome measures

Table 3 Multiple regressions predicting post-treatment change in outcome measures from change in coping beliefs, catastrophizing,

End of treatment to 6-month follow-up process analysis

Table 2 shows the Pearson product-moment coefficients for correlations between residualized changes in process variables (measured from end of treatment to 6-month follow-up) and residualized changes in outcome variables (measured from end of treatment to 6-month follow-up). From end of treatment to 6-month follow-up, 11 of the 20 correlations between changes in process measures and changes in outcome measures were significant. The correlations between the process measures were not sufficiently high ($r \ 0.53$) to raise concern about multicollinearity in subsequent regression analyses.

Table 3 shows the concurrent validity of change in acceptance, kinesiophobia, catastrophizing, and coping cognitions. The criterion variables were change in depression and disability. Analyses were not conducted with change in pain-intensity and timed walk because these outcomes did not show significant change from end of treatment to 6-month follow up. Change in sit-stand was not considered as a criterion measure in the process analysis because it did not correlate with any process measures. All process variables entered simultaneously predicted 38 % ($R^2 0.38, p \ .001$) of variance in change in depression and accounted for 32 % ($R^2 0.32, p \ .001$) of variance in change in disability. The process variables of catastrophizing ($b = 0.35$), kinesiophobia ($b = -0.26$), and acceptance ($b = -0.44$) were statistically significant unique predictors of change in depression; kinesiophobia ($b = 0.31$) and acceptance ($b = -0.22$) were statistically significant predictors of changes in disability.
Reliable change analyses

Table 4 contains the reliable change scores for all process measures and outcome measures. A 95% confidence interval (α = 0.05) was used to calculate the criterion values to assess reliable change in each measure as described by Jacobson and Truax (1991). To make comparisons between variables, deterioration was defined as change in the direction associated with decreased adjustment in chronic pain as classified in previous research and included decrease in acceptance, increase in catastrophizing, increase in kinesiophobia, decrease in coping cognitions, increase in depression, and increase in disability. The average proportion of patients who had experienced reliable deterioration was 24.1% across all measures (range 15–35.8%). Of the 120 participants, 33.3% (n = 40) had reliably deteriorated in either depression and disability. This indicates that for one person to see a reliable deterioration in depression or disability, 3 patients (i.e., 120/40) would need to go through the 6-month post-treatment period. A total of 5 patients (i.e., 120/24) would need to go through the 6-month post treatment period to see a reliable deterioration in depression for one patient. A total of 4.3 patients (i.e., 120/28) would need to go through the 6-month post treatment period to see a reliable deterioration in disability for one patient.

Logistic regressions predicting reliable deterioration in functioning

Given the importance of depression and disability as outcomes in chronic pain treatment, as documented in a recent Cochrane Review (Williams et al., 2012), reliable change categories of these measures were used as outcomes in logistic regression analysis. In addition to considering reliable change in these variables individually, a composite measure of reliable post-treatment deterioration was developed. A similar approach has been used to create dichotomous dependent variables to measure treatment response in studies evaluating effectiveness and processes of change (e.g., Vowles et al., 2011). In the present study, patients were considered to have experienced reliable post-treatment deterioration in clinically relevant outcomes when they experienced reliable deterioration in depression and/or disability.

First, logistic regressions were run with demographic variables (age, gender, duration of pain, highest level of education) and post-treatment scores as the predictor variables and reliable changes in disability, depression and depression and/or disability as the outcome measures. The model containing demographic and post-treatment scores was not statistically significant for any of the three dependent variables, indicating that the model was not able to distinguish between patients who did and did not experience a reliable deterioration in measures of disability (v2(11, N = 120) = 10.6, p = .48); depression (v2(11, N = 120) = 7.8, p = .73) and, disability and/or depression, (v2 (11, N = 120) = 7.7, p = .74).

Second, a logistic regression was performed to assess the impact of change in process variables on the likelihood that patients would experience reliable deterioration in depression. The model consisted of four independent variables (changes in coping cognitions, acceptance, catastrophizing cognitions, and kinesiophobia). The model containing all four change variables as predictors was statistically significant (v2 (4, N = 120) = 29.1, p = .001), which indicated that the model was able to
distinguish between patients who reliably deteriorated in disability over the 6-month post treatment period and those who did not. The Cox and Snell R square was .31 and the Nagelkerke R Square was .49. The model correctly classified 88.8 % of cases. As can be seen in Table 5 (top section), change in CPAQ-8, in addition to changes in catastrophizing and kinesiophobia, made a significant contribution to the model.

Third, a logistic regression was performed to assess the impact of change in process variables on the likelihood that patients would experience reliable deterioration in disability. The model again consisted of four independent variables (changes in coping cognitions, acceptance, catastrophizing cognitions, and kinesiophobia). The model containing all four change variables as predictors was statistically significant ($\chi^2 (4, N = 120) = 14.0, p = .001$), which indicated that the model was able to distinguish between patients who reliably deteriorated in disability over the 6-month post treatment period and those who did not. The Cox and Snell R square was .14 and the Nagelkerke R Square was .22. The model correctly classified 77.7 % of cases. As can be seen in Table 5 (middle section), only change in CPAQ-8 made a significant contribution to the model.

Finally, logistic regression was performed to assess the impact of change in process variables on the likelihood that patients would experience a reliable deterioration in a composite of depression and disability (i.e., change in either depression and/or disability). The model consisted of four independent variables (changes in coping cognitions, acceptance, catastrophizing cognitions, and kinesiophobia). The model containing all four change variables as predictors was statistically significant ($\chi^2 (4, N = 120) = 19.7, p = .001$), which indicated that the model was able to distinguish between patients who reliably deteriorated in depression and/or disability over the 6-month post treatment period and those who did not. The Cox and Snell R square was .19 and the Nagelkerke R Square was .26. The model correctly classified 75.8 % of cases. As can be seen in Table 5 (bottom section), only change in CPAQ-8 made a significant contribution to the model.

Discussion

The results of this study indicate that the Chronic Pain Acceptance Questionnaire-8 (CPAQ-8) is sensitive to post-treatment change in pain acceptance and has clinical utility to track post-treatment progress. Changes in pain acceptance, catastrophizing, and kinesiophobia all showed statistically significant associations with changes in depression, from end of treatment to 6-months follow-up. Further, pain acceptance and kinesiophobia were significantly associated with change in disability. Change in pain acceptance was the only significant predictor of reliable change (as measured by the Reliable Change Index; Jacobson & Truax, 1991) in depression and/or disability, among a number of empirically supported process variables.

This study demonstrated that the CPAQ-8 may be used to effectively track patient progress after treatment completion with low response burden. Furthermore, the findings support the notion that maintaining levels of pain acceptance (namely behaviours associated with activity engagement and pain willingness) may lessen deterioration in depression and disability in follow up. Consequently,
treatment approaches that produce enduring patterns of activity engagement and pain willingness may produce good long-term outcomes.

The focus of this study was to assess the use of the CPAQ-8 as an indicator of deterioration in depression and disability following multidisciplinary pain treatment. Nevertheless, the study highlighted that, in addition to changes in acceptance of pain, changes in catastrophizing and kinesiophobia were also associated with changes in depression, and change in kinesiophobia was associated with change in disability. These findings support previous research that has linked catastrophizing with depression (Esteve et al., 2007; Flor et al., 1993), and kinesiophobia with disability (Vlaeyen & Linton, 2012). Further, catastrophizing and kinesiophobia have been shown to be associated with future sick-leave and dysfunction in a longitudinal sample (Westman et al., 2011). Pain acceptance appears to play an equally important and unique role as a process variable in the 6 months following treatment. The CPAQ-8 adds incremental validity to the assessment of processes of change in the post-treatment period, even when catastrophizing, kinesiophobia and coping cognitions are assessed.

This study has both theoretical and assessment implications. Pain acceptance was not targeted in the traditional CBT program. Nevertheless, as reported in Baranoff et al. (2013), pain acceptance did increase in response to traditional CBT treatment and was uniquely associated with changes in outcomes, even after accounting for change in catastrophizing. We considered the exposure based treatment and goal setting of the traditional CBT program to include pain acceptance as an implicit component. The key role that pain acceptance plays in both acceptance-based treatment and traditional CBT has now been demonstrated in a number of comparison studies (e.g., Vowles et al., 2009; Wetherell et al., 2011) and uncontrolled studies (e.g., Baranoff et al., 2013; Vowles et al., 2007). Therefore, monitoring acceptance during traditional CBT programs and acceptance-based programs has utility. The present study extends the literature by examining whether the recently developed CPAQ-8 has utility in the post-treatment period relative to a broad range of process variables that have been supported. This study provided support for the CPAQ-8’s sensitivity to change and unique relationship with outcome variables in the 6-months post treatment, even when process measures from traditional CBT were assessed. The CPAQ-8 holds promise as a brief measure to detect decline in functioning following treatment. From a theoretical perspective, this study highlights that pain acceptance plays a key role as a process variable in the 6 months following the completion of a traditional CBT pain program.

This study has some limitations. First, the outcome variables were determined by standardised self-report questionnaires. Although widely used in pain research, they remain proxy measures of functioning. Second, process measures and outcomes were assessed concurrently; therefore, statements of causation are not possible. Third, although follow-up retention was high and only one difference was identified on process or outcomes measures between those that completed the 6-month follow-up and those that did not, it is possible that retained patients represented a better functioning group.

In future research, the direction of the relationship between process and outcome could be examined by employing designs that incorporate random allocation of patients to treatment and a comparison or control group. The design would be further improved by collecting data over more than two data points and by using methods such as cross-lagged panel correlation (Kenny, 1975).
Crosslagged panel correlation analysis has been used to compare early treatment changes to late treatment changes over the intervention period for chronic pain treatment (see Burns et al., 2003a & b). In this study, we were primarily interested in the changes that occur after the completion of the program. In order to carry out a causal analysis of process variables in the post-treatment period, identification of the appropriate time-frame to detect post-treatment deterioration in process variables and then in outcome variables is required. Future research could also investigate whether the CPAQ-8 is suitable to use in intensive data sampling to determine the individual trajectories of patients who deteriorate after the completion of treatment (see Tang & DeRubeis, 1999). This approach has been used in the psychotherapy literature but has not been extensively applied to chronic pain treatment. Repeated sampling may include completion of the CPAQ-8 on a weekly or session by session basis. The CPAQ-8’s sensitivity to detect such changes requires further investigation. Clinically, a patient’s departure from the expected progress trajectory could be used as a signal to commence further intervention. Treatment booster sessions that focus on relevant processes could be initiated for individuals who show deterioration in pain acceptance. The use of single case designs may also highlight the patterns of deterioration and response to booster sessions more clearly (Moran and Tai, 2001). It remains unclear whether changes post-treatment differ according to whether the treatment is acceptance-based or traditional CBT. Group level comparison is unlikely to clarify this issue fully because there may be moderating factors that affect the durability of response to particular treatments. Further analysis of individual deterioration of function following both acceptance-based and traditional CBT is required. This study demonstrated that using a 95% confidence interval for RCIs provided sufficient sensitivity to detect change at the individual level in the 6 months post-treatment.

In summary, change in acceptance of pain was a strong predictor of change in depression and disability following pain treatment, even after accounting for changes in painrelevant cognitions. Pain acceptance provides clinically relevant information in the post treatment period, either as a measure used alone or as part of a broader assessment approach.

Acknowledgments Jason Connor is supported by an Australian National Health and Medical Research Council (NH&MRC) Career Development Fellowship (APP1031909).

References


Nicholas, M. K., Asghari, A., Corbett, M., Smeets, R. J., Wood, B.


